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ENTOMOLOGICAL NEWS

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The Early Genera of Ithomiinae. (Lepidoptera: Nymphalidae).

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

The Ithomiinae are a group whose natural arrangement has been disguised by much mimicry (Müllerian, of course) within the group. The present note is based on a survey of quite a number of characters, ignoring pattern features, in an attempt to judge what is the really most probable ancestral type, and the line of development of the higher genera.

In general we may take Schatz's arrangement in Staudinger's "Exotische Tagfalter," vol. 3, as representing the chief structural subdivisions and, with one or two exceptions, the genera. As to the primitive genera (his Gruppe I) there has been general acceptance of the more recent subdivision of *Tithorea*, and I shall for this note use the names that Seitz's "Macrolepidoptera of the World" has made familiar. The only other genus that needs subdivision is *Athesis,* whose *dercyllidas* group shows much divergence in pattern and some in structure from *A. clearista*. A striking likeness to *Hirsutis* in sex-tufting, wing-form and some details of pattern is not wholly supported by other structures; I shall leave its fuller discussion to Mr. Fox, but note here that it must lie between *Hirsutis* and *Athesis*—about as far off the main line of evolution as *Tithorea* is in another direction.

Pending Mr. Fox's revision of the genera[1] I shall use the system of names established by Schatz and slightly extended by Haensch in the "Macrolepidoptera of the World".

Schatz's "Gruppe I" is defined in the male by having a clearly separate tibia and tarsus of the male fore leg, which is normally almost as long as the femur. Two exceptions make a little trouble—in *Thyridia* (*Methona*) the tibia and tarsus, while distinct, are much shorter than the femur, and in *Melinaea egina* (with its form *paraiya*) the tibio-tarsus is reduced to the

[1] Since published in Trans. Amer. Ent. Soc. 66: 161-207, 1940.

same little knob so typical of "Gruppe II". *M. comma* has reached about the stage of reduction of *Thyridia,* but varies individually. On the other side of the boundary *Aprotopus* has the tibio-tarsus less reduced than the residue of group II. Personally I believe it is a separate reduction from something not unlike *Thyridia,* and merely parallel to the *Mechanitis* and *Ithomia* types.

Group I is then taken to include *Hirsutis, Tithorea, Athesis, Olyras, Eutresis, Athyrtis, Melinaea* and *Thyridia,* with *Aprotopus* as a doubtful appendage.

To determine the ancestral form we may take *Tellervo* as a norm. Whether actually Ithomiid, or a distinct subfamily as now listed (see Ent. Am. xix, 102) it is certainly nearer to the ancestral stem than any other living type. It shares with other early Nymphalidae the following features which vary significantly within the remaining genera of "Group I": M-spur attached to middle discocellular[2] in both wings; lower discocellular forming an acute angle with m-cu, the cubitus being of the "trifid" type; Sc and R of hind wing widely separated at origin, as in normal Nymphalidae; hum. forming a wide and fairly symmetrical Y-fork, cell of hind wing much shorter than free part of R. We may also note that Sc is long and similar in both sexes, unlike the Melinaea and Mechanitis groups, and that the scaling, while somewhat thin, is not degenerate.

Comparing our list of genera to this set of characters it turns out that *Hirsutis* comes definitely nearest, differing in the simpler hum. and movement of the M-spur to ldcv, but even the latter has only reached M_2 in some specimens. This is also one of the genera that sometimes has R_2 free, as in *Tellervo,* though never so far back on the cell. Our female of *H. togarma* shows this. The rest of the genera fall into a single line, as listed above, ending in *Aprotopus,* each genus being like those immediately before and after in more features

[2] This is the upper M-spur, i. e., M_{1+2}; the lower one, M_3, while equally clear in *Tellervo,* is weak or reduced to a fold in the proper Ithomiinae—it always arises from ldcv.

than to any others. The only possible other candidates for position next to *Tellervo* are *Tithorea,* on account of its more perfectly separate Sc and R, and *Athesis acrisione,* which still has the M-spur on the mdcv of a perfectly "trifid" wing. The remaining genera with high M-spur are quadrifids, and the spur has no doubt moved up secondarily to the migration of M_2 itself.

The successive steps of development may be noted as follows, though the actual arrangement was made on the basis of some 20 characters, both superficial and genitalic.

At *Athesis* Sc and R of female hind wing become distinctly approximate at base; with *Olyras* the angle between udcv and m-cu of hind wing becomes obtuse, though the venation is not truly quadrifid till we come to *Athyrtis;* the free part of R in the male also becomes much shorter than the cell at *Olyras.*

With *Thyridia* the distal fork of hum. becomes very long and the uncus becomes much reduced; Sc and R are closely parallel for a greater distance than in the preceding genera, and the general transparent ground is unlike any of the preceding, though approached by the extensive transparent spotting of *"Athesis" hewitsoni.* In each of these points *Aprotopus* resembles *Thyridia,* and the closely parallel Sc and R is the only one really typical of group II. Only the relatively long R suggests an origin from an earlier genus, perhaps *Athesis.*

Other features tend strongly to tie neighboring genera, but are not too consistent: thus the narrow V-shaped juxta is present in *Hirsutis, Athesis* (including *dercyllidas*) and *Tithorea,* and not in *Olyras, Eutresis, Thyridia* or *Aprotopus,* but it does reappear in *Melinaea.* A specialized costal process of the valve is limited to *Athyrtis* and *Melinaea,* which on all points make a subgroup together, but *Thyridia* has a different specialization of the costa—a rough thickening that reaches from the joint clear to the apex of the valve. The thin penis links together *Athesis* and *Olyras,* but reappears in *Aprotopus.*

As to the origin of Group II, I have already noted the marked likeness, deep as well as superficial, between *Aprotopus* and *Thyridia.* Tabulation of the same list of characters in a couple of other genera, shows a marked linkage between *Mechanitis* and *Melinaea* (and of course *Scada,* with *Heteroscada,* and *Sais* must follow *Mechanitis*), but the later genera with their decidedly "trifid" venation seem to my eye to link more closely with *Athesis.* So my present opinion is that group II is triphyletic: *a, Aprotopus,* to be treated like *Melinaea egina* as a sporadic reduction of group I; *b, Mechanitis, Scada* and *Sais; c,* the residue. *Velamysta* shows the short spur of Sc arising from far out on the cell in the female, like *Mechanitis,* but I should put more weight on the character of udcv, which is quite normal for the *Ithomia-Heterosais* series.

On Two Species of Diploplectron from Texas (Hymenoptera: Sphecidae).

By V. S. L. Pate, Cornell University.

In 1902, James A. G. Rehn and the late Henry Lorenz Viereck made their first collecting trip to the southwestern United States. Much of the material taken on that expedition has long since been reported upon, yet there still remains, in the collections of the Academy of Natural Sciences of Philadelphia, a considerable residue, at least of the smaller Hymenoptera, to be studied. Recently while sorting this material, the following interesting new forms were discovered and are herewith described.

Diploplectron vierecki[1] new species.

The black head and thorax and bright ferruginous abdomen immediately distinguish the present and the following new form from all other Nearctic *Diploplectra.* The closest ally of *vierecki* is apparently *D. bidentatus* Ashmead, but in addition to the different general livery, the present species may be separated from that form by the unclouded fore wing, the immaculate clypeus and front, and the much smaller clypeal teeth.

Type. ♂; Foothills of the Franklin Mountains north of El Paso, El Paso County, Texas. Elevation, 3713-4000 feet.

[1] After its collector, the late Henry Lorenz Viereck.

April 5, 1902. (H. L. Viereck.) [Academy of Natural Sciences of Philadelphia, Type no. 10571.]

♂. 4.5 mm. long. Black; mandibles, save for red apices, deep yellow; antennae dark fuscous; legs distad of femora deep fulvous; tegulae and axillary sclerites fuliginous; abdomen bright ferruginous. Wings clear hyaline, iridescent, hind wings with an ovate fuscous cloud subapically; veins and stigma deep fulvous.

Head fulgid; front, vertex, post-temporal region and clypeus with a sparse clothing of short, suberect, dark aenous setulae. Front inconspicuously tumid; with a microscopically fine shallow, clathrate foveolation superposed upon which are a few small, irregularly disposed, shallow alveoli; bisected discally by a short furrow. Vertex sculptured like front but more finely so; postocellar distance one and one-half times the length of ocellocular line; temples subnitidous and subglabrous. Antennae reaching to a little beyond tegulae; the antennocular line two and one-half times the interantennal distance; scape short, stout, about one-third (.36) the vertical length of eye; pedicel subcylindrical, five-eighths the length of first flagellar article; flagellum simple, finely puberulent, first two segments subequal in length. Clypeus narrow, transverse, median length two-sevenths the vertical length of eye, flat laterally but rather strongly obtrapezoidally tumid and subnitidous discally, ending medio-apically in an obtusely pointed lobe bearing two very small median teeth distally.

Thorax more or less fulgid; with a moderate clothing of suberect, rather long whitish pubescence dorsally, pleura and sterna more scantily clothed with long, suberect, dark aeneous setulae. Pronotum rounded anteriorly and laterally; with scattered fine punctures, and traversed by a few horizontal, inconspicuous rugulae; tubercles almost attaining tegulae. Mesonotum with small, moderately close punctures; scutellum flat, nitidous and glabrous discally; postscutellum subnitidous medially. Mesopleura without epicnemium anteriorly; episternal suture and episternaulus distinct and well impressed; prepectus and below episternauli with inconspicuous horizontal striae and a few scattered fine punctures, above episternauli and behind episternal suture glabrous and nitidous. Metapleura glabrous, subnitidous, with very inconspicuous horizontal striae. Propodeum with dorsal face glabrous, opaque, granulate tending to become finely transversely rugulate, the anterior margin with fine irregular reticulations, somewhat depressed medio-posteriorly; posterior face subfulgid, with erect, rather long whitish pubescence, discally with an indistinct cuneiform impression, laterad of which surface is finely and irregularly punctate and rugulate; lateral faces fulgid, with rather long, erect whitish pubescence and a few parallel subhorizontal striae.

Legs with middle and hind tibiae bearing a few weak spines.

Fore wing with third submarginal cell twice as long on cubitus as on radial vein.

Abdomen fulgid; with microscopically fine, transverse clathrate aciculation. Tergites and sternites with a transverse subapical row of short decumbent fine setulae; pygidium small, elongate trapeziform, glabrous, perfulgid, with a few small, coarse, well separated punctures; ultimate sternite elongate, linguiform.

♀. Unknown. *Paratypes.* 2 ♂; Topotypical; April 4, 1901, April 5, 1902; [A. N. S. P.]

The paratypes agree with the type in all essential details of livery and structure, except that in the specimen taken April 5th ,1902, the second and third transverse cubital veins of the fore wing have anastomosed anteriorly just before their reception on the radial vein.

Diploplectron kantsi[2] new species.

Although resembling *viereckí* so closely as to be easily confused with it, *kantsi* differs from that form in a number of details, notably in the shape of the clypeus, the penult abdominal sternite, the venation of the fore wing, its opaque granular head and thorax, the different postocellar-ocellocular ratio, and the longer, differently proportioned antennal segments.

Type. ♂; Foothills of the Franklin Mountains north of El Paso, El Paso County, Texas. Elevation, 3713-4000 feet. April 6, 1902. (Henry L. Viereck.) [Academy of Natural Sciences of Philadelphia, Type no. 10572.]

♂. 5 mm. long. Black; mandibles dark miniatous; antennae dark fuscous; legs distad of femora deep fulvous; tegulae and axillary sclerites fuliginous; abdomen ferruginous. Wings hyaline, uniformly tinged throughout with light fulvous; hind wings with a small diffuse light fuscous cloud subapically; veins and stigma fuliginous.

Head opaque; sparsely clothed with decumbent whitish pubescence. Front finely granulate, bisected discally by a short

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[2] Named after the Lipan Indians, who were given the name Kantsi by the Caddo.

furrow. Vertex subgranular; postocellar distance about one-half the length of ocellocular line; temples subfulgid, with microscopically fine, shallow, clathrate faveolation. Antennae long, reaching at least to middle of scutellum; antennocular line two and one-half times the interantennal distance; scape short, stout, one-fourth the vertical length of eye; pedicel subcylindrical, one-third the length of the elongate first flagellar article; flagellum somewhat compressed, first two segments elongate, the second five-sixths the length of first article. Clypeus subopaque, narrow, transverse, median length one-fourth the vertical length of eye, flat laterally to obtrigonally tumid discally, ending medio-apically in an obtusely pointed lobe bearing two minute median teeth distally.

Thorax granular, more or less opaque; thinly clothed with suberect, rather long whitish pubescence. Pronotum rounded anteriorly and laterally; the tubercles almost attaining the tegulae. Mesopleura granulate throughout, with episternal suture and episternauli distinct and well developed. Metapleura glabrous, finely granulose. Propodeum opaque, granulose throughout; dorsal face glabrous; posterior and lateral faces scantily clothed with short suberect light pubescence; posterior face with a median cuneiform impression dorsad.

Legs with middle and hind tibiae bearing a few weak spines.

Fore wings with first transverse cubital vein bearing a spur directed toward the base of stigma; second submarginal cell subtrigonal, the second and third transverse cubital veins coming together to a point on radius; third submarginal cell twice as long on radius as on cubitus.

Abdomen more or less fulgid; with microscopically fine, transverse clathrate aciculation. Tergites and sternites with a transverse subapical row of short decumbent fine setulae; pygidium small, elongate, narrow trapeziform, developed only on posterior half of ultimate tergite, and glabrous, perfulgid, with a few punctures; ultimate sternite elongate linguiform apically, penult sternite trigonal, narrowly truncate and notched medio-apically, the posterior half somewhat compressed.

♀. Unknown. This species is known at present from only the unique male described above.

Notes on Costa Rican Mycetophilidae (Diptera).

By Elizabeth G. Fisher, Academy of Natural Sciences of Philadelphia.

Dr. Alan Stone has kindly called my attention to the fact that *Leia analis* Fisher (Trans. Am. Ent. Soc. *65*: 232-233. 1939) is a homonym of *Leia analis* Meigen (Syst. Beschr. *1*: 257. 1818). The latter is now considered to belong to the genus *Boletina*. I therefore propose the name *Leia costaricensis* new name for *Leia analis* Fisher.

The four males identified by me as *Platyura* (*Proceroplatus*) *pictipennis* Williston are a distinct species. Dr. F. W. Edwards has sent me a rough sketch of the dry male terminalium of Williston's type in the British Museum. It differs from that figured by me. (Fisher 1. c. pl. 13, fig. 6). I therefore describe the Costa Rican species below:

Platyura (Proceroplatus) vittata new species

1939. *Platyura* (*Proceroplatus*) *pictipennis* Williston, Fisher Trans. Am. Ent. Soc. *65*: 228, pl. 13, fig. 6.

This species is close to *Platyura pictipennis* Williston differing in terminalial structure as well as in color. These color differences are described in the author's paper referred to above.

♂. Total length 2.8 to 3 mm. Face yellow; vertex dark brown, deep black around the ocelli. Palpi dark brown. Mesonotum brown with a wide median yellow stripe, the humeral angles and the lateral margins whitish. Pleura whitish yellow except the pleurotergites which are deep brown. Scutellum yellow. Apex of the postnotum deep brown. Mesonotum uniformly setose. Anepisternites and pleurotergites with setae. Halteres yellow, knob brown. Legs yellow. Fore tibia longer than fore basitarsus (1. 5: 1.). Abdomen brown to blackish-brown, except the first segment which is entirely yellow; the second to fifth tergites with yellow posterior margins, the sixth and seventh tergites deep brown .

Type: ♂ ; San José, Costa Rica (H. Schmidt). June 27, 1930. [Acad. Nat. Sci. Phila. no. 6626].

Paratypes: 3 ♂ ; San José, Costa Rica (H. Schmidt). April (defective) May 7, June 23, 1930.

Some of the Eumolpinae and Chrysomelinae of South Dakota (Coleoptera).

By PAUL H. JOHNSON, Mexico, Missouri.

The specimens seen were those in the collection of the Entomology-Zoology Department of the South Dakota State College at Brookings.

This collection is composed of the Truman collection, and of collections made by various members of the Entomology Department of State College. The Truman collection was bought by State College after his death, which occurred in the early 1900's. Very few of the specimens in the Truman collection have date labels, and the locality labels at times seem to be incorrect. The collections of the Entomology Department have been state-wide in extent and have been carried on for a number of years.

The specimens in the Truman collection have no collector labels, so any specimen in that group is marked by a "T" in the list. Other collectors were John Hetland, G. I. Gilbertson and H. C. Severin. All specimens collected by these men are marked in the list by the initials of their surnames.

There were twenty-four species, representing eleven genera, of th tribe Chrysomelinae in the collection. Of the eleven genera two (*Phaedon* and *Prasocuris*) may not occur in the State. *Phaedon* was found only in the Truman collection, and the species represented is not likely to inhabit South Dakota. *Prasocuris* was found only in the Truman collection.

There were twenty species of Eumolpinae representing thirteen genera found in the collection. This is not including *Fidia viticida* Walsh, which occurs in the State, but was not represented in the collection. The only doubtful genus in the Eumolpinae is *Colaspidea*. There were four of these in the Truman collection; three were from Los Angeles, California, and the other was labeled Volga, South Dakota.

EUMOLPINAE.

ADOXUS OBSCURUS (Linn.), 1 specimen, Englewood (June) G.

A. OBSCURUS VITIS (Fab.), 8 specimens, Englewood (June) G.

MYOCHROUS MOVALLUS Johnson, 5 specimens, Elk Point (June) G.

M. SQUAMOSUS Lec., 16 specimens, Whitewood (June) G., Martin (June) G., Canton (June) G., Buffalo (June) G., Philip (June) G., Orman Dam (July) G., Houghton (June) G., Belle Fourche (June) G.

GLYPTOSCELIS ALBIDA Lec., 1 specimen, Newell (July) G.

(G. CRYPTICA (Say), not in collection, but probably in state.)

COLASPIDEA VARICOLOR Crotch, 1 specimen, Volga T. (Leng lists this species from Southern California.)

PARIA CANELLA ATERRIMA (Oliv.), 14 specimens, Philip (June) G., Volga T., Chester (June) G., Belle Fourche (June) G., Colton (June) G., Oelrichs (June) G.

P. CANELLA GILVIPES Horn, 1 specimen, Lake Oakwood (July) S.

P. CANELLA THORACICA (Melsh.), 2 specimens, Oelrichs (June) G., Browns Valley (June) G.

P, CANELLA QUADRINOTATA (Say), 15 specimens, Colton (June) G., Brookings (May) S., Springfield (June) G., Yankton (June) G., Chester (June) G.

P. CANELLA VITTATA Horn, 4 specimens, Volga T., Colton (June) G.

P. CANELLA QUADRIGUTTATA Lec., 5 specimens, Volga T., Springfield (June, August) G.

P. CANELLA SEXNOTATA (Say), 1 specimen, Volga T.

P. CANELLA PUMILA Lec., 1 specimen, Volga T.

CHRYSOCHUS AURATUS (Fab.), 15 specimens, Volga T., Nowlin T., Brookings (June, July) S., Vermillion (July) S., Lennox (August) S., Martin (June) G., Watertown T., White (July) S., Aberdeen (July) S.

C. COBALTINUS Lec., 8 specimens, Volga T., Aurora county T., Brookings, (June, September) S.

XANTHONIA DECEMNOTATA (Say), 9 specimens, Big Stone

(August) S., Whitewood (July) G., Springfield (June) G., Lake Hendricks (August) S.

(X. VILLOSULA (Melsh.), not in collection, but probably in state.)

(FIDIA VITICIDA Walsh, not in collection, but known to be at Yankton and Elk Point.) Severin.

GRAPHOPS PUBESCENS (Melsh.), 2 specimens, Parmelee (June) G., Martin, in sand hills, (August) G.

G. CURTIPENNIS (Melsh.), 2 specimens, Custer (September) G., Kadoka, in Bad Lands, (August) G.

METACHROMA DUBIOSUM (Say), 3 specimens, White (July) G., Little Bend (August) G., Martin, in sand hills, (June) G.

M. INTERRUPTUM (Say), 2 specimens, Elk Point (June) G.

M. PARALLELUM Horn, 2 specimens, Elk Point (June) G.

COLASPIS FAVOSA Say, 28 specimens, South Dakota T., Brookings T. (July) S., Clark (July) S., Volga T., De Smet (July) G., Springfield (June) G., McNelly (June) G.

RHABDOPTERUS PICIPES (Oliv.), 14 specimens, Newell (July) G. S., Springfield (June) G., Vermillion (June) S., Browns Valley (June) G.

NODONOTA TRISTIS (Oliv.), 38 specimens, Volga T., Whitewood (July) G., Lakeview (June) G., Parmelee (June) G., Hot Springs (June) G., Springfield (June) G., Rapid City (June) G., Elk Point (June) G., Martin, in sand hills, (June) G., Pine Ridge (June) G.

N. CONVEXA (Say), 1 specimen, Elk Point (June) G.

N. PUNCTICOLLIS (Say), 181 specimens, Volga T., Brookings T., South Dakota T., Volin (June) G., Whitewood (June, July) G., Springfield (June) G., Newell (July) G., Tabor (June) G., Chester (June) G., White, in Warrens Wood, (August) G., Rosebud (June) G., Lake Hendricks (July) G.

CHRYSODINA GLOBOSA (Oliv.), 26 specimens, Capa (June) S., Armour (June) S., Mitchell (June) S., Parmelee (June) G., Springfield (June) G., Lakeview (June) G., Martin, in sand hills, (June) G., Vivian (June) G., Interior (June) G., Hot Springs (June) G., Fox Ridge (June) G., Pine Ridge

(June) G., Rapid City (June) G., Buffalo (June) G.

CHRYSOMELINAE.

PRASOCURIS PHELLANDRII (L.), 2 specimens, Volga T.

(P. VITATTA (Oliv.), not in collection, but may be in State.)

LABIDOMERA CLIVICOLLIS (Kby.), 21 specimens, Volga T., Elk Point (June) G., Brookings T. (June, August) G. S., Big Stone City T., Springfield (June) G., Canton (August) G., Aurora county T., Capa (August) S.

LEPTINOTARSA DECEMLINEATA (Say), 19 specimens, Brookings (June, July) S. T., Yankton (June) G., Capa (August) S., Volga T.

ZYGOGRAMMA EXCLAMATIONIS (Fab.), 39 specimens, Volga T., Yankton (August) S., Claremont (August) S., Aberdeen (July) S., White Lake (August) G., Lake Oakwood (June) G., Pierre T., Grass Rope (August) G., Philip (June) G., Newell (July) G., Wewela (August) G., Vivian (June) S., Nowlin T., Custer T., Provo (June) G., Rapid City (June) T. G., White River (June) S., Fairfax (August) S.

Z. CONJUNCTA Rogers, 28 specimens, Newell (June, July) G.

Z. SUTORALIS CASTA Rogers, 37 specimens, Volga T., Brookings (August) S. T., Lake Oakwood (June, August) S. G., Vermillion (July) S., White (July) S., Lake Preston (May) S., Colton (August) S., Lennox (August) S., Mitchell (June) S., Lake Hendricks (July) G., Ipswich (July) S., Whitewood (July) G., Rapid City (June) G., Wewela (August) G., Grass Rope (August) G., Yankton (August) G.

CALLIGRAPHA LUNATA (Fab.), 28 specimens, Lake Preston (May) S., White (July) S., Sisseton (July) S., Claremont (August) S., Interior (August) S., Kadoka, in Bad Lands, (August) S., Camp (Fort) Crook (July) S., Wasta (September) S., Capa (August) S.

C. SIMILIS Rogers, 6 specimens, Volga T., Mitchell (August) S., Lake Campbell (August) S., Waubay (September) G., Newell (July) G., Fairfax (August) S.

C. INCISA Rogers, 11 specimens, Brookings T., White (July) S.

C. PRAECELSIS Rogers, 11 specimens, Volga T., Brookings (May, June, August) S., G. T., Springfield (August) G., Canton (June) G.

C. ELEGANS (Oliv.), 29 specimens, Volga T., Brookings (May) S., Yankton (August) S., Lake Oakwood (June) G., Waubay (September) G., Lake Campbell (August) S., Madison (June) S., Newell (July) G., Camp (Fort) Crook (July) S., Englewood (June) G., Martin, in sand hills, (August) G.

C. SCALARIS Lec., 4 specimens, Brookings (July) S., Springfield (June) G., Yankton (August) G., Mitchell (June) S.

C. MULTIPUNCTATA (Say), 71 specimens, Volga T., Elk Point (June) G., Brookings (June, July, August) S. G., Aberdeen (July) S., White (July) S., Lake Preston (August) S., Sisseton (July) S., Newell (July, August) G. H. S.

CHRYSOMELA FLAVOMARGINATA Say, 25 specimens, Volga T., Newell (July) G., Rapid City (June) G., Martin (June) G., Buffalo (June) G., Pine Ridge (June) G., Cave Hills (July) S.

C. AURIPENNIS Say, 1 specimen, Meckling (June) G.

PHAEDON OVIFORMIS (Lec.), 4 specimens, Volga T.

P. VIRIDIS (Melsh.), none in collection from the State, but it may be present.

GASTROIDEA POLYGONI (L.), 96 specimens, Volga T., Brookings (June) T., Lead (July) G.

G. CYANEA (Melsh.), 26 specimens, Volga T., Springfield (June) G. S., Canton (June) G., Yankton (April) S., Newell (June, July) G.

G. VIRIDULA (De Geer), 23 specimens, Pierre (May) S., Rapid City (June) G.

LINA INTERRUPTA Fab., 198 specimens, Volga T. S., Elk Point (June, August) G., Brookings (June, July) S. G., Springfield (June) G., Canton (April, August) S. G., Yankton (April) S., Colton (August) S., Pierre T., Sioux Falls (August) S., Wentworth (August) S., Capa (May) S., Newell (July) G. S., Nisland (July) S.

L. INTERRUPTA QUADRIGUTTATA Sch., 26 specimens, Volga T., Salem (May) S.

L. TREMULAE (Fab.), 42 specimens, Newell (July) G., Custer T., Rapid City (June) G., Whitewood (June, July) G., Englewood (June, July) G., Lead (July) G., Deadwood (July) G.

L. SCRIPTA (Fab.), 71 specimens, Volga T., Brookings (July, August) S. T., Colton (July) S., Pierre T., Wentworth (August) S., Sioux Falls (August) S., Capa (June) S., Newell (July) G.

PHYTODECTA AMERICANA Sch., 8 specimens, Englewood (June) G., Deadwood (July) G. S., Determination confirmed by H. S. Barber.

PHYLLODECTA AMERICANA Sch., 4 specimens, Englewood (June) G., Sylvan Lake (September) G. Determination confirmed by H. S. Barber.

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SCHAEFFER, CHAS.—New Genera and Species of Coleoptera. Jour. N. Y. Ent. Soc. XII, pp. 197-236.

ID.—Notes on the Species of Lina and Allied Genera. The Canadian Ent. Vol. LX, 1928, pp. 42-47.

ID.—On a Few New and Old Chrysomelidae. Jour. N. Y. Ent. Soc., Vol. XXXII, 1924, pp. 138-145.

Damage to Entomological Collections in the British Museum of Natural History.

Science for December 6 and 13, 1940, states that the Museum has been hit by high explosive and incendiary bombs and that the department of entomology was damaged, especially by water seepage.

Notes on Florida Odonata.

By M. J. Westfall, Jr., Baker Museum, Rollins College, Winter Park, Florida.

While connected with the Baker Museum during the past three years I have done considerable field work and collecting in Florida. Being especially interested in Odonata, I have concentrated on these insects with the result that some species have been taken which have proved to be quite unusual and it seems that comments on them would be in order at this time. Various notes of interest are included in the following records.

Progomphus alachuensis. This species was collected very commonly during the Spring of 1939, on the sandy shores of lakes in central Florida. Of the considerable number of specimens taken, only two were females, one collected while emerging, and the other, a mature specimen caught in my hands in the woods about one-half mile from a lake.

Coryphaeschna virens. One female was collected on Lower Matecumbe Key, March 20, 1938, as it flew back and forth over a roadside ditch. In the hand it was quite distinct from *C. ingens,* in the greater extent of the green coloration of the thorax, as well as other slight differences. Dr. P. P. Calvert confirmed this identification.

Tetragoneuria sepia. Though some persons have doubted the validity of this species, we believe it to be quite distinctive. My first specimens, a male and female, were collected from the street in front of my home in Orlando, at least one-half mile from a lake, on March 28, 1938. Immediately we noticed differences between these and the other Tetragoneurias previously taken. We supposed them to be *sepia* and sent the male to Dr. P. P. Calvert who confirmed the identification. Now I seem to be able to identify this species before capture, especially by the slightly smaller size. Certainly when in the hand, the prominent yellowish spots of the thorax and the relatively longer inferior appendages distinguish *T. sepia* from the other members of that genus found here.

I found a dead male on a lily pad in a Winter Park lake on May 9, 1939. Mr. E. M. Davis collected a male on the west end of the Tamiami Trail in the early part of March, 1939. In the afternoon of June 7, 1939, my father and I were collecting various small Odonata for about an hour in Nassau County at what is known as Boggy Creek. We had almost decided to leave when an unusual dragonfly appeared. I succeeded in catching it and found it to be *T. sepia*. Soon another appeared and then another, until we were swinging right and left at them. They would fly toward the collector until just out of reach of the net and stop in mid-air, often for several seconds, and then dart at great speed perhaps within a foot of the collector who would usually miss. Then the same thing would be repeated. In all the other specimens of *T. sepia* I have taken, this characteristic of hovering so long in the air has not been noticed, but the flight has been much more nervous. With a sling shot or gun that day we might have collected many more, but when we began to learn the trick of catching them with a net it became dark and we found only sixteen specimens had been taken, only one of which was a female. The following morning we returned and stayed until 9 A. M., but no more of these dragonflies appeared. Several of these specimens were presented to the Cornell collection and Dr. Needham agreed on the identification.

This year I took one male and one female at my home again on April 8 and April 21, 1940, respectively. Two females were collected April 8, 1940, at Lake Redbug in Orange County. All the specimens I have taken were collected just before dusk and were not seen at other times, but whether this denotes a tendency toward a dusk-flying habit of this species or not, I would hesitate to say.

CELITHEMIS BERTHA and FASCIATA. The first species with its characteristic red venation of the wings was found commonly on many lakes of central Florida in the Spring of 1939. Also *C. fasciata* was unusually common during the same time, being collected at almost every lake and pond visited. The spotting of the wings was found to be quite variable. In a series of specimens taken in Florida, Georgia, and North Carolina, some were found with no indication of the yellowish color in the pale areas of the wings which is so characteristic of *C.*

fasciata. The dark area just proximal and posterior to the nodus in the front wing in all cases extended posteriorly to Cu_1, and in most cases extended well beyond that vein.

LIBELLULA AURIPENNIS and JESSEANA. It has been a great pleasure, with the help of Mrs. Leonora K. Gloyd, to straighten out some of the kinks in the identification of these two species in Florida. We had formerly believed *L. auripennis* to be very abundant here and *L. jesseana* to be quite rare because of the few purplish bodied specimens of the latter species collected. We now find that *L. jesseana* is our abundant species and *L. auripennis* has certainly not been common in our collecting experience. Because of the very red hue of the stigma and wing veins of *jesseana,* as well as the difference in thoracic markings pointed out by Mrs. Gloyd, field identification is made quite easy. Farther south in the state, on Merritt's Island, and at a few other stations we have taken *auripennis,* while I have collected *jesseana* commonly on up into Georgia and North Carolina. There have probably been many errors made in the identification of specimens of these two species. Some have thought that *L. jesseana* was not a distinct species, but certainly the genitalia and thoracic pattern are very different and separation of the species is quite easy.

SYMPETRUM CORRUPTUM. We have usually found these dragonflies sparingly in Florida. Several specimens have been collected on Merritt's Island and I took one female on Sanibel Island, December 31, 1939. Mr. E. M. Davis found this species very common on the beach near Cape Canaveral in November, 1939.

LEPTHEMIS VESICULOSA. October 2-4, 1939, I was collecting shells at Sanibel and Captiva Islands. While walking down the beach on the gulf shore of Sanibel I saw what appeared to be a large female *Erythemis simplicicollis.* Then another flew by and many more were soon seen. I knew at once that I had found a good place to collect *L. vesiculosa,* but alas, I had no net, only a sling shot and cyanide jar which had been thrown in at the last minute while packing. I found however that the sling shot with coarse sand was very effective in collecting them. They lit on the grass, sand, pen shells, etc., and were so indifferent about my presence that I began throwing sand at them and thus catching them easily. Hundreds of them were seen and about 25 collected. On December 27, 1939, I returned to Sanibel but saw only one *Lepthemis* on the gulf shore during our stay. However, on January 1, 1940, I visited the bay side of the island and found them just as abundant as they had been on the gulf shore in October; 35 were taken in a short time, males and females. This locality is much further north than the former published records from the Florida Keys.

The coloration of the specimens from Sanibel taken on the second trip varied considerably from the descriptions by Needham and Byers. They might have described from very dry specimens, but even our dry specimens appear different. The stigma, appendages of the 10th segment, the face except for a little yellow about the mandibles and labrum, the vertex, coxae and trochanters of these specimens were decidedly greenish. The tibiae and tarsi were predominantly blackish and the femora were for the most part brownish, although sometimes blackish externally or inferiorly.

Macrodiplax balteata. We have collected this species commonly on Merritt's Island, at Titusville, Sebastian Inlet, etc., in the vicinity of brackish water along the coast. A few years ago we were very much surprised to find it on the flood plains of the St. John's River near Geneva, approximately 20 miles inland. Here there are brackish water ponds, but we wondered what path they had followed in extending their range from the coast. When Mr. E. M. Davis collected a few specimens at a brackish lake west of Mims the possibility of their having spread inland at this point became apparent. The chain of lakes from Titusville to the St. John's would furnish a possible path for this extension of range. This species was also found on Sanibel in May, 1940, as we would expect from the species found there which prefer a similar habitat.

(To be continued)

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.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bolletino 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.
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.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
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.
55. Pan-Pacific Entomologist. San Francisco, Cal.
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.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
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.
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.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
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.
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.
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.
117. Microentomology, Stanford University.
118. Ward's Ent. & Nat. Sci. Bull., Rochester, N. Y.
119. American Midland Naturalist, Notre Dame, Ind.
120. The Great Basin Naturalist, Provo, Utah.
121. Ciencia, Mexico City.
122. Revista Museo de la Plata, Buenos Aires.
123. Indian Journal of Entomology, New Delhi.

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.—Anduze, P. J.—Un proyecto de estudio de la fauna entomologica Venezolana. [Bol. Soc. Venezolana Cien. Nat.] 6: 238-248. **Armbruster, L.**—Eine miocaene Insektenfauna (mit meinem Praparierverfahren). [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1365-1371. **Aubrook, E. W.**—The preparation of models of the heads and tracheal system of insects. [Mus. Jour., London] 40: 223-225, ill. **Beall, G.**—The fit and significance of contagious distributions when applied to observations on larval insects. [84] 21: 460-474. **Blackwelder, R. E.**—Some aspects of modern taxonomy. [6] 48: 245-257. **Carpenter, G. D. H.**—Birds as enemies of butterflies, with special reference to mimicry. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1061-1074, ill. **Chapman, R. N.**—Insect population problems in relation to insect outbreak. [Ecol. Monogr.] 9, (1939): 261-269. **Eichler, W.**—Geographische und okologische Probleme bei ektoparasitischen Insekten. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1089-1096. **Emerson, A. E.**—Populations of social insects. [Ecol. Monogr.] 9, (1939): 287-300. **Fall, H. C.**—Obituary and bibliography by P. J. Darlington. [5] 47: 45-54, ill. **Fichter, E.**—An ecological study of Wyoming spruce-fir forest Arthropods with special reference to stratification. [Ecol. Monogr.] 9: (1939): 185-215, ill. **Fiebrig, C.**—Skizzen aus dem Insektenleben in Paraguay. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1097-

1105, ill. **Gerhardt, U.**—Ueber die biologische bedeutung der lautäusserungen einiger insekten. [Forsch. & Fortsch.] 16: 291-292. **Gibson, A.**—The Canadian Entomological Service; 50 years of Retrospect, 1887-1937. [Verh. VII Internat. Kongr. Ent. Berlin] 3: 1429-1479. **Graham, S. A.**—Forest insect populations. [Ecol. Monogr.] 9, (1939): 301-310. **Griffin, F. J.**—The first entomological societies. An early chapter in entomological history in England. [107] A, 15: 49-68. **Hoffmann, W. H.**—Das Finlay-Institut und die Gelbfiebermucke. [Verh. VII Internat. Kongr. Ent. Berlin] 3: 1589-1603, ill. **Hungerford, H. B.**—Results of the Oxford University Cayman Islands Biological Expedition of 1938. [8] 76: 255-256. **Janse, A. J. T.**—Glimpses of the development of entomological science in South Africa. [J. Ent. Soc. So. Afr.] 3: 1-8, **King, K, M,**—Population studies of soil insects [Ecol. Monogr.] 9, (1939): 270-286. **Lounsbury, C. P.**—The pioneer period of economic entomology in South Africa. [J. Ent. Soc. So. Afr.] 3: 9-29. **Park, O.**—Nocturnalism—The development of a problem. [Ecol. Monogr.] 10: 486-536. **Sakimura & Linford.**—An annotated list of insects from Lanai (Hawaiian Ids). [37] 10: 451-454. **Savely, H. E., Jr.**—Ecological relations of certain animals in dead pine and oak logs. [Ecol. Monogr.] 9, (1939): 323-385, ill. **Schmidt, E.**—Libellen als Objecte der angewandten Entomologie. [Verh. VII Internat. Kongr. Ent. Berlin] 3: 1494-1505, ill. **Schuhardt, V. T.**—A "tictorium" for the propagation of a colony of infected Ornithodoros turicata. [Jour. Parasit.] 26: 201-206, ill. **Sellnick, M.**—Milben als Parasiten von Insekten. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1300-1307, ill. **Silvestri, F.**—Importanza dell 'entomologia nell' economia mondiale. [Verh. VII Internat. Kongr. Ent. Berlin] 3: 1506-1522. **Smith, C. C.**—Biotic and physiographic succession on abandoned eroded farmland. [Ecol. Monogr.] 10: 422-484. **Smith, H. S.**—Insect populations in relation to biological control. [Ecol. Monogr.] 9, (1939): 311-320, ill. **Smith, R. H.**—Modified Riker insect mount for use in teaching. [4] 72: 209-211, ill. **Ulrich, H.**—Uber den generationswechsel und seine bedingungen. [Die Naturwissensch.] 28: 569-576, ill., cont. **Van Duzee, E. P.**—The life and works of, by Essig & Usinger. [55] 16: 145-177, ill. **Weidner, H.**—Die Grossstadt als Lebensraum der Insekten, ihre Biotope und ihre Besiedlung. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1347-1361, ill. **Weiss, H. B.**

—Money losses due to destructive insects. [6] 48: 195-199. **Wille, J. E.**—Landwirtschaftliche Entomologie in Peru und angrenzenden Landern Sudamerikas. [Verh. VII Internat. Kongr. Ent. Berlin] 3: 1523-1539. **Williams, C. B.**—The numbers of insects caught in a light trap at Rothhamsted during four years, 1933-37. [107] A, 15: 78-80.

ANATOMY, PHYSIOLOGY, ETC.—Andre, M.—Sur l'allotrophie chez les Acariens. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 1009-1023. **Barbieri, N. A.**—L'ampoule articulee des Dipteres (balancier), organe de respiration et de direction du vol. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 628-629, ill. Les crustaces et les insectes ne possedent pas d'yeux composes ou le systeme oculaire dans l'echelle zoologique. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 630-652, ill. **Baumann, C.**—Ueber den Legeapparat von Baryconus rufipes (Hym., Proct.). und seine Beziehungen sum Abdominalhocker. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 653-666, ill. **Berg, V. L.**—The external morphology of the immature stages of the bee fly Systoechus vulgaris (Dipt.: Bombyliid.), a predator of grasshopper egg pods. [4] 72: 169-178, ill. **Buchmann & Sydow.**—Weitere Versuche an Drosophila melanogaster uber den Einfluss von Schwermetallsalzen auf die Mutationsauslosung durch Rontgenstrahlen. Versuche mit Uranylacetat. [97] 60: 137-142. **Campau, E. J.**—The morphology of Chauliognathus pennsylvanicus (Coleo: Cantharid.). [Microent.] 5: 57-90, ill. **Catala, R.**—Variations experimentales de l'Urania de Madagascar (Lep.) [Verh. VII Internat. Kongr. Ent. Berlin] 2: 667-672, ill. **Clark, H. W.**—The adult musculature of the Anisopterous dragonfly thorax (Odonata). [J. Morph.] 67: 523-565, ill. **Cope, O. B.**—The morphology of Psocus confraternus. [Microent.] 5: 91-115, ill. **Cumley, R. W.**—Comparison of serologic and taxonomic relationships of Drosophila spp. [6] 48: 265-274, ill. **Dallas, E. D.**—Coexistencia de dos Monstruosidades en un Coleoptero. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 673-677, ill. Coleopteros que originan Dermatitis en la Republica Argentina. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 678-682. Un Lepidoptero ginandromorfo. [Verh. VII Internat. Kongr. Ent. Berlin] 2: 683-684, ill. **Dutky & White.**—Note on the occurrence of microsporidian infection among native Scarabeid larvae. [Jour. Parasit.] 26: 333. **Ebner, R.**—Einige teratologische Naturfunde bei Orthopteren. [Verh. VII Internat. Kongr

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SPECIAL NOTICES.—Vegetation type maps of California and western Nevada. By A. E. Wieslander. Univ. of Calif. Press, Berkeley, California. 1932.

OBITUARY

The *Philadelphia Inquirer* for October 10, 1940, carried a dispatch from Bedford Hills, New York, of the preceding day, that Miss Katherine Mayo, best known for her book "Mother India," 1927, died at her home that day after a long illness, at the age of 72. She was born in Ridgeway, Pennsylvania.

Miss Mayo spent five years in Surinam extending into 1906. Among the letters which Dr. Henry Skinner left at the Academy of Natural Sciences of Philadelphia are some from Miss Mayo and her sister, Miss Gertrude Mayo, of the years 1906 and 1907, referring to insects which she sent for the Academy. In her letter from Paramaribo of May 22, 1906, she mentions that she had sent ten boxes by consecutive mails since March 29; "All the insects in these boxes have been caught here in Paramaribo or in the brush of the immediate outskirts." After her return to the United States, she placed an advertisement in the *News* for June and July, 1907: "Surinam insects for sale—Apply to Katherine Mayo, Frankford

Arsenal, Philadelphia, Pa." It was of this that she wrote from Locust, New Jersey, August 22, "I have as many answers, now, as I have insects for; so it may be as well to discontinue the advertisement." Previously, on July 6, 1907, she wrote of a visit to the Academy which "makes me wonder if by any chance there might be a place in the Academy that I could apply for." Dr. Skinner's reply, not at hand, brought the letter of August 22: "I should have liked working at the Academy, but as you say and show, the conditions are not exactly practical."—P. P. Calvert.

We regret to notice in recent numbers of *Science* announcements of the deaths of the following biologists interested in entomology:

Dr. Otto Emil Plath, professor of biology at Boston University, on November 5, 1940, in his fifty-sixth year. His papers and book on the biology of bumble bees are well known.

Miss Grace Adelbert Sandhouse, of the U. S. Bureau of Entomology and Plant Quarantine, specialist in identification of bees and wasps, on November 9, 1940, aged forty-four years. Her memoir on the North American Bees of the genus *Osmia* was reviewed in the *News* just a year ago.

Dr. John Pattillo Turner, assistant professor of zoology at the University of Minnesota, on November 11, 1940, in his thirty-ninth year. A paper on the black widow spider in a Minnesota winter was contributed by him to the *News* for December, 1939.

Dr. F. W. Edwards, since 1937 deputy keeper of entomology at the British Museum of Natural History, on November 15, 1940, at the age of forty-six years. He was well-known for his work on the Diptera, especially the Nematocera, and was joint leader of the British Museum Ruwenzori Expedition of 1934-35 to the high mountains of British East Africa.

Prof. Charles William Woodworth, emeritus professor of entomology at the University of California, on November 19, 1940, in his seventy-sixth year. An obituary notice by E. O. Essig is in *Science* for December 20, 1940. He had recently been elected an honorary fellow of the Entomological Society of America.

Entomological News for December, 1940, was mailed at the Philadelphia Post Office on December 20, 1940.

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-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 852, La Paz, 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., Birmngham, 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.

ATTENTION WORKING ENTOMOLOGISTS

We would call your attention to the increasing scarcity of many of the publications of The American Entomological Society, and advise you to obtain those desired before the publisher is unable to supply them, at least at the present prices. This refers to contributions published in the Proceedings of The Entomological Society of Philadelphia and in the Transactions of The American Entomological Society. We will be glad to give you prices on any available if you send us your desiderata, stating authors, volume and pagination. We also have a large number of entomological papers published in other journals, duplicated in the Society's library. In submitting your want list in this line, give order, author, journal, volume, pagination and date. Address:

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Subscriptions for 1941 are now due

ENTOMOLOGICAL NEWS

FEBRUARY, 1941

Vol. LII No. 2

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1941, 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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Notes on Florida Odonata.

By M. J. Westfall, Jr., Baker Museum, Rollins College, Winter Park, Florida.

(Continued from page 18)

Tramea lacerata. While at Sanibel from December 27, 1939, to January 1, 1940, I saw two mating pairs and one single male of *T. lacerata*. The single specimen remained around the camp for two days and could have been collected if the sling shot had not broken. After having collected this species during the summer in North Carolina, there was no difficulty in identifying it in the field, as the general black coloration is very distinct.

Argia bipunctulata. This species had been very uncommon in our collection until the Spring of 1939. During the previous Spring I found a few at a roadside ditch in Orange County and collected 17 specimens on April 24, 1938. On May 13, 1939, over a hundred specimens, both male and female, were taken in a marshy area surrounding a very small pond which was nearly dry and not more than fifty feet across. Later many more were seen in the same place. In another similar locality about ten miles distant they were also found on May 14, but only a few were seen. Spaghnum moss seemed to be characteristic of the localities where this species occurred.

Argia tibialis. In central Florida this damselfly has been very rare in our experience. We have collected only one male in this vicinity, this being taken April 4, 1937, in Seminole County. In Nassau County, however, it was one of the commonest of the Zygoptera in the summer of 1939, being common everywhere I collected.

Enallagma durum. On the flood plains of the St. John's River many of these large *Enallagmas* have been collected. For this part of the state, this is our only locality record except for a single male which I collected on a lake in Winter Park. In May, 1939, I visited the above mentioned plains and found *E.*

durum very common on a large Indian mound. There was a strong breeze blowing and they were found around thorn bushes which grew on the mound, and stayed on the side away from the wind. By going from one thorn bush to another more than a hundred of these Enallagmas were collected in a short time, one swing of the net catching three of them on several occasions.

E. LAURENTI. In the late afternoon of November 15, 1939, a friend and I collected *E. laurenti* on a Winter Park lake from a canoe, using swatters almost entirely. These damsels were so common on the lily pads that four times as I struck at one another appeared so that two were taken at one swat. In a little over an hour we took 90 specimens, all but one of which were males.

E. SULCATUM. A number of collectors have been quite delighted to receive this species from us. Certainly it is one of our commonest Enallagmas here, since in an afternoon it is no task to collect over a hundred around one small lake while collecting various other species.

E. POLLUTUM and SIGNATUM. We have found since the paper on "Odonata at Winter Park, Florida," by E. M. Davis and J. A. Fluno was published in 1938, that our common *Enallagma* here is *E. pollutum*. Around the lakes and on the Wekiwa River they are abundant most of the year. Only about five specimens of *signatum* have been taken here. In Nassau County, a little more than 150 miles north of us, this situation seems to be reversed, and while catching several hundred *signatum* which fairly swarmed over the water at Boggy Creek and elsewhere, very few specimens of *pollutum* were taken.

E. DUBIUM. Also in Nassau County while making a swoop for an *E. weewa,* a male of *E. dubium* came along just in time to be caught in the net. On June 7, 1940, I collected three more males at this same station. On September 11, 1940, a number of males were collected, as well as four mating pairs. Females were found just emerging. On the previous day I stopped at Satilla Creek in Bacon County, Georgia, where I had taken a pair of *dubium* a year earlier. At about 9:30 A. M., I began searching for this species. About an hour later the males began to appear, but were not collected. Then about noon the females began appearing, and the pairs in tandem began alighting on floating vegetation where the females deposited the eggs. Sixteen pairs were quite easily taken. The place where this species was found was along the roadside ditch into which Satilla Creek backs. The creek is bordered by a swampy area with a number of cypress trees in sight. The water is quite deep and dark.

E. CONCISUM. This brilliant red and black damselfly has been uncommon here in the past, but was collected at almost every lake visited in Central Florida during the Spring and Fall of 1939. Certainly it was far from being uncommon, especially at the lakes with dead grass extending out into the water for some distance. They seemed to like to stay on this grass as far from the shore as possible, so that one usually waded in the water to collect them. Some were also collected in Nassau County.

E. WEEWA. In March, 1935, one male of this species was collected on the Wekiwa River by Mr. E. M. Davis. Then I took another male in the same locality in May, 1939. No other specimens were taken by us until September 13, 1939, when I found them very abundant at certain points in Nassau County. They were first found at a small stream about five miles south of the Florida-Georgia state line. Also I collected them at a stream on the Nassau-Duval County line. Over 100 specimens, male and female, were taken in a short time. Three males were also collected in the same place on June 7, 1940. The streams where *E. weewa* was so abundant were small, flowing through low woods, which were overflowed by high water. The bottom was sandy, and the water quite dark, forming deep pools in some places. Over these pools *E. weewa* hovered as if motionless, then moved leisurely up and down the extent of the pool, hesitating here and there in mid-air. *E. cardenium* was present and at first was confused with *weewa,* but soon could be distinguished from the latter by the heavier build of the body and different flight. I believe *E. weewa* may be more common on the Wekiwa than the two records indicate, but that the few individuals are lost in the host of *cardenium*.

TELEALLAGMA (ENALLAGMA) DAECKII. We have never taken this species in central or southern Florida, but on June 7, 1940, I collected nine mating pairs in Nassau County. They were all taken at one station, in a grassy area at the edge of a creek which was almost dry.

ISCHNURA KELLICOTTI. With a swatter this species is taken in large numbers on the local lakes, where it flies from one lily pad to another with a quick, nervous movement unlike that of any other of the Zygoptera with which I am familiar. Almost every lake with lily pads had its share of them during the Spring and Fall of 1939, males, and both homochromatic and heterochromatic females. In a couple hours to collect a hundred specimens of *I. kellicotti,* together with additional specimens of other species, was not a difficult task with a swatter at one lake where I collected.

A Synonymical Note on Crabro (Blepharipus) davidsoni Sandhouse (Hymenoptera, Sphecidae: Pemphilidini).

During a recent visit to the Museum of Comparative Zoölogy at Cambridge, Mr. Nathan Banks called my attention to a species he described in 1921 as *Blepharipus parkeri* (Ann. Ent. Soc. Amer., XIV, p. 17), and inquired if it was not the same as that which Miss Grace A. Sandhouse named *Crabro* (*Blepharipus*) *davidsoni* in 1938 (Ann. Ent. Soc. Amer., XXXI, p. 1). Comparison of the type of Banks' *parkeri,* described from a series of females taken at Lexington, Massachusetts, with material of *Crabro* (*Blepharipus*) *davidsoni,* indicates that the two are indubitably one and the same species. Miss Sandhouse's name must therefore be recorded as a synonym of Banks' earlier *Blepharipus parkeri. Crossocerus* (*Blepharipus*) *parkeri* (Banks), which nests in old stumps and rotting logs, provisioning its galleries therein with a diverse assortment of leafhoppers, is a rather common and widely distributed form throughout the New England, Middle Atlantic, and North Central states. Davidson, for whom Miss Sandhouse named the species, and Landis presented an excellent account of its biology in 1938 (Ann. Ent. Soc. Amer., XXXI, pp. 5-8).—V. S. L. PATE, Cornell University.

New Genera and Species of North American Ephydridae (Diptera).

By EZRA T. CRESSON, Jr., Associate Curator, Dept. of Insects, The Academy of Natural Sciences of Philadelphia.

Discocerina flavipes new species.

Whether this is a variety or subspecies of *obscurella,* or a distinct species, is difficult to determine at present. Its similarity to the Neotropical *nitidiventris* Hendel, the narrow-cheek form of *obscurella,* is apparent, differing only, it seems, in having the legs entirely yellow. In all the material I have seen of *obscurella* from North America, the femora are dark with at most their apices showing some dilution. In the present form the legs, including the coxae, are entirely yellow, although the femora may show some infuscation on the posterior surfaces. In other respects the characters are those of that form of *obscurella* with narrow parafacies and cheeks.

Very similar to *obscurella* but the legs mostly yellow; parafacies very narrow and conspicuously pale and show little or no dilatation ventrad. Tergite V of the male seems to be no more shining than IV and is sometimes not at all shining.

Type.— ♂ ; Bakersfield, CALIFORNIA, September 4, 1898; [A. N. S. P., no. 6607][1]. *Paratypes.*—2 ♂ , 1 ♀ ; with same data.

HELAEOMYIA new genus.

Genotype: *Psilopa petrolei* Coquillett, 1898.

This interesting insect, the "Petroleum fly," cannot well be retained in *Psilopa*, nor will it more comfortably go in *Mimapsilopa* Cresson nor *Clasiopella* Hendel.

The face is somewhat gently convex and bifoveate, with two rather stout facials on each side, occupying the lower third of facial profile. The antennal spine is short and the third segment but slightly elongate and not conoid.

Helaeomyia californica new species.

Very similar to the European *Psilopa nitidula* (Fallen) in the color pattern of the legs, but the strong general setation and the strong second facial, places it near *Psilopa dimidiata* (Cresson), another member of the genus.

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[1] This material was given me by Dr. C. W. Woodworth of the University of California, in 1908.

Fore legs entirely black; antennae black with base of third segment slightly diluted. Yellow: apices of mid and hind femora, entire mid and hind tibiae and their tarsi except apices. Halteres white. Wing slightly dusky with some veins pale; posterior crossvein distinctly clouded. Shining, without any metallic reflections.

Setation strongly developed. Head broader than high; distinctly higher than long. Fronto-facial profile rather straight, oblique from anterior ocellus to mid face, with vertex rounded; Frons about .6 width of head, twice as broad as long; ocellars about as far apart as are the posterior ocelli; frontorbital aligned with frontal and well removed mesad. Face about .3 width of head, scarcely twice as long as broad; rather strongly convex but not gibbous in profile; foveal sulci slightly indicated; upper facial almost at mid profile, cruciate; second bristle one-half as long; one to two setae ventrad. Cheek about as broad as third antennal segment; buccal very long. Antennal spine as long as third segment; arista with six hairs.

Mesonotal setulae rather distinctly seriated; prescutellar rectangle, quadrate. Scutellum flat. Abdomen elongate-ovate; tergite V of male not longer than IV; genital segment well developed.

Fore coxae with weak lateral marginal setae; fore femur minutely serrulated on antero-flexor margin. Vein II but slightly curving into costa; second costal section slightly longer than third.

Length, 2 mm.

Type.—Male; Davis, CALIFORNIA; June 9, 1936; (R. M. Bohart; sweeping lawn grass); [A. N. S. P., no. 6608][2]. *Paratypes.*—1 female; with same data. 1 ♀; Eldridge, Sonoma County, California; October 25, 1915; (J. A. Kusche).

MIMAPSILOPA new genus.

Genotype: *Clasiopella metatarsata* Cresson, 1939.

Much like the Indo-Malayan *Clasiopella* Hendel, 1914, in the form of the antennae, but the arrangement of the facials simulates that of *Helaeomyia* Cresson and in this respect approaches *Leptopsilopa*.

Strongly setose species with long antannal spine and conoid third segment. Face distinctly convex medianly, the facials well separated and occupying the lower half or three-fifths of

[2] This type was placed in the Collection of the Academy by Dr. A. L. Melander.

the facial profile.

Hydrellia bergi new species.

Very similar to *H. subnitens* Cresson, 1931 in possessing such a conspicuous genital segment, but it has the legs including the tarsi, entirely black.

Black, including antennae and tarsi; palpi and genital segment, orange or yellow. Halteres lemon yellow. Wings with black veins.

Frons almost opaque black, its areas but slightly differentiated. Face sericeous, yellow to golden; lunule more whitish; cheeks and occiput cinereous. Mesonotum including humeri and notopleura and scutellum, black with very sparse gray or brownish vestitum, almost shining; pleura cinerous especially ventrad but becoming darker dorsad and on metanotum. Abdomen opaque black, becoming more shining and sparsely einerous laterad and apicad; ventral lobes cinereous. Legs somewhat cinereous

Head scarcely broader than high. Frons strongly transverse; ocellars rather weak. Face more than one-fourth width of head, about twice as long as broad, evenly convex in profile, not definitely carinate; facial series of about six fine bristles, extend well dorsad; parafacies linear almost to postbucca. Cheeks about as broad as third antennal segment. Arista with about six hairs.

Mesonotal bristles and setulae rather well developed and the latter not numerous; antesutural dorsocentral about as strong as postsutural one with an intermediate seta, and a second postsutural dorsocentral sometimes well developed. Abdomen ovate; tergites III to V of male long, subequal in length, the latter trigonal; genital segment large, always visible, the large pale protegen being most conspicuous.

Legs slender with rather strong setation. Wings elongate, with costa II not much longer than III.

Length, 2.2 mm.

Type.—Male; Nigger Creek, Cheboygan County, MICHIGAN; June 27, 1940; (C. C. Berg); [U. S. N. M.]. *Paratypes.*—1 ♂; 1 ♀; Douglas Lake, Cheboygan Co., Michigan; July 5, 1940; (C. C. Berg). 1 ♀; Cheboygan County, Michigan, June 25, 1940; (C. C. Berg).

Hydrellia johnsoni new species.

Very similar to *H. tibialis* Cresson, 1917, but entirely opaque to subopaque. The frons uniformly opaque, almost velvety-black, but the mesofrons sometimes slightly differentiated in extreme dorsal aspect. Antennae entirely opaque black. Mesonotum, scutellum and abdomen concolorous, almost truly opaque, with tendency to gray or brownish; pleura more cinereous, as are also the coxae. Second costal section slightly longer than third.

Type.—Male; New Mill Pond, Mt. Desert, MAINE; July 25, 1935; (William Procter); [Acad. Nat. Sci. Phila., no. 6609].[3] *Paratypes.*—8 ♂, 6 ♀; with same data.

Ants Preying on Termites (Hymen.: Formicidae; Isoptera: Rhinotermitidae).

In spite of the ease with which the capture of swarming termites by ants might, supposedly, be observed, there seems to be only one record extant for North America This is of an unnamed species taken in Louisiana by *Iridomyrmex humilis.*

This spring at Lincoln, Massachusetts, I was able to observe the following six ants taking alates of *Reticulitermes flavipes*: *Crematogaster lineolata, Aphaenogaster fulva acquia, Lasius niger alienus* var. *americanus, Formica rufa integra, F. neogagates,* and *F. pallidefulva nitidiventris.* This is, so far, the roll of termitharpactic ants in North America.

Wheeler (1936, Proc. Amer. Acad. Arts Sci., 71: 159-243) has excellently summarized the ecological relations of ants to termites. On pp. 178 and 179 he distinguishes five relationships: (1) termitharpagy or predation, (2) cleptobiosis or theft of termite prey from termitharpactic ants, which is really an ant to ant relationship, (3) lestobiosis or theft of termite brood by ants, (4) plesiobiosis or utilization of termitaries by ants, (5) termitoxeny or friendly residence in the termite-inhabited part of the termitary. Termitharpagy has been considered and cleptobiosis is not yet recorded for this continent. Wheeler lists four North American termitolestic ants. His fourth category is represented in North America by, at least, an occasional colony of *Crematogaster lineolata* and probably of *Camponotus castaneus americanus.* Termitoxenic ants are not known in the New World.—CHARLES H. BLAKE, Massachusetts Institute of Technology, Cambridge, Mass.

[3] The type of this species has been placed in the Academy's Collection by Mr. Procter.

Further Notes on the Snail-collecting Aphis-lion Larva (Neuroptera: Chrysopidae).

By David T. Jones, M.S., Ph.D., Associate Professor Zoölogy, University of Utah.

Identification, Distribution and Snails Carried.

Recently Dr. Roger C. Smith of Kansas State College, has examined the wing-venation of the snail-collecting aphis-lion, the larva of which has been previously described (Jones, 1929). He has tentatively identified it as *Nodita virginica* (Fitch). The specimen was collected two miles north of Bloomington, Indiana, but was in the pupal stage. After some time the adult emerged and the wings were mounted. These were later photographed by Calvin A. Richins of the University of Utah.

In addition to the above, I am indebted to the following for aid in the study of this species: Prof. H. R. Eggleston, Dr. R. G. Guthrie, Roy Ash, Ralph Alexander, and Paul Crone of Marietta College, Ohio; Adrienne Satterfield (now Mrs. Huston Newman) of West Union, Ohio; Dr. Fernandus Payne and Dr. A. C. Kinsey of Indiana University; Dr. Carl J. Drake and Dr. E. R. Becker of Iowa State College; Dr. R. V. Chamberlin and Dr. Don M. Rees of the University of Utah; and the officials of the Smithsonian Division of the Library of Congress, Washington, D. C.

Historically, the first mention that I have found of such a snail-carrying aphis-lion larva is that of Banks (1905) who erroneously placed it in the Hemerobiid, rather than in the Chrysopid family, as Smith (1926) later confirms. No locality record was given. I quote this first mention by Banks. "The larvae of *Hemerobius* appear to be much less known than allied forms; I have not bred any, but a larva given me by Mr. Schwarz probably belongs to this genus; it has a broader head, a shorter body than *Chrysopa;* and the lateral processes of the thorax are very long; this specimen was taken among fallen leaves and carried the empty shells of several small molluscs." Smith (1926) lists no snail-carrying larvae in his very fine discussion of trash-carrying Chrysopid larvae. The author (1929) described the external features of the larva now under consideration, giving two localities: Vinton County, Ohio, approximately seven miles west of Albany, which is about twelve miles east of McArthur; and Squaw Hollow, near Marietta, Ohio. The numbers, unreported therein, were from these localities respectively: five, which were preserved; and one, which escaped. Subsequent to this publication one more living specimen was taken at Squaw Hollow. Observations have recently been made (Archer, 1938) on a similar Chrysopid, perhaps not the same species, in North Carolina and Alabama. He found only four specimens, one from each of the following four localities: Hayesville, North Carolina; Robbinsville Road in the northwest of Macon County, North Carolina; Clay, Jefferson County, Alabama; and Fort Payne, DeKalb County, Alabama. Archer reports the following species of snails carried: *Retinella indentata paucilirata, Retinella indentata carolinensis wetherbyi, Polygyra rugeli* juveniles, *Hawaiia minuscula, Euconulus sterkii, Euconulus chersinus,* and *Vertigo gouldii.* Two insect crania were also listed. As this paragraph contains all the literature resulting from a search of over ten years, it is evident that the literature is as meager, as the specimens are rare.*

During this time, however, the following locality records have accumulated for this species: Athens County, Ohio, midway between Torch and Coolville, five live specimens and two dead specimens; Meigs County, Ohio, two miles northeast of Rock Springs, near Chester, one live specimen; Morgan County, Ohio, on Turkey Run, one mile west of Stockport, one pupal case with snails intact, from which the adult insect had emerged; Adams County, Ohio, at Hill's Fork on the Panhandle Road, one living specimen; and Bloomington, Indiana, two live specimens, and one pupa from which the adult emerged, the wings of which are mentioned above.

The snails carried on the Ohio and Indiana specimens are of the following species: *Punctum pygmaeum* (Drap.), *Euconulus*

* Since this paper was submitted, Dr. Roger C. Smith has called attention to my overlooking the article by Gordon K. MacMillan. January, 1939, A snail. "taxi." Naut. Vol. 52, No. 3, pp. 94-95. He thinks that the specimens Mr. MacMillan has are "unquestionably Chrysopid" rather than Hemerobiid.

fulvus (Müller) *Striatura milium* (Morse); *Carychium exiguum* (Say), *Strobilops labyrinthica* (Say), and *Cochlicopa lubrica* (Müller). The first two seem to be favorites, as they are chosen far more often than the proportion in which these species occur in the natural fauna. Fragments of insect skeletons are also often used.

BEHAVIOR, LOCOMOTION, TROPISMS AND FEEDING.

The following observations on behavior chiefly of the Athens County specimens are submitted. Animals mechanically prodded "play possum", recovering in from ten to fifteen seconds if undisturbed. In walking there is a peculiar "feeling" or exploratory movement every few steps by the piercing spears. The animals at room temperature attained the following speeds in walking for thirty second periods: 11 cm. (including stops), 10 cm. (including stops), 16 cm., 16 cm., and 16 cm. The last three were non-stop promenades. While the leg action is ordinary (the first and third femora on one side moving in the same direction, while the second on the same side is moving in the opposite direction), they have a "hitching" stride. The spears can be approximated, and frequently are, when the animal stops. The animal stops "jeep-like", with head down and flattened against the table, the hind legs elevated thus raising the abdomen.

When turned over on their backs, they somersault to regain the upright position instead of turning sidewise. Sometimes they somersault spears first. At other times they recover by placing the last pair of legs down first and then flopping over.

They dislike excess moisture. They prefer a rather dry habitat of dead leaves. They choose dry instead of wet or moist surfaces. When placed in the light they turn and travel in the other direction. The more intense the light, the faster they travel, seeking darkness or at least shade. They respond negatively to heat, avoiding the warm dry hand or finger. They travel with equal facility on all inclines. They travel as easily vertically downward as vertically upward. When a vertical plane is placed at right angles to their course, they go up over it, rather than crawling along the junction of the plane with the table. In this they appear to be negatively thigmotropic, unlike the positively thigmotropic trash-carrying Chrysopid larvae reported by Smith (1926). However, under certain circumstances, there is positive thigmotropism. They tend to wedge into crevices. Also they are very uncomfortable when divested of their cloak of shells, as described below. Smith found this also to be true with his trash-carriers, none of which are mentioned as snail-carriers.

One evening Dr. Guthrie, Roy Ash, and the author, carefully pulled the snails off the backs of two specimens and placed them in dirt containing many *Strobilops labyrinthica* and other small snails from the Lawrence Church region, Washington County, Ohio. As soon as they found themselves divested of their cloaks, they became frantic, rushing around and seizing the first objects available. One secured a lump of dirt, one *Carychium,* and one *Euconulus* and fixed them on its back. The other secured a large juvenile shell of *Cochlicopa lubrica* and a piece of dirt for its new cloak. After fastening these first objects on their backs, they behaved more leisurely. The next morning, however, they were so overloaded with small snails that each could walk only with difficulty.

At this time the one *Cochlicopa* and the *Euconulus* mentioned above were seen to be living but they were withdrawn within their shells. This observation was made under a binocular, without removing the snails from the backs of the "snail-lions". The burdens of snails of each larva suspiciously and gradually disappeared during the next few days, after which most of the shells, including the two mentioned above, were found to be empty. These suspicions were confirmed later, both at Marietta College and at Indiana University, when living insects were seen to remove living snails from their burden, thrust the long sucking spears within the aperture into the body of the snail. The snails soon were deflated, much as the ordinary aphis-lions deflate plant lice. These observations change our concept of the burden. It is a "pantry" as well as a "cloak" and a "graveyard". However, the last hardly applies, for after the feast, the shell was more often discarded than replaced on the back, especially if a fresh supply of small snails were available.

Fixation of Shells and Hibernation.

It is very interesting to watch a larva "fix" a snail on its back. The larva seizes the snail shell between the curved sucking spears, as one would pick up an object with pincers. Both abdomen and head are elevated, by raising the third and first pairs of legs respectively, while the mesothoracic region is lowered, by widely spreading the second pair of legs. This allows the head to be thrown straight back and the abdomen to be elevated, at times almost to the vertical. The shell still clasped by the sucking-spear pincers is placed among the hooked hairs on the back, and worked back-and-forth only for a very short time, after which it sticks. The animal is so small, and the process completed so quickly, that it is difficult to observe with hand lens or binocular. Moreover, the animal goes through the process rarely while being watched, and never when you would like to have it thus perform. If the shells after "fixation" are removed and examined under the binocular, fine silk-like strands can be observed to be plastered over their surface. I think that spinnerets on the tip of the elevated abdomen secrete the semi-fluid silk, which quickly dries on the shell and elsewhere hardens to form strands, which when the shell is worked back-and-forth, engage the hooked hairs on the back. However, I have yet to observe the silk being secreted. The whole process of "fixing" a shell can be completed in less than thirty seconds. The thoracic pedicels, the bristles of which are not hooked, serve as a "hay-rack" to support the overhanging portions of the burden. These have been previously described in detail (Jones, 1929). Some of the larger snails have been observed to escape from the cloak of the Squaw Hollow specimen. They continued to live quite normally, outliving the insect.

Attempts to raise the larvae in captivity have all resulted in eventual failure, though some have been kept for several weeks in a jar filled partially with dry leaves, screened over the top. Such a jar kept during the winter indoors at room temperature yielded the following observations at Marietta College. A drop of water occasionally had to be inserted to relieve excessive dryness. It was cautiously avoided, however, by the larvae which would crawl back among the dry leaves. Excessive humidity is to be avoided, as moulds tend to accumulate and the larvae die. In the latter part of November the larvae curl the edges of the leaves and hibernate. This is probably much later than hibernation under natural conditions as the room was quite warm. I uncoiled the leaf a few times and found they were using little or no silk in the construction of their "nest". As they coiled the leaves tighter finally, I decided to let them alone until Spring. Then I found nothing by fragments of the pupae and of wings too shattered for identification. Also some white oval eggs were present, but were so dry and brittle that they shattered. At Indiana University the successful emergence of the adult from the pupal case occurred so early in the morning that it was unobserved. Shortly after its emergence I found it on the underside of the screen covering the jar. The body of the adult was still soft, moist, and light-colored. So eager was I to secure the wings for venation-study that I killed the creature before the body attained maturity of color and rigidity.

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Smith, Roger C. 1926. The trash-carrying habit of certain lace wing larvae. Sci. Monthly, Vol. 23, pp. 265-267.

A New Opisodasys from Idaho (Siphonaptera: Dolichopsyllidae).

By IRVING FOX, Washington, D. C.

The following new species of *Opisodasys* Jordan (1933, p. 72) is named in honor of Dr. W. L. Jellison, who has recently (1939) redescribed the other known species of the genus. In that paper and in another recently published by Jordan (1939, p. 316), the male of *O. robustus* (Jordan) is described, and is shown to be the same as that of *O. spatiosus* I. Fox (1940, p. 65). Hence the latter name falls as a synonym of *O. robustus*.

Through the courtesy of the authorities of the United States National Museum, the writer has had the opportunity to study the collections in their charge which include determined specimens of *O. enoplus* (Rothschild) and *O. robustus*, and type material of the following species: *O. pseudarctomys* (Baker), male and female; *O. keeni* (Baker), male and two females; and *O. vesperalis* (Jordan), male and female. Since specimens of all the known species of the genus have been available for study, it has been possible to devise a key to aid in the determination of the males. The type species of the genus is *Ceratophyllus vesperalis* Jordan (1929, p. 28), by original designation.

KEY TO THE SPECIES OF OPISODASYS JORDAN (MALES ONLY).

1. Sternal plate VIII broad basally, truncate distally, *O. jellisoni*, n. sp.
   Sternal plate VIII narrow basally, not truncate distally..2
2. Process of clasper bifurcate 3
   Process of clasper not bifurcate......................4
3. Lobes of process of clasper subequal....*O. pseudarctomys*
   Posterior lobe of process much shorter than anterior, *O. vesperalis*
4. Uppermost spiniform bristle of movable finger elbowed near base, not straight, apex directed upward..*O. robustus*
   Uppermost spiniform bristle of movable finger not elbowed, straight or with apex directed downward..........5
5. Sternal plate VIII with an apical bristle.........*O. keeni*
   Sternal plate VIII without an apical bristle....*O. enoplus*

Opisodasys jellisoni, n. sp. (Figs. 1, 2, 3.).

♂. Preantennal region of head with two rows of bristles; upper row consisting of seven bristles, lower row of three much longer ones. Post-antennal region with three bristles, in addition to a marginal row of five. Labial palpus almost reaching to apex of fore coxa, acuminate distally. Pronotal comb consisting of about 21 spines. Mesopleural suture with one bristle, mesepimeron with three bristles. Supraepisternum with one bristle, infraepisternum with three bristles; metepimeron with two bristles. *Modified segments.*—Movable finger, process of clasper and sternal plate VIII as shown in Fig. 1. Penis long and slender, spring short not completing a turn.

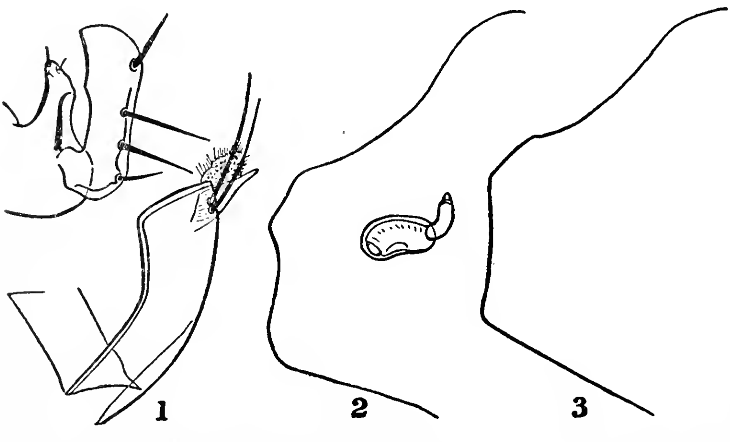

Fig. 1. *Opisodasys jellisoni,* n. sp., process of clasper, movable finger and sternal plate VIII of male.

Fig. 2. *Idem.* receptaculum seminis and sternal plate VII of female allotype.

Fig. 3. *Idem,* sternal plate VII of female paratype.

♀. Chaetotaxy of head and thorax not well shown by specimens available. Bristles of upper preantennal row reduced, some of them absent. Labial palpus not acuminate distally. Mesepisternum and mesepimeron each with four bristles. Supraepisternum with one bristle; metepimeron with three bristles. Sternal plate VII showing variation in depth of sinus. In the holotype the sternal plate VII has the shape shown in Fig. 2; while in a paratype it has the shape shown in Fig. 3.

Type host and type locality.—Flying squirrel, *Glaucomys sabrinus bangsi* at Deer Park, Boise, Idaho.

Type material.—Male holotype and female allotype from *Glaucomys sabrinus bangsi* at Deer Park, Boise, IDAHO, collected December 15-18, 1939, by W. H. Marshall; in the United States National Museum. *Type.*—U. S. N. M. Cat. No. 54259. Male and female paratypes bearing the same data in the Author's private collection.

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FOX, IRVING. 1940. Notes on North American Dolichopsyllid Siphonaptera, Wash. Ent. Soc. Proc. 42: 64-68, illus.

JELLISON, WILLIAM L. 1939. *Opisodasys* Jordan 1933, a genus of Siphonaptera. Jour. Parasitol. 25: 413-420, illus.

JORDAN, KARL. 1929. Notes on North American fleas. Novitates Zool. 35: 28-39, illus.

ID. 1933. A survey of the classification of the American species of *Ceratophyllus s. lat.* Novitates Zool. 39: 70-79.

ID. 1939. On some Nearctic Siphonaptera. Novitates Zool. 41: 316-320, illus.

Modification of the Behavior of Dragonfly Nymphs with Excised Labia (Odonata).

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

About fifteen years ago certain experiments carried on with the nymphs of *Anax* and *Aeschna* established the fact that those insects are capable of modifying their activities to the extent that they will learn to come to the experimenter for food.

Recently it occurred to me that it might be of interest to perform similar experiments, using instead of normal specimens, those from which the labia had been removed. Unfortunately the relatively active Aeschnids were not obtainable, and it was necessary to use the more sluggish Gomphids and Libellulids instead. Yet, even with these, the results of the experiments exceeded expectations.

Each of eleven specimens was treated in the following manner: a looped thread was slipped over the labium until it reached the point where the organ was attached to the head; the thread was drawn tight, ligating the labium proximally;

after which the useless organ was excised just distad of the ligature. This treatment seemed to have no seriously injurious effect upon the nymphs; for, although some of them did die shortly after amputation, so also did some untreated specimens; on the other hand, some of the amputated specimens lived long after the experiments were terminated. Each experimental animal was kept in a preparation dish, containing, in addition to water, a little sand. Once each day an attempt was made to feed the insects by presenting each of them with a bit of meat impaled on the end of a dissecting needle. The materials varied somewhat: raw frog muscle was used, also hamburger, and once liver from a rat.

As in the previous experiments with Aeschnids, one could detect in the behavior of these animals a period of indifference, followed by orienting movements of the head, and, finally a tendency to follow the food about the dish. But what was curiously different from the behavior of normal specimens was the fact that some of these nymphs actually learned to take food from the needle with the mandibles!

A detailed account of the experiment follows. Of the eleven specimens amputated at the beginning of the experiment, three died within two days of treatment; three of the remaining insects gave no response at any time; and one specimen responded once, six days after amputation. The responses of the remaining four specimens, since they are of special interest, are given in detail.

No. III, a Libellulid, gave no response until the third day after amputation, when it accepted food placed in its mandibles. On the sixth day it made as if to seize the food; and on the seventh day it swam toward the food, "lunged" at it, and finally grasped this food with its mandibles. This behavior was repeated on the ninth day, rather feebly, however. The animal was dead on the tenth day.

No. IV, a Gomphid, made slight movements toward the food the day following amputation. It gave no other response until the eighth day, when it followed the food about the dish. On the ninth day this nymph not only followed the food, but finally succeeded in taking some of it with the mandibles. It died on the tenth day after amputation.

No. V, a Gomphid, gave slight positive responses the day after amputation. Until the sixth day it gave no other definite response, although it invariably took food placed in its mandibles. On the sixth day it attempted to seize the food, which it followed for some distance; on the seventh day it succeeded in obtaining some of the food. On the eighth day it only partially responded, but again on the ninth day it duplicated its behavior on the seventh. The experiment was terminated on the tenth day, as most of the other specimens had died.

No. VII, a Gomphid, took food placed in its mandibles the day after amputation, but not until the sixth day did it swim to the needle and take food of its own accord. This it repeated on the seventh day. On the eighth day only feeble responses were given, and the experiment was discontinued.

In considering these results it is well to remember that only a few specimens were used, that of these, only four gave the responses described, and that the responses were, in part, what one might expect to find in untreated animals. Nevertheless, it seems significant that *some* of the nymphs did respond as they did; for this implies that others are capable of doing likewise. It is the more remarkable when one considers the sluggish habits of these myopic, mud-inhabiting forms, lacking the decisive movements and greater visual powers of the Aeschnids. Consider that the labium of the dragonfly nymph is used, not only for seizing prey, but for holding that prey while it is being consumed. The mandibles are poorly adapted to holding food, and they are placed very inconveniently for seizing it.

In view of these considerations, and without implying that the modification exhibits any *intelligence* on the part of the nymph, I feel bound to maintain that it does indicate adaptive powers which are not easily explained on a purely mechanistic basis. The nymph is far from being the mechanically automatic thing some biologists claim. Moreover, the modification involves a modification of the organism *as a whole*. No theory of reflex action *alone* can account for the behavior of the excised nymph which swims to food, thrusts its head *over* that food, and employs its mandibles in a manner for which they are poorly fitted, and, under normal conditions, would never be employed.

A New Species of Amblyscirtes from Texas (Lepidoptera, Rhopalocera, Hesperiidae).

By H. A. Freeman, Lancaster, Texas.

Amblyscirtes belli n. sp.

♂. *Upperside.* Primaries, black with some fulvous overscaling toward the base and inner margin; three sordid white subapical spots, the top and bottom ones longer than the middle one; a small sordid white spot in interspace Cu_1 directly below the bottom subapical spot; a V-shaped, sordid white spot in interspace Cu_2 with the bars of the V pointing toward the outer margin of the wings, the upper bar twice as long as the lower one. The spots in some specimens slightly fulvous.

Secondaries. Black with a few scattered fulvous hairs toward the base and inner margin of the wings.

Underside. Primaries. Black, somewhat lighter than above except at the base, fulvous overscaling toward the costal margin and apex. The five spots on the upper surface reappear, more distinctly, and in addition there are three spots making a curved connection between the last subapical spot and the small spot in interspace Cu_1, with the curvature toward the outer margin below the apex.

Secondaries. Black, nearly completely overscaled with gray in some specimens, in others the overscaling is restricted to the outer margin and base of the wings. Two indistinct, vestigial spots near the costa; one minute discal spot; a submesial row of connected spots forming an irregular line, bordered on the inside by dark scales and on the outside by lighter ones. All spots are dark hoary gray.

Body above black with some long gray hairs on the thorax and anterior part of the abdomen; beneath grayish; sides of the abdomen black, gray scales forming lines between the segments; palpi light gray, with a few scattered black scales; antennae black, ringed with sordid white; club black above, lighter beneath. Fringes of both wings sordid white between the veins black at the ends of the veins.

♀. Similar to the male but with reduced maculation.

Expanse: Male, 24-29 mm., average size 26 mm.; female 23-32 mm., average size 27 mm.

Described from 109 specimens, 68 males and 41 females, collected by the author at Lancaster and two miles west of Vickery, Dallas County, TEXAS, during April, May, June and August of 1940.

This species was placed as undescribed by Mr. E. L. Bell, American Museum of Natural History, New York, and in his honor I take great pleasure in naming it.

Holotype male and *allotype* female in the collection of the author. *Paratypes* are being placed in the following collections, three pairs, American Museum of Natural History, New York; one pair, United States National Museum, Washington, D. C.; one pair, Carnegie Museum, Pittsburgh, Pennsylvania; one pair, Field Museum, Chicago, Illinois; one pair, The Academy of Natural Sciences of Philadelphia; one pair, collection of Mr. F. Martin Brown, Colorado Springs, Colorado; one pair, collection of Mr. Lowell Hulbirt, Glendora, California; and one pair in the collection of Dr. A. W. Lindsey, Granville, Ohio. The remaining 87 paratypes will remain for the present in the collection of the author for determination purposes.

Belli more closely resembles *celia* Skinner than any of the other species of *Amblyscirtes*. In preparing this description *belli* was compared with 37 specimens of *celia* contained in the author's collection and the following differences were noted.

1. Although a dark species, *celia* is lighter than *belli*. None of the specimens in the type series were as light as any of the 37 specimens of *celia*.

2. *Celia* often has a spot near the end of the cell on the upper surface of the primaries. *Belli* never has a spot in that region.

3. *Celia* is more completely overscaled with lighter scales on the under surface of both wings than is *belli*.

4. The spots on the under surface of the secondaries of *celia* are white, contrasting with the brown rather plainly, whereas *belli* has dark hoary gray spots that are inconspicuous; in some specimens they are nearly absent.

A Bibliography of Keys for the Identification of Immature Insects. Part II. Odonata[1].

By Wm. P. Hayes.

The study of immature aquatic insects has probably been given more attention than terrestrial forms for the reason that in most instances aquatic insects can be more easily reared and with such rearings has come a greater knowledge of the growing stages. As pointed out in Part I[2] of this work the writer is attempting to make available for investigators the literature containing tables or keys for the identification of the developmental stages of various insect orders. The following references have been gathered for use in class work devoted to the taxonomy of immature insects and many have been tried and found to have distinct value. It is realized that the list is probably not complete and the writer would welcome having his attention called to additional citations.

Among aquatic nymphs (naiads) of the three orders Odonata, Plecoptera and Ephemerida, the Odonata have been given more intensive study by a greater number of students than the Plecoptera or Ephemerida. This perhaps can be attributed to the greater appeal to collectors that is possessed by the adults. Hence more study of younger stages and, as a result, we find more keys for their identification than we find in the other two orders.

Attention should be called to the works of Lamb (1924) and Nevin (1929 and 1930) in which we are supplied with *keys to the instars* of the three species representing both suborders—the Anisoptera and Zygoptera. From these it is apparent that we have scarcely made a beginning of our study of these forms. Moreover Calvert (1934, Proc. Amer. Philosophical Soc. Vol. 73, pp. 63-64) in a study of growth rates and larval development in the genus Anax begins his summary of this work with the following highly significant statement, "Different indi-

[1] Contribution No. 200 from the laboratories of the Department of Entomology of the University of Illinois.

[2] A Bibliography of Keys for the Identification of Immature Insects, Part I—Diptera. Ent. News, Vol. 49: 246-251, 1938; 50: 5-10, 76-82, 1939.

viduals of *Anax junius,* a common North American species, and different parts of the same individual grow at different rates. This renders an *exact* definition of the characteristics of any one of the thirteen larval instars impossible. Nevertheless it is believed that the age of a given larva may be determined within an approximation of one or two instars. All possible characters should be taken into consideration in making such determinations." This condition perhaps occurs in all Odonata and probably in immature insects of all orders. It is an important consideration that must be kept in mind in using our available keys. So many of our key couplets are concerned with size, and from the above quotation it is apparent that statements of size mean very little, unless qualified by the words "when full grown" and even then how many of us are able to say when a larva or nymph is fully developed?

I asked Dr. Calvert to add any references known to him which I had not included in my original draft. He has complied with my request and about half the number here listed have been furnished by him.

Ander, Kjell. 1926. Beiträge zur Kenntniss der schwedischen Odonaten 1. 2. *Ent. Tids.* 47 (1); 31-42, 14 figs., Taf. 2. (*Agrion hastulatum, lunulatum, armatum, puella;* no keys, but interspecific comparisons.)

Id. 1929. Ueber die Nymphe von *Mesogomphus hageni* Selys. *Konowia* 8 (2): 159-162, 4 figs. (No keys, but comparisons with allied forms.)

Ausserer, Carlo. 1869. Neurotteri tirolesi colla diagnosi di tutti i generi europei. Parte I. Pseudo-Neurotteri. *Annuario Soc. Nat. Modena* 4: 71-156, Tav. viii-ix. Also separately paged 1-88. (Analytic table of genera of larvae facing p. 84 (16).

Barbiche (Abbé). 1884-87. Faune synoptique des Odonates ou Libellules de la Lorraine. *Bull. Soc. Hist. Nat. Metz* (2) 16: 11-20, 17: 85-163. Also paged separately 1-93, Metz Imprimerie Even Freres 1887 (on cover), Impr. Verronnais (Fischer Succ.) 1883 (on title-page). (Key to genera of larvae pp. 87-89 (15-17).

Barnard, K. H. 1937. Notes on dragonflies of the S. W. Cape with descriptions of the nymphs and of new species. *Ann.*

S. Afr. Mus. 32: 169-260, 32 figs. (Key to genera of nymphs pp. 182-3.)

BRAUER, F. u. LÖW, F. 1857. Neuroptera austriaca. Die im Erzherzogthum Oesterreich bis jetzt aufgefundenen Neuropteren u. s. w. Wien, Carl Gerold's Sohn. Pp. i-xxiii, 1-80, 5 Taf. (Synopsis of genera of Odonate larvae, pp. xiv-xvi.)

BRUES, C. T., and MELANDER, A. L. 1932. Classification of insects. *Bull. Mus. Comp. Zool.* 73. Cambridge, Mass., 672 pp., (Key to families pp. 164-167).

BYERS, C. F. 1927. The nymph of *Libellula incesta* and a key for the separation of the known nymphs of the genus *Libellula. Ent. News* 38: 113-115. 1927. (Key to species pp. 114-115).

ID. 1927. Notes on some American dragonfly nymphs (Anisoptera). *Jour. N. Y. Ent. Soc.,* 35: 65-74, (Key to species of *Anax,* pp. 68-69 and to species of *Tramea* p. 73).

ID. 1930. A contribution to the knowledge of Florida Odonata. *University of Florida Publ. Biol. Sci.* Series 1 (1); 1-327, 19 figs., 11 pls. (Key to spp. of nymphs, pp. 34-39, table for *Enallagma* spp., pp. 194-195).

ID. 1936. The immature form of *Brachymesia gravida,* with notes on the taxonomy of the group (Libellulidae). *Ent. News* 47: 35-37, 3 figs., 60-64. (Key to genera of Corduliinae and Libellulinae, pp. 60-64).

ID. 1937. A review of the dragon-flies of the genera *Neurocordulia* and *Platycordulia. Misc. Publ. No. 36. Mus. of Zool., Univ. Mich.,* pp. 1-36. 8 pls. (Key to species, p. 9).

ID. 1940? A study of the dragonflies of the genus *Progomphus* (*Gomphoides*) with a description of a new species. *Proc. Florida Acad. Sci.* 4: 19-85, tables, 1 graph, 6 pls. 1939. (Key to 3 spp. of nymphs, pp. 58-59.)

CABOT, L. 1872. The Immature State of the Odonata. *Ill. Cat. Mus. of Comp. Zool.,* No. V (*Mem.* of same 2) Part I. Subf. Gomphina, pp. 1-17, Pls. I-III. 1881. Part II. Subf. Aeschnina, *Mem.* of same 8 (1): pp. 35-39. 1890. Part III. Subf. Cordulina, *Mem.* of same 17 (1); pp. 37-41.

CALVERT, P. P. 1893. Catalogue of Odonata (Dragonflies) of the vicinity of Philadelphia, with an introduction to the study of this group of insects. *Trans. Amer. Ent. Soc.*, 20: 152a-272. (Key to genera of nymphs, pp. 225-227).

Id. 1928. Report on Odonata, including notes on some internal organs of the larvae collected by the Barbados-Antigua Expedition from the University of Iowa in 1918. *Univ. Iowa Stud. Nat. Hist.* 12 (2): 1-54, Pls. I-V. (Generic keys to four Libelluline genera, pp. 15, 18; tables to spp. of *Tramea* and *Erythemis* pp. 29, 34.)

Id. 1934. The rates of growth, larval development and seasonal distribution of dragon-flies of the genus *Anax* Aeshnidae). *Proc. Amer. Philosophical Soc.*, 73 (1): 1-70, 4 Pls. (Key to species of *Anax*, pp. 46-47.)

Cowley, J. 1933. The larvae of the European species of *Gomphus* Leach. *Ent. Mo. Mag.* 69: 251-252, pl. vii.

Djakonov, A. M. 1926. [Our Libellulidae—Keys for the identification of Libellulidae and their nymphs.] In Russian. Exkursion Fauna des Leningraders Gouvernements. Moscow and Leningrade 72 pp. 8° (Paper not seen).

Dufour, Leon. 1852. Études anatomiques et physiologiques, et Observations sur les larves des libellules. *Ann. Sci. Nat.* (3) *Zool.* 17 (2): 65-110, Pls. 3-5. (Statement of generic and specific characters of *Aeschna* 3 spp., *Libellula* 2 spp., *Calopterix* 1 sp., *Agrion* 1 sp. pp. 67-73.)

Fraser, F. C. 1925. The true position of the genera *Orogomphus* and *Chlorogomphus* as demonstrated by a study of the larva of *O. atkinsoni* and *O. campioni* and by a comparison of the latter with the larva of *Anotogaster nipalensis*. *Rec. Ind. Mus.* 27 (5): 423-429, pls. ix, x.

Id. 1933-36. The fauna of British India, including Ceylon and Burma. Taylor & Francis, London. Odonata. Vols. I-III. (No keys to larvae, but characters of the larvae of some of the larger groups are given.)

(To be continued.)

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.

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.

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 852, La Paz, 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., Birmngham, 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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MARCH, 1941

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1941, 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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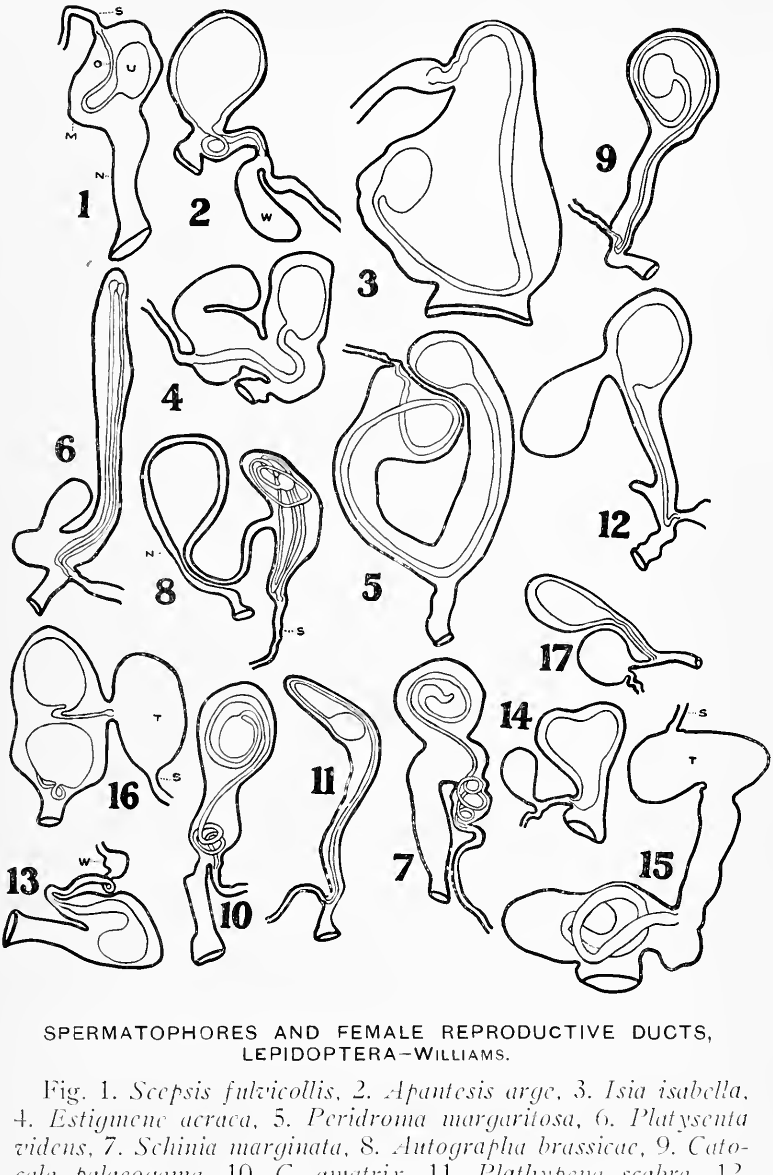

SPERMATOPHORES AND FEMALE REPRODUCTIVE DUCTS, LEPIDOPTERA—Williams.

Fig. 1. *Scepsis fulvicollis*, 2. *Apantesis arge*, 3. *Isia isabella*, 4. *Estigmene acraea*, 5. *Peridroma margaritosa*, 6. *Platysenta videns*, 7. *Schinia marginata*, 8. *Autographa brassicae*, 9. *Catocala palaeogama*, 10. *C. amatrix*, 11. *Plathypena scabra*, 12. *Coryphista meadi* f *badiaria*, 13. *Tlascala finitella*, 14. *Carpocapsa pomonella*. 15. *Halisidota tessellaris*, 16. *H. caryae*, 17. *Pandemis limitata*.

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The Relations of the Spermatophore to the Female Reproductive Ducts in Lepidoptera.

By JOSEPH L. WILLIAMS, University of Pennsylvania and Lincoln University, Pennsylvania.

(Plate I.)

Spermatophores of Lepidoptera have been known for many years. Balbiani, Hagen, Norris and Stitz discuss them in connection with their principal subject. The first study devoted entirely to spermatophores is that of Petersen, 1907. The only other work on this subject is that of the author, 1939. Higher Lepidoptera have the seminal duct extending from the bursa copulatrix or its duct to the vagina. The sperms follow this path from the spermatophore in the bursa to the vagina and thence to the spermatheca. The purpose of this paper is to discuss the relationship of the spermatophore to the bursa copulatrix and to the seminal duct.

I wish to thank Dr. Philip P. Calvert for his kindness during the progress of this investigation, Mr. John W. Cadbury, 3d, for identifying the specimens and Dr. A. Glenn Richards, Jr., for criticisms and helpful suggestions.

Females were captured by means of a light trap described by the author, 1939. The reproductive organs were dissected in physiological salt solution and the contents of the bursa observed. The diagrams were drawn with the aid of a camera lucida using the same power of the same microscope throughout.

Although the shapes of the bursa and spermatophore vary to a considerable degree even in the same family, the females observed, according to this study, are of classes A, B and C. Class A is composed of those females having the spermatophore in direct communication with the seminal duct. Since most of the females observed belong to this class, the bursa and spermatophore of only a few serving as types are figured.

Some specimens had more than one spermatophore; each represents a pairing, but only one at a time communicates with the seminal duct (fig. 6). Members of class B do not have the spermatophore communicating directly with the seminal duct, but with a duct that leads to a secretion-filled reservoir.[1] The seminal duct extends from this reservoir to the vagina. A last class of primitive moths C has no seminal duct. The spermatophore opens into the bursal duct, which extends to the vagina. The anatomy of this type is given in a forthcoming paper.

The insects are taxonomically arranged in descending order. Names used are those of the McDunnough check list unless otherwise indicated.

Class A

Macro-lepidoptera
Superfamily Noctuoidea
Family Amatidae
Scepsis fulvicollis Hbn. Fig. 1
Family Arctiidae
Subfam. Arctiinae
Apantesis arge Dru. Fig. 2
Isia isabella A. & S. Fig. 3
Estigmene acrea Dru. Fig. 4
Family Phalaenidae
Subfam. Phalaeninae
Agrotis ypsilon Rott[2]
Feltia subgothica Haw.
Peridroma margaritosa Haw., Fig. 5
Subfam. Hadeninae
Scotogramma trifolii Rott.
Polia subjuncta G. & R.
P. legitima Grt.
P. renigera Steph.
Orthodes sp. ?
Ceramica picta Harr.
Protoleucania albilinea Hbn.
Subfam. Amphipyrinae
Agroperina helva Grt.
Oligia fractilinea Grt.
Platysenta videns Gn. Fig. 6
Elaphria grata Hbn.
Anorthodes tarda Gn.
Galgula partita Gn.
Prodenia ornithogalli Gn.
Ogdoconta cinereola Gn.
Subfam. Heliothiinae
Heliothis obsoleta Fabr.
Schinia arcigera Gn.[3]
S. marginata Fig. 7
Subfam. Acontiinae
Erastria carneola Gn.
Subfam. Plusiinae
Autographa brassicae Riley Fig. 8
A. oo[4]

---

[1] Bursa usually without any secretion. In these species it is only the reservoir that is filled with a secretion.
[2] Bursa and spermatophore similar to that of *Peridroma margaritosa* Haw.
[3] Bursa and spermatophore similar to that of *S. marginata.*
[4] Bursa and spermatophore similar to that of *A. brassicae.*

Subfam. Catocalinae
Catocala palaeogama Gn. Fig. 9
C. amatrix Hb. Fig. 10
C. ultronia Hb.[5]
Caenurgina crassiuscula Haw.
Anomis sp.
Subfam. Hypeninae
Plathypena scabra Fabr. Fig. 11
Subfam. Herminiinae
Bleptina caradrinalis Gn.
Palthis angulalis Hbn.
Family Notodontidae
Dasylophia anguina A. & S.
Superfamily Bombycoidea[6]
Family Lasiocampidae
Lasiocampa quercus L.[7]
L. callunae[7]
Gastropacha quercifolia L.
Cosmotriche potatoria L.
Malacosoma americana Fabr.[7]
M. neustria L.[7]
Superfamily Geometroidea
Family Geometridae
Subfam. Sterrhinae
Haematopis grataria Fabr.
Subfam. Larentiinae
Coryphista meadi f. *badiaria* Hy. Edw., Fig. 12
Subfam. Ennominae
Semiothisa nigrocominae Warr.
Vitrinella pampinaria Gn.
Micro-lepidoptera
Superfamily Pyralidoidea
Family Pyralidae
Subfam. Pyraustinae
Desmia funeralis Hbn.
Nomophila noctuella D. & S.
Loxostege similalis Gn.
Phlyctaenia ferrugalis Hbn.
Subfam. Chrysauginae
Galasa nigrinodis Zell.
Subfam. Crambinae
Chilo puritellus Kft.
Subfam. Phycitinae
Tlascala finitella Wlk. Fig. 13
Ephestia kuhniella Zell.
Superfamily Tortricoidea
Family Olethreutidae
Subfam. Laspeyresiinae
Carpocapsa pomonella L. Fig. 14

Class B

Macro-lepidoptera
Superfamily Noctuoidea
Family Arctiidae
Subfam. Arctiinae
Halisidota tessellaris A. & S. Fig. 15
H. caryae Harris Fig. 16
Superfamily Tortricoidea
Family Tortricidae
Pandemis limitata Rob. Fig. 17

Class C

Without a seminal duct.
Superfamily Incurvarioidea
Family Prodoxidae
Tegeticula alba Zell. (=*yuccasella* Riley)
Proxodus quinquepunctella Cham.

Members of the superfamily Incurvarioidea have the spermatophore opening into the bursal duct, which extends to the vagina.

[5] Bursa and spermatophore similar to that of *C. amatrix*.
[6] All members of this superfamily except *M. americana* are from Meyrick's revised handbook of British Lepidoptera, London, 1928.
[7] The spermatophore is too small to be certain of its relation to the seminal duct.

In the three species listed under class B, it might be argued that the secretion-filled reservoir is not a part of the bursa copulatrix, but a swollen part of the seminal duct. Such a distinction is of comparative morphological interest. It is only a forensic argument here. Whatever the morphological homology of this reservoir may be, it is functionally the same; namely a secretion-filled sac through which the sperm must pass in order to reach the narrow duct leading to the vagina. In this sense they are exceptions to the general rule in the higher lepidoptera. A comparison of the bursa copulatrix and seminal duct of *Carpocapsa pomonella* (fig. 14) and *Pandemis limitata* (fig. 17) suggest that in the Tortricoidea at least the secretion-filled reservoir had best be considered a pouch on or just off the seminal duct.

Summary.

61 species representing 52 genera in 18 subfamilies of 9 families of 6 superfamilies of Lepidoptera were examined. The six superfamilies were Noctuoidea (39 species), Bombycoidea (6 species), Geometroidea (4 species), Pyralidoidea (8 species), Tortricoidea (2 species) and Incurvarioidea (2 species). Two types of relationship of the spermatophore to the seminal duct were noted. (1) In 56 of the species representing all superfamilies except Incurvarioidea, the spermatophore opens into the seminal duct. (2) In only three species, one of which is debatable, representing two genera (1 Noctuoid and 1 Tortricoid) the spermatophore does not open directly into the seminal duct. In these the open end of the spermatophore connects with a secretion-filled reservoir; this reservoir in turn connecting with the seminal duct.

The spermatophore, of course, is secreted by the male at the time of pairing. It is so formed and hardened in the bursa copulatrix of most Lepidoptera that the sperm leaving its open end pass directly into the seminal duct leading to the vagina. Thus the first stage of the frequently torturous wandering of the sperm within the female moth is assured by the structure of the spermatophore, as already reported by Norris and Petersen. But in rare cases the spermatophore empties into a secretion-filled reservoir in turn connecting with the seminal duct. In these exceptional cases the first stage of sperm migration cannot be so simple. How sperm may traverse such a secretion-filled reservoir is not known.

The most primitive families of moths have a fundamentally different type of female reproductive system. One of these, the Yucca Moth, is being treated in a separate paper. No seminal duct is present. The spermatophore opens into the bursal duct, which extends to the vagina.

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Explanation of Plate I.

Parts of the reproductive organs of the species indicated at the bottom of the plate and in the list on pages 62-63.

Abbreviations: M, Bursal cavity; N, Bursal duct; O, Neck of spermatophore; S, Seminal duct; T, Reservoir; U, Head of spermatophore; W, Reservoir.

A Bibliography of Keys for the Identification of Immature Insects. Part II. Odonata.

By Wm. P. Hayes.

(Continued from page 55.)

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(To be continued.)

A Population Study of a Bumblebee Colony, Bombus americanorum Fabr. (Hymen.: Bombidae).

By Phil Rau, Kirkwood, Missouri.

This is a population study of one colony of *Bombus americanorum* Fabr., removed on August 23, 1939, from its nest at Pacific, Missouri. While this species normally nests in the ground, this one was found in an old rodent's domicile in the hollow portion of a fallen log near a field of red clover.

Important studies in population problems of social insects have been made by such able investigators as Emerson[1], Bodenheimer[2], and others, but the life conditions of social insects are so intricate and the studies of colonies so difficult that many data must yet be gathered before extensive generalizations may be made. In regard to population studies of bumblebees, Bodenheimer says that "no reliable data are yet known on the duration of development, on longevity, or on total egg-production" and that the "lack of the relation between the number of cells and the number of individuals in the nest is even greater than in the wasps". For certain species of American bumblebees, however, Plath[3] and Frison[4] have recently supplied many of the missing data; but even so, the last word has not yet been said on bumblebee populations; therefore, when I had the opportunity to take a colony of *B. americanorum* late in the season, I decided to gather what information I could add to the meager knowledge of bumblebee populations.

The date when the nest was taken, August 23, is about four weeks before the colonies break up for the winter; that is if the information which Frison obtained for this species in Illinois holds also for Missouri, which is quite likely. The colony as taken was complete except for three workers, which spent the night away from home and were taken on their return next morning.

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[1] Population of Social Insects. Ecological Monographs 9: 287-300, 1939.

[2] Population Problems of Social Insects. Biol. Rev. 12: 393-430, 1937.

[3] Bumblebees and Their Ways. pp. 199, N. Y., 1934.

[4] A Contribution to the Knowledge of the Bionomics of Bremus americanorum. Ann. Ent. Soc. Amer. 23: 644-665, 1930.

The food reserves in the nest were scanty; there were only four cocoons full of honey, and one full and three half full cocoons of pollen. In addition, six others gave evidence of having at one time served as pollen containers. None of the containers were sealed. These were the old cocoons from which insects had emerged and were later used as containers.

Frison, who has very thoroughly worked up the life history of *B. americanorum*, says that *Psithyrus variabilis* is the common social parasite of this bumblebee. I looked carefully for evidence of this parasite in the colony but found none; nor was there any evidence of damage done by other parasites. Only a few foreigners were found in the nest; one caterpillar that might have been *Vitula edmandsii* (since it resembled a figure in Plath's book); four adult beetles, *Harpalus herbivagus* Say. (L. L. Buchanan det.), whose interest in the nest could not be determined; a half-dozen nymphs and a half-dozen empty egg cases of the woodroach *Parcoblatta* sp. The beetles and roaches were evidently scavengers and probably in no way injured the colony.

A Census of the Colony.

Immature Population.

Eggs; two batches totaling	20
Larvae; small, about ½ grown or less	26
Larvae; medium, males or workers in act of spinning cocoons	13
Larvae; large, queens in act of spinning cocoons	10
Large cocoons containing adult queens	58
Thirty-five of the above were fully pigmented and winged, ready to emerge as adults; 23 had white bodies, some of which were just beginning to become pigmented.	
Large cocoons containing quiescent larvae of queens	17
Cocoons with workers	0
Cocoons; small, with male pupae	48
Of the 48 listed above, 8 were fully formed ready to emerge, 17 were only partly pigmented, 23 were completely white.	
Small cocoons with quiescent larvae (sex unknown)	46
Since the size of adult workers and adult males are the same (Plath) one may legitimately expect the	

cocoons also to be the same size for both castes; therefore, the 46 listed above may be either males or workers.

Total of immature organisms in colony..................238

Adult Population.

Foundress queen; only one in colony with frayed wings....	1
Adult workers; dried pinned specimens, 14 to 17 mm.[5]....	95
Dwarfed workers.[6]	4
Young queens; dried, pinned specimens, 20-22 mm.......	26
Young queens; dried, pinned specimens, about 18 mm.....	3
Workers which returned next day.......................	3
Total number of adults in colony......................	132

The tables show that the immature organisms totaled 238 and the adults 132, thus giving a grand total for the colony of 370. How many of the immature organisms would have reached maturity before the coming of winter is not known; it probably would depend upon climatic conditions. At any rate, the colony at that late date would have no use for additional workers, and actually we do not find any immature workers in the nest, granting that the 46 small cocoons with larvae, whose sex could not be determined, are males. If these 46 larvae are males, then the colony would have had, before the close of the season, a population of 94 males; they would then almost have equaled the workers in number, whose total was 102.

It is interesting to note that there were no males in the nest on August 23, but that 29 new queens were there. The emerging date for males was still some time off because of the 48 males still within their cocoons, only eight were so far along in their development as to have the bodies pigmented. In con-

[5] Measurements of adults of this species according to Plath (p. 164) are: queens 22 mm., workers 17 mm., males 17 mm.

[6] There were four dwarfed workers in this colony and Frison (p. 660) finds that workers of this species produced in the early part of the season are often very small. For certain social wasps (Ecology 20: 440, 1939) it was found that workers of the first brood, probably due to undernourishment are often of small size.

trast to this when queen cocoons were cut open it was found that 35 out of the 58 were completely formed, with wings expanded, and ready to emerge. In this nest, at least, the queens became adult sometime before the males.

It is also interesting to note that while 29 adult queens were in the nest, there were, in addition, 85 cocoons (58, 17, and 10; see table) which contained immature queens that would have emerged before the close of the season had the colony not been disturbed. This would have given a total of 114 queens. Since apparently there would have been no more worker bees becoming mature, our total population of workers is 102. This colony, then, would have produced before the end of the summer 114 queens and 102 workers.

An item of much importance, also, in a colony of this kind is the amount of mortality among the bees during the working season. In populations of social insects generally, it is not always easy to study the relation of the number born to the number that survive to the end of the season. In bumblebees, however, a study of this kind is comparatively easy, since each adult leaves behind a telltale cocoon from which it hatched, and unlike other social insects, the cells are not used a second time for brood. Therefore when we counted 132 adults in the colony, we would expect to find 131 empty cocoons in the nest (deducting 1 cocoon for the queen which was born elsewhere). A count actually gave us 137 empty cocoons, showing that the total loss of adult insects for the summer was only six. A separation of the cocoons into two sizes, queen cocoons and worker cocoons, showed no loss of queens; there were 29 queens in the colony and 29 large empty cocoons. The six bumblebees that had been lost, came from among the worker caste. The lack of mortality of the queens was only to be expected, since they were young and had probably spent no time outside the nest. The mortality among worker bees is indeed low and proves, for this colony at least, that in a world of enemies, *Bombus americanorum* with her big body, flashy colors, audible hum and severe sting holds her own very well.

Triungulins of a Rhipiphorid Beetle Borne by Elis quinquecincta Fabr. (Coleoptera).

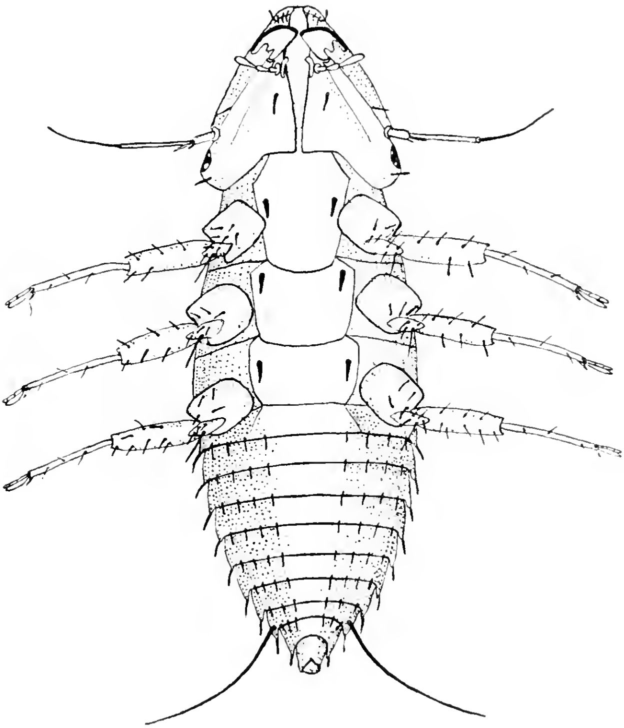
By Robert W. Pyle, Biological Laboratories, Harvard University, Cambridge, Massachusetts.

Among the specimens of Coleoptera, Diptera, and Hymenoptera collected at Sycamore Mills (near Philadelphia), Pennsylvania, during August, 1938, were a male and female *Elis quinquecincta* Fabricius. Subsequent examination of the Hymenoptera disclosed the fact that each of these two specimens had four triungulins attached to it. On the male one was attached to the hairs of the right side of the clypeus, one to the hairs of the prothorax, and one between the tarsal claws of each middle leg. The female *Elis* bore two attached to the hairs of the prothorax, one at the apex of the right hind wing, and one on the basal portion of the left hind wing on the anal vein.

These triungulins had been killed, as was the host, in a cyanide bottle and were quite dry when discovered. They were cleared in potash and mounted in gum damar, and probably belong to the genus *Rhipiphorus;* they may be described as follows:

Length 0.34 mm., width 0.12 mm. Body uniformly intensely black with the eyes slightly darker. The entire body much flattened dorso-ventrally, about twice as wide as thick throughout.

Head triangular, one-twelfth wider than long; the front border forming a blunt point. Eyes set upon the posterior corners of the head, and appearing, in specimens cleared in potash, to be composed of four or five ommatidia of more or less uniform size. Antennae three-jointed, cylindrical; a small basal joint, a short second joint, and the third joint more than twice as long as the second. Two apical setae, one much larger than the other, are set in the apex of the second joint. The apical seta of the third joint is long and extremely thin, its apex seen only after careful scrutiny under an oil immersion lens. The antennae and setae are about as long as the head. The palpi are about one-fourth the length of the head, three-jointed; joints cylindrical. Mandibles large, somewhat triangular, bluntly pointed; concealed beneath the head when closed and capable of overlapping slightly. They are set, on the posterior border, into a socketlike depression. Labrum with a number of setae along the ventral exposed portion. There is also one ventral in front of each antenna, one ventral back of each eye, and one along each side of the median ventral groove that runs the entire length of the head passing dorsad to the closed mandibles.



Thorax about as long as the abdomen; prothorax the longest, and metathorax the shortest. Each sternum is armed, on the anterior portion, with two very heavy bristles, one on each side.

The abdomen is relatively short in comparison to its width and is composed of nine segments in addition to an apical membranous process. Each segment bears a number of setae on the posterior margin ventrally; these are arranged in four longitudinal rows on each side with another row on the lateral margins of the segments. In addition to these the eighth segment bears laterally a pair of long bristles. The dorsal part of the body is devoid of bristles or setae.

The legs are about one-half the length of the body, and about equal in size. The femora are somewhat thickened, the tibiae more slender, and the tarsi apparently composed of three slender joints supported by a process equally long, but even under oil immersion their structure is exceedingly difficult to ascertain. Each part of the leg bears a number (4-8) of bristly hairs of varying lengths.

The method of attachment of these triungulins to the host is the same as has been described by Brues (1924) for *Horia maculata* Swed. Several hairs, or in some cases one hair, are grasped in such a way that they pass along the median ventral groove of the head dorsad to the mandibles which close below them. That this method of attachment is secure is attested by the fact that the specimen attached to the apex of the hind wing of the female *Elis* was extended at an angle and the legs were directed posteriorly. This wasp, being a fairly rapid flyer, must have given her passenger quite a dizzy ride. No ridges were observed on the mandibles as is the case of *Horia maculata*.

Reference of these triungulins to the genus *Rhipiphorus* is based upon a few distinguishing characteristics. *Rhipiphorus* is the only genus in which the eyes are set upon the posterior corners of the head with the antennae just anterior to them (Böving and Craighead, 1931, p. 281, figs. E. & G.). In all other genera the antennae are located upon the anterior half of the head with the eyes either upon the anterior half or near the middle. In some the eyes are located upon the posterior corners, but the antennae are well forward. Cros (1920) states that the numbers of ocelli are good characters for distinguishing between the various triungulins. He states the *Sitarini* possess two ocelli, *Rhipiphoridae* three, *Macrosiagon, Emmenadia, Rhizostylops* four, *Stylops* several and the other *Meloidae* (*Horiini, Meloini, Lyttini*) one. Böving and Craighead (1931), on the other hand, figure (p. 281 fig. E.) *Rhipiphorus solidaginis* Pierce with five ocelli. The triungulin in question has four or five; the exact number being difficult to determine due to their extremely small size. It seems that the position of the eyes and antennae rather than the number of ocelli is a better character for distinguishing this genus from closely related ones. Chobaut (1919) figures *Rhipidius densi* (p. 204), but although the eyes are located upon the posterior corners of the head the antennae are far forward. *R. densi* also possesses many more bristles than the triungulin in question.

The mandibles of this triungulin are broader than those shown in most figures, and do not correspond well with those figured by Böving and Craighead (1931). This difference, I believe, is due to the amount of clearing done in potash. The anterior border of the mandible is much thicker than the posterior portion. Consequently, at first sight the mandibles appear to be thin hooked structures and it is only after detailed study of a number of specimens that the posterior portion is evident. The position of the mandibles eliminates the possibility of these specimens belonging to the *Epicauta* or *Macrobasis* as described by Milliken (1921), since the mandibles of those genera are visible from above at all times. In the specimen in question the mandibles are well concealed by the labrum when closed. Other genera, *Tetraonyx*, *Zonitis Horia*, *Meloe*, with the mandibles placed so that they are not visible from above, have the antennae and the eyes located more toward the anterior portion of the head; this distinguishes them from *Rhipiphorus*. As is common with all genera having the mandibles so placed, these triungulins have a median ventral groove running the entire length of the head on the ventral surface. It is in this that the hair of the host is pressed by the mandibles.

The tarsus is worthy of note. It appears to be composed of three more or less equal joints which are supported by an equally long process. The structure of the tarsus is very difficult to determine, even using an oil immersion lens, and its clarity depends upon the amount of clearing in potash. Cros (1920) states that the specimens of *Meloini* he observed possessed tarsi which terminated in three similar curved claws, of equal thickness or sometimes with the median one stouter and straight. These types he termed "en fourche" and "en trident de Neptune". Brues (1924) describes the tarsus of *Horia maculata* as "reduced to a single curved claw on each leg". Pierce (1904) describes *Rhipiphorus* (*Myodites auct.*) *solidaginis*, Pierce: "Tarsus apparently three-jointed with a long claw, almost entirely concealed by a large, transparent, fleshy, elliptical sucker which is double its length." The triungulin found upon *Elis* also has the tarsus three-jointed, but the so-called sucker is only as long as the tarsus. Unfortunately, Pierce's figures are not sufficiently detailed to show the form of the tarsus in that species.

The presence of these triungulins, genus *Rhipiphorus*, upon both male and female *Elis quinquecincta* led me to examine other specimens of this wasp to see if they also bore triungulins. Accordingly, I examined the collection of Prof. C. T. Brues, which he so kindly placed at my disposal. This series contained specimens taken in various parts of the United States from Texas and Chicago eastward. In no case was I able to discover any triungulin upon any of the specimens in this collection, although they had been taken at various times during the entire season. This is not, however, the first case of triungulins having been found associated with wasps. Barber (1915) has noted *Macrosiagon flavipennis* in the cocoon of the wasp, *Bembex spinolae*. The presence of these Rhipiphorid triungulins upon *Elis quinquecincta* can probably be explained as a case of mistaken host as the *Elis* were taken while feeding upon some flowers.

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Does He Stridulate? (Lepidoptera : Eupterotidae).

By WM. T. M. FORBES, Department of Entomology, Cornell University, Ithaca, New York.

Tamphana marmorea Schaus is a striking little moth, more or less related to the North American *Apatelodes*,—one of the odd American group which has, roughly speaking, the venation and strong frenulum of the Notodontidae, larva of the Lasiocampidae and appearance of the Bombycidae,—a group which I should rate as a subfamily of Eupterotidae, though Schaus places it with the Bombycidae[1].

For the Apatelodinae as a whole the genitalia are of normal character: uncus well developed and articulated with the inflated tegumen, as in Bombycidae, Geometridae, Sphingidae, etc.; valves well developed, normal in character and articulation, their inner side articulating with a transtilla above and a normal juxta below; tegumen and vinculum forming a normal ring, the latter with a more or less distinct saccus; gnathos showing a slight peculiarity in being often continuously chitinized with the tegumen, though the two elements show separate systems of sculpture in *Olceclostera,* at least.

The genera as a whole fall into two groups, which do not correspond to the venational groups used in "Seitz",, but do correspond with the few known larvae. In the first, typified by *Epia,* the eighth segment is highly modified, chitinized, and

[1] See Seitz's "Macrolepidoptera of the World" vol. vi, pp. 675, 692, pl. 89, fig. k8.

toothed or spined dorsally and ventrally; uncus reduced and more or less membranous, and aedeagus long and slender; but the valves, while a little reduced in size and simplified, are normal in general structure, position, attachments, and obviously in function. The larvae show masses of very characteristic hair-scales. *Quentalia* is typical of this group, which includes *Anticla, Zanola, Colla* and *Epia*. In the last two the specialization has gone further and the last two segments are hopelessly fused.

The other type is that of true *Apatelodes*. The uncus is strongly chitinized and clearly articulated, is most often forked, and plainly fully functional; the eighth segment is unmodified, the aedœagus very short and stout, usually simple, and the valves are large and complex, often showing some trace of a clasper, and typically with a hairy lobe projecting posteriorly from the costal articulation. The known larvae have tufts and pencils of fine hair. *Apatelodes, Olceclostera, Arotros, Drapatelodes, Colabata, Compsa and Drepatelodes* belong to this group, though with some variation,—*Compsa, e.g.,* has lost the juxta.

Tamphana (see figure 1) falls quite outside this picture. The uncus is as reduced as in any Epiine, but is wholly separate from the large inflated tegumen, which latter has large rough lateral extensions. The eighth segment is not chitinized dorsally or ventrally, but has two lateral chitinizations on its inner face, ending below in hooks (*Accessory sclerite* of the figure); I can find no juxta, transtilla or gnathos, but on the other hand the saccus is longer than in any other Apatelodine. Most extraordinary of all are the valves. The main part of these, corresponding to valvula, sacculus and clasper, are reduced to two little hairy lobes, the right one subsessile, the left attached by a slender stem, and both obviously functionless rudiments; but above these there are two unsymmetrical and highly chitinized masses, attached by a broad sliding articulation to the side lobes of the tegumen, and extending up nearly to meet the sides of the uncus. The right one is broader at the base, occupying the whole midventral line, and ends ventromesally

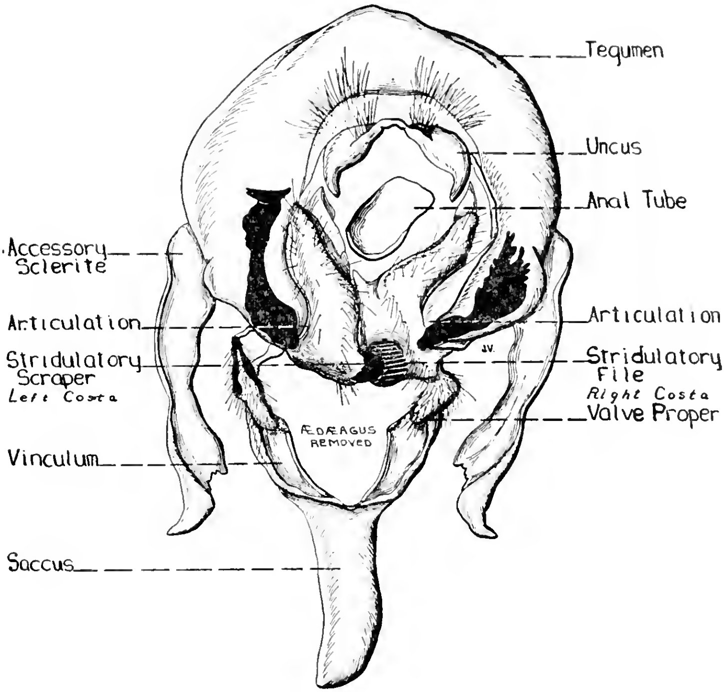


Fig. 1. Male genitalia of *Tamphana marmorea.*

in a black horizontally striated knob; while the left one overlies it, is narrower, less obviously striated (the faint striations are not shown in the figure) and ends mesally in a blunt ridge which lies on the striated area of the right one.

This has all the appearance of a stridulatory organ, with file and scraper; and we hope some good field observer in Panama or elsewhere will report on the mating behavior. The species is not too rare at Barro Colorado Island, though only males are before me.

It is also a curious problem how mating is managed in this species; the uncus and valves, which together form the usual clasping apparatus, are obviously non-functional; there is no adequate modification of the eighth segment to take their place.

I may only note that the aedeagus is tremendously developed, ending in a heavy circular hook. It would doubtless be strong enough to hold an attachment, but it is a mystery how it could be engaged and disengaged.

Descriptions of Three New Species of Mexican Chimarrha (Trichoptera: Philopotamidae).

By DONALD G. DENNING, University of Minnesota, St. Paul.

In December, 1938, Mr. Janus Ridley made a short collecting trip into northeastern Mexico. While collecting in the Mexican state, Nuevo Leon, approximately 200 miles south of the Texas border, three new species of *Chimarrha* were taken. I wish to express my thanks to Mr. Nathan Banks for examining these specimens, and to Mr. Ridley for presenting them as a gift to the University of Minnesota.

Chimarrha betteni n. sp.

♂.—Wing expanse 13 to 16 mm. Head blackish, thorax, antennae, palpi and legs fumose. Setae of head and thorax black and light brown. Wing membranes fumose, black setae quite dense along costal portion of wings and sparsely scattered over remainder. Three hyaline areas, devoid of setae, distributed over forewings as follows: a narrow nearly straight line extending from fork of R_{2+3} to M_3; a wide V-shaped spot, at fork of M_{1+2} and M_3; a short narrow line just beyond tip of Anal veins. Ocelli small and inconspicuous. Second segment of maxillary palpus with a group of long stout black setae distally, extending almost two-thirds length of third segment of maxillary palpus. Spurs 1-4-4; spur of foreleg small and inconspicuous. Venation typical for genus.

Genitalia as in Fig. 1. Eighth tergite heavily sclerotized curved ventrad distally with a median laminate process extending to the cercus, curving anteriorly and fusing to the anterodorsal angle of tenth tergite, distal margin of this process much more heavily sclerotized than remainder; eighth tergite, on each side of this median process, produced caudad into a thin, flat ovate projection, bearing a few rather long setae. Sternite of ninth segment heavily sclerotized, almost completely covered by eighth sternite, ventral lamina narrowly attenuated. Ninth tergite heavily sclerotized, sickle-shaped, curved caudad distally; bearing the semi-ovate cercus along posterior margin;

entire margin of cercus and ninth tergite with a brush of dense rather long setae; proximally this tergite fused to postero-ventral angle of eighth tergite. Small ovate structure, covered with small setae, between distal end of ninth and tenth tergites, barely discernible when viewed laterally. Tenth tergite extending caudad over aedeagus, saddle-shaped, posterior margin curved dorsad about even with cercus. Clasper small, narrow, widest portion about three times width of base; ventral margin elongated dorsad into blunt finger-like projection, dorsal margin with two short blunt angulations. Aedeagus weakly sclerotized, distally two splinter-like sclerites.

♀.—Wing expanse 16 mm. Very similar in size, color and general characteristics to male.

Holotype—Male, Villa Allende, Nuevo Leon, MEXICO, December 6, 1938, (Janus Ridley). Deposited in University of Minnesota collection. *Allotype*—Female, same data as for holotype. *Paratypes*—2 males, same data as for holotype .

Chimarrha ridleyi n. sp.

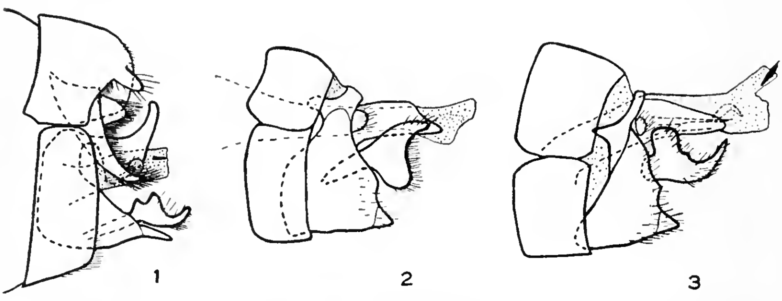
♂.—Wing expanse 10 mm. Head, thorax and antennae blackish, setae of head and thorax brown; palpi and legs fumose. Wing membranes fumose, short black pubescence very sparsely scattered. Four small hyaline areas distributed over forewings as follows: a narrow line extending from fork R_{4+5} to M_{1+2}; a rounded hyaline spot near fork of M_{1+2} and M_3; a narrow line a short distance beyond this fork, and extending across cell M_2; a relatively wide line near tip of Anal veins, extending from near Cu to margin of wing. Ocelli small and inconspicuous. Second segment of maxillary palpus with a group of stout black setae distally extending almost one-fourth length of third segment of maxillary palpus. Spurs 1-4-4, spur of fore tibia relatively stout and prominent. Venation typical for genus.

Genitalia as in Fig. 2. Ninth segment heavily sclerotized, sternite broadly triangular, proximal fifth covered by eighth segment, ventral lamina short, triangular, bearing a few, small, fine setae; dorsally ninth tergite narrowed to about one-fourth width of eighth tergite, along lateral margin an anteriorly directed blunt angulation. Tenth tergite relatively simple, composed of a pair of narrow plates, extending caudad about two-thirds length of aedeagus, postero-ventral corner shortly attenuated; dorso-distal portion with a small, wide, flattened triangular projection; distally tenth tergite weakly sclerotized. Small rounded clasper, base of tenth tergite, bears a few long fine setae. Clasper with base narrow, greatly widened distally, postero-dorsal corner elongated dorso-caudad; postero-ventral corner blunt, directed ventrad; distal margin serrate, it and rounded ventral margin bearing fairly long, fine, light-colored setae, concave inner surface with no setae.

Holotype—Male, Villa Allende, Nuevo Leon, MEXICO, December 6, 1938, (Janus Ridley). Deposited in University of Minnesota collection.

Chimarrha pylaea n. sp.

♂.—Wing expanse 12 mm. Head and thorax blackish, antennae black, palpi and legs fumose. Setae of head and thorax dark brown. Wing membranes fumose, covered with short black sparse pubescence. Five small hyaline areas, all devoid of setae, distributed over the forewing as follows: a small spot along R_1 near fork of R_{2+3} and R_{4+5}; a narrow line extending from fork R_{4+5} to M_{1+2}; a small round spot at fork of M_{1+2} and M_3; a narrow line, just beyond this fork extending from M_{1+2} across to M_3; a fairly wide line near tip of Anal veins extending from near Cu to margin of wing. Ocelli small and inconspicuous. Second segment of maxillary palpus with a group of stout black setae distally, extending slightly less than one-fourth length of third segment of maxillary palpus. Spurs 1-4-4; spur of fore tibia relatively stout and prominent. Venation typical for genus.



Terminalia of males of *Chimarrha*, left lateral views: 1. *Ch. betteni* n. sp., 2. *Ch. ridleyi* n. sp., 3. *Ch. pylaea* n. sp.

Genitalia as in Fig. 3. Sternite of ninth segment heavily sclerotized, ventral lamina short, triangular, directed slightly dorsad, a few fine setae present, dorsally ninth tergite narrowed to about one-tenth width of eighth tergite, lateral margin with an acute angulation directed anteriorly. Clasper convex, postero-ventral angle fingerlike, curved dorsad, almost reaching ventral margin of aedeagus; proximo-dorsal angle wide, blunt, directed dorsad; viewed laterally two small teeth along distal margin; mesal margin serrate entire length. Convex outer surface with a few fine setae along margins, concave inner surface with no setae. Tenth tergite a thin narrow plate, gradually tapering ventro-caudad, extending caudad about two-thirds length of aedeagus; proximal half of plate moderately sclerotized, distal half only weakly sclerotized. Small rounded cercus, at base of tenth tergite, bearing a few long fine setae. Distal portion of aedeagus with a dorso-caudad directed lobe, bearing a small splinter-like sclerite.

Holotype—Male. Monterey, Mexico, December 4, 1938, small stream, (Janus Ridley). Deposited in University of Minnesota collection.

Cardinal Feeding on a Mantid (Orthoptera: Mantidae).

Early in the morning of October 19, 1940, a cold day (26°F. at 6 A. M.), I saw a male cardinal on the porch, under an arborvita tree, apparently eating leaves and white fruits of a silver lace vine which had been left on the floor when the vine was cut back for the winter. After close watching I saw that the "green leaves" were the front wings of a mature mantid (*Paratenodera sinensis*) and the "white fruits" were bits of the internal organs. All four wings in turn were picked up and passed through the bill from side to side, beginning at the thin outer edge and working toward the base, in such a way that the bird seemed to be squeezing out any substance that could be extracted. The base of the wing was "nibbled" thoroughly and then the wing was tossed aside. Between dealing with wings, the bird ate most of the thorax, discarding the tougher chitin of the back, and the femora of most of the legs. He then started on the abdomen and dragged out the contents bit by bit until he had consumed at least half. By that time the bird was obviously "stalled" and he would eat a bit, then sit back and wait until he was able to take another beakful. Finally he had to give up and leave the rest for another time—which never came as we gathered up the fragments.

I did not see the beginning of the feast so I do not know if the bird caught the mantid or found it dead. If the latter, it must have just died as it was flexible and juicy—Amelia S. Calvert, Cheyney, Pennsylvania.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.

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.—Alexander, C. P.—Records and descriptions of North American crane-flies. [119] 24: 602-644, ill. **Anders, C.**—Living aerials. [Nat. Mag.] 34: 94-96, ill. **Anon.**—A new entomologist joins Ward's staff. [118] 14: 1-2, ill. **Anon.**—Collections of insects for illustrating important biological concepts. [118] 14: 9-10, ill. **Fletcher, F. C.**—Collecting and preservation of Coleoptera. [118] 14: 8-9, ill. **Ruediger, E.**—Insekten als krankheitsüberträger. [Ent. Jahr.] 1938-39: 149-160. **Schtepetilnikova, V. A.**—For the ecology of the Azof-Black Sea race of Trichogramma evanescens. [Bull. Plant Protection USSR] 1940: 161-165. **Teale, E. W.**—The Golden Throng. Dodd, Mead & Co. 1940. 208 pp., ill. **von Tunkl, F. F.**—Bemerkungen über die art der fundortangaben vom wissenschaftlichen standpunkt. [Ent. Jahr.] 1938-39: 113-120, ill.

ANATOMY, PHYSIOLOGY, ETC.—Fallis, A. M.—(see under Diptera). **Hollick, F. S. J.**—(see under Diptera). **Huzimatu, K.**—The life history of a new cynipid fly, Kleidotoma japonica. [Sci. Rep. Tohoku Imp. Univ.] 15:457-480, ill. **Mitchell, R. T.**—The alimentary tract of Vespula maculifrons (Vespid.). [43] 41: 29-38, ill. **Sidorovnina, E.P.**—On the hibernation of the egg-parasite of the bug (Eurygaster integriceps) Microphanurus semistriatus. [Bull. Plant Protection USSR] 1940: 183-184. **Tsuda, M.**

—Metamorphose von Glyphotaelius admorsus. [Annotationes Zool. Japonenses] 19: 195-197, ill.

ARACHNIDA AND MYRIOPODA.—Strelnikov, I. D. —Heat production by movement and its importance in the ecology of nocturnal butterflies. [Izvestiia Nauchwoo Inst.] 23: 293-338.

THE SMALLER ORDERS OF INSECTS.—Carpenter, F. M.—A revision of the nearctic Hemerobiidae, Berothidae, Sisyridae, Polystoechotidae and Dilaridae. [Pro. Amer. Acad. Arts & Sci.] 74: 193-280, ill. **Carriker, M. A., Jr.**—Studies in neotropical Mallophaga—Part II. New genera and species. [Lloydia] 3. 281-300, ill. **Hubbard, C. A.**—A review of the fleas of the genus Meringis with two new species. [Pacific Univ. Bull.] 37: 4 pp., ill. A review of the western fleas of the genus Malaraeus with one new species. and the description of a new Thrassis from Nevada. [Pacific Univ. Bull.] 37: 4 pp., ill. A check list of the fleas of the Pacific Northwest. [Pacific Univ. Bull.] 37: 4 pp. **Montgomery, B. E.**—A revision of the genus Diastatops (Libellulidae) and a study of the leg characters of related genera. [Lloydia] 3: 213-280, ill. **Yoshi, R.**—On some Collembola from Hokkaido. [Annotationes Zool. Japonenses] 19: 185-190, ill.

ORTHOPTERA.—Rehn, J. A. G.—On the species of the genus Camposia (Acridid. Cyrtacanthacrid.). [Notulae Naturae] No. 68: 11 pp., ill. (ks*). **Urquhart & Corfe.**—The European praying mantis (Mantis religiosa) in Ontario. [Canadian Field-Nat.] 54: 130-132, ill.

HEMIPTERA.—da Costa Lima, A.—Insetos do Brasil. Hemipteros. Volume 2. 1940. 351 pp., ill. (k). **Novopolskaia, E.**—New data concerning the biology of the apple sucker in the Crimea. [Bull. Plant Protection USSR] 1940: 96-98. **Snipes. Carvalho & Tauber.**—Biological studies of Ornithocoris toledoi, the Brazilian chicken bedbug. [Iowa State Coll. Jour. Sci.] 15: 27-37, ill.

LEPIDOPTERA.—Bell, E. L.—A new genus and some new species of Hesperiidae from Peru, in the Bassler Collection. [40] No. 1094: 7 pp., ill. **Bobinskaia, S. G.**—Basic ecological factors regulating the increase of Polychrosis bortana in Kakhetia. [Bull. Plant Protection USSR] 1940:

78-86. **Clark, A. H.**—Butterflies of Farmville, Virginia. [91] 31: 38-40. **Davenport, D.**—The butterflies of the satyrid genus Coenonympha. [Bull. Mus. Comp. Zool. Harvard Coll.] 87: 215-349, ill. **Kotzsch, H.**—Das präparieren der Schmetterlinge. [Ent. Jahrb.] 1938-39: 5-15. ill. **Miller, H. D. O.**—Observations on sod web-worms (Crambus spp.) in Kansas. [Trans. Kansas Acad. Sci.] 43: 267-281, ill.

DIPTERA.—Bequaert, J.—Notes on Hippoboscidae 17. The Hippoboscidae of the Antilles. [115] 19: 305-327. **Cope, O. B.**—The morphology of Esthiopterum diomedeae (Mallophaga). [117] 5: 117-142, ill. **Fallis, A. M.**—Studies on Oestrus ovis. [Can. Jour. Res.] 18: 442-446, ill. **Hollick, F. S. J.**—The flight of the dipterous fly Muscina stabulans. [Philosoph. Trans. Ry. Soc. Lond.] (B), 230: 357-390, ill. **Rubcov, I. A.**—Geographical expansion and evolution of gadflies in connection with the history of their hosts. [Priroda] 1940, No. 6: 48-60, ill. **Seevers, C. H.**—New Termitophilous Diptera from the neotropics. [Zool. Ser. Field Mus. Nat. Hist.] 24: 175-193, ill. **Alexander, C. P.**—See General.

COLEOPTERA—Blaisdell, F. E. — A monographic study of the species belonging to the melyrid genus Tricho chroides. [1] 66: 283-306, ill. Studies in the Melyridae. No. 12. [1] 66: 319-324. **Murayama, J.**—Nouvelle note sur les Scolytides du Manchoukuo. [Annot. Zool. Japon.] 19: 229-237.

HYMENOPTERA.—Linsley, E. G.—A revision of the genus Oreopasites (Nomadid.). [1] 66: 307-318, ill. **Mitchell, R. T.**—(See under Anatomy). **Rees & Grundmann.**—A preliminary list of the ants of Utah. [Bull. Univ. Utah] 31: 11 pp. **Snodgrass, R. E.**—The male genitalia of Hymenoptera. [Smiths. Misc. Coll.] 99: 86 pp., ill.

SPECIAL NOTICES.—Synonymic list of butterflies of Korea. By D. M. Seok. Korea. 1939. 391 pp., ill.

The Louse, an account of the lice which infest man, their medical importance and control. By Patrick A. Buxton, M. A., M. R. C. S., L. R. C. P., D. T. M. & H., Director, Department of Medical Entomology, London School of Hygiene and Tropical Medicine, Professor of Medical Entomology, University of London. A William Wood Book. The Williams and Wilkins Co., Baltimore, 1940. 8¾ x5½ inches, pp. ix, 115, 5 tables, 28 text figures, $3.00.—The author, writing in November, 1939, says in the preface: "At the present moment the control of the louse has become extremely important in civil as well as military life. It may therefore be of service to publish an account of the insect, its relations to disease and the methods that may be used for controlling it. The present book was originally written as part of a larger work on medical entomology which is in preparation. It was designed for readers with some knowledge both of entomology and medicine: I trust that it has now been made comprehensible to those who lack the one or the other."

A better general description of the book could hardly be written. It is full of valuable information and data of all kinds. It should be most useful to physicians, nurses and sanitation entomologists working in the war zone and of value to all students wishing a concise yet comprehensive summary to date of our knowledge of these insects and their relation to medicine, as well as to any intelligent layman who may have reason to use it. Essentially a highly concentrated compilation of data and results of responsible work on the louse, its biology and medical importance, much that is inconclusive has been omitted from text and bibliography. The student is thus saved the labor of sifting the literature for himself.

The author justifiably devotes only the first 22 pages to the zoological position of the Anoplura and the external and internal anatomy of *Pediculus humanus*. The next 30 pages are concerned with the individual and collective biologies of head and body lice. Twenty-seven more have reference to the medical importance of *P. humanus* with full discussions of the entomology of Typhus, Trench and Relapsing fevers together with development of their causative organisms while in the body of the louse and the methods by which they are transmitted to man. Ten full pages on control followed by six on all aspects of *Phthirus pubis*, and an appendix of 5 pages on methods of rearing and artificially feeding lice for experimental purposes complete the main text. There are 7 pages of references and an adequate index.

There is nothing superfluous in the book, yet Mr. Buxton avoids condensing his material to the point of unreadability. Moreover, the selection of illustrations, graphs and tables seems most fortunate and should be very helpful if only because they are brought together in one volume. Helpful too are the cross references in the text to figures, other sections of the book and bibliography, and the citation of all temperature readings in both Fahrenheit and Centigrade scales. Finally, it seems to this reviewer that the author has succeeded admirably in making the volume intelligible to either a medical student or an entomologist.

Perhaps the only disappointing feature is the short treatment accorded *Phthirus pubis.* Although not as important medically, or as thoroughly studied biologically, as *Pediculus humanus,* very brief accounts of this species are the rule in most reference works. Undoubtedly Mr. Buxton has felt justified in reducing his discussion of the crab-louse, but in comparison with the rest of the text, this section seems to be somewhat less comprehensive.

The total content and its arrangement, together with its convenient size will combine to make this book a most valuable tool in the hands of medical and entomological workers. Perhaps it is not too bold to suggest that for these very reasons it may make a great contribution toward controlling major outbreaks of lice and louse-borne diseases in war ravaged Europe. If the years to come prove this to be so, Mr. Buxton will have performed a service for which humanity itself can be profoundly grateful.—John W. Cadbury, 3rd.

OBITUARY

We regret to record the deaths of the following Entomologists, of whom we hope to give longer notices in future issues:

Dr. Charles Wardell Stiles, author of papers on ticks, and long secretary of the International Commission on Zoological Nomenclature, on January 24;

Charles William Leng, prominent Coleopterist and Director of the Public Museum of Staten Island, New York, on January 25;

Dr. Levi W. Mengel, Lepidopterist, Director emeritus of the Reading, Pennsylvania, Museum and Art Gallery, on February 3;

Samuel Henshaw, Coleopterist, Director emeritus of the Museum of Comparative Zoology at Harvard University, on February 5.

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—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 852, La Paz, 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., Birmngham, 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

ENTOMOLOGICAL NEWS

APRIL, 1941

Vol. LII No. 4

CONTENTS

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1941, 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. LII APRIL, 1941 No 4.

Take Offs by Prey-Laden Wasps (Hymen : Pompilidae?, Sphecidae).

By W. V. BALDUF, University of Illinois, Urbana.

In the summer of 1939, I chanced to observe two isolated instances that indicate certain predatory wasps at least occasionally ascend on foot to some elevated vantage point in order to take off by flight when burdened heavily with paralyzed prey they are in the process of transporting to their nesting sites. No effort has been made to review the similar cases that have doubtlessly been recorded in the literature.

The first instance involved a rather large black wasp that resembled a pompilid in general appearance, and a medium-sized green adult tettigoniid orthopteran. In the brief glance afforded me, I was unfortunately not able to identify either predator or prey more fully. It was about 5:00 P. M., of August 8 and on the back porch of my mother's home at Oak Harbor, Ohio, that I happened upon the wasp standing on the porch floor astride the long-horn. Presumably the hopper had been seized in the honeysuckle vines that decorated the adjacent end of the porch, for tettigoniid stridulations had emanated from this growth on previous days.

When first seen, the wasp had already chewed a hole through the vertex of the captive's head and stood feeding from the perforation. But in a few seconds, she started gingerly toward the wooden porch post four feet away, and upon reaching it climbed approximately four feet vertically on it, remaining astride the victim all the time as she proceeded. From this high point she took off through the air without further delay, and, carried by a stiff wind attained an elevation of about 15 feet just before she disappeared beyond my vision.

The second instance was observed as I walked through the campus woods of the University at 7:45 A. M., of August 1. There I came across a cicada-killing wasp, *Sphecius speciosus*

(Dru.) in possession of an already inactivated large green cicada, probably *Tibicen linnei* (Sm. and Grosb.). Curious to learn what was to happen next, I came to a stop not more than two feet from where the wasp stood over her prey. In a moment, *speciosus,* standing astride of and dragging her catch, proceeded toward me and climbed at once upon my left shoe, then successively up the outside of a trouser leg, over the shirt front and a shoulder, and around the back of the neck to the top of the head. Whereas the horizontal approach to the shoe was made slowly, the vertical climb was accomplished with a burst of speed that recalled the sudden response made by an airplane when the accelerator is pushed quickly down for the take off. The ascent to the height of six feet and three inches was therefore completed in only a few seconds. From that more advantageous elevation, *speciosus* promptly zoomed away among the trees with her load, and was gaining elevation slowly as she faded from view.

In order to determine the approximate carrying power of this wasp during flight, I weighed a female freshly killed in a cyanide jar and two females of *Tibicen linnei* that had probably fallen dead out of trees on the day they were found. One of the cicadas weighed 1.4 grams, the second 2.1 grams, whereas the wasp balanced the chinomatic scale at 0.3536 gram. *Sphecius speciosus* is therefore probably capable of flying a prey load four to six times greater than her own weight to her nesting site.

In most cases, the cicada killer presumably overcomes her captives where she catches them in trees and would therefore usually not be obliged to ascend on foot to some vantage point in order to take off. In their struggle with the living cicadas, some *speciosus* probably chance to fall to the ground, as may have been true in the instance described above. Although possibly exceptional, this case is nevertheless of interest in showing that such accidents need not frustrate the wasp in her activity of provisioning her nest.

A Bibliography of Keys for the Identification of Immature Insects. Part II. Odonata.

By Wm. P. Hayes.

(Continued from page 69.)

Needham, J. G. 1897. Preliminary studies of N. American Gomphinae. *Can. Ent.*, 29 (7): 164-168, (8): 181-186, pl. 7. (Key to genera, pp. 167-168).

Id. 1903. Aquatic insects in New York State. Life histories of Odonata Suborder Zygoptera Damselflies, *N. Y. State Mus. Bull.* 68: 218-276, figs. 3-17, pls. 5, 11-19. (Key to families, subfamilies, genera and species.)

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Needham, J. G. and Betten, C. 1901. Aquatic insects in the Adirondacks. *N. Y. State Museum Bul.*, 47. Odonata: 429-540. (Various keys mostly to genera).

Needham, J. G. and Fisher, E. 1936. The nymphs of North American Libelluline Dragonflies. *Trans. Am. Ent. Soc.* 62: 107-116, pls. vi, vii. (Key and verification table to genera, pp. 113-115.)

Needham, J. G. and Gyger, M. K. 1937. The Odonata of the Philippines. *Philip. Jl. Sci.* 63 (1): 21-101, 10 pls. (Many keys to nymphs of Anisoptera as far as genera throughout the paper.)

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Needham, J. G. and Heywood, H. B. 1929. A handbook of the dragonflies of North America, vii, 378 pp., many figs. Thomas Co., Springfield, Ill. (Many keys as far as genera, many tables to spp. throughout the book.)

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Nevin, F. R. 1929. Larval development of *Sympetrum vicinum* (Odonata: Libellulidae). *Trans. Amer. Ent. Soc.* 55: 79-102. (Key to instars of this species, p. 100.)

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Nunney, W. H. 1894. Larvae-nymphs of British dragonflies. *Science Gossip* (n. s.) 1 (4): 80-82, 3 figs.; (5): 100-102, figs. 1-5; (6): 129-131, figs. 7-15; (7): 148-150, figs. 16-26; (8): 176-177. (No keys, but diagnostic synopsis of 30 spp., pp. 176-177.)

Peterson, Alvah. 1939. Keys to the orders of immature stages (exclusive of eggs and pronymphs) of North American insects. *Ann. Ent. Soc. Amer.* 32 (2): 267-278. (Keys leading to Odonata, pp. 268-270.)

Pulkkinen, A. 1927. Über die Larven einiger Odonaten III. *Notulae entom.* 7: 11-12. (Keys to 3 spp. of *Leucorrhinia* and 7 spp. of *Sympetrum* of Finland.)

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Id. 1921. The Odonata or Dragonflies of South Africa. *Ann. S. Afric. Mus.* 18 (3): 245-452, pls. v-xii, 6 figs. (No S. African larvae, except that of *Chlorolestes*, are described or figured, but the more striking characters of Gomphine (p. 339), Aeschnine (p. 357), Corduline (p. 375) and Libelluline (pp. 383-4) nymphs are given.)

Roster, Dante Alessandro. 1885. Contributo all'anatomia ed alla biologia degli Odonati. *Boll. Soc. Ent. Ital.* 17: 256-268, tav. iii, iv. (Distinguishes 2 groups of Odonate larvae: Caudobranchiati and Rectobranchiati, p. 259.)

Id. 1886. Cenno monografico degli Odonati del gruppo Ischnura. *Boll. Soc. Ent. Ital.*, 18: 239-258, tav. ii-vi. (Distinguishes two species of Agrion, pp. 241-245).

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Id. 1921. Les larves et nymphs aquatiques des insectes d'Europe, Vol. 1. Office de Publicité Anc. Etabliss J. Lebegue & Co., 967 pp. Brussels, (Odonata—pp. 101-161, Keys to genera and some spp.)

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Id. 1936. Die mitteleuropäischen *Aeschna*-Larven nach ihren lezten Häuten. *Deutsche Ent. Ztschr.* 1936 (I/II): 53-73, 15 figs. (Key to 10 spp. and subspp., pp. 60-63.)

Id. 1936. Die europäischen *Leucorrhinia*-Larven, analytisch betrachtet. *Arch. Naturges.* (N. F.) 5 (2): 287-295, 9 figs. (Key to 5 spp., p. 289.)

Id. 1936. Die westpaläarktischen Gomphiden-Larven nach ihren letzten Häuten. *Senckenbergiana* 18 (5/6): 270-282, 10 figs., 1 table. (Key to 11 spp., pp. 274-277.)

SEEMAN, M. T. 1927. Dragonflies, Mayflies and Stoneflies of Southern California. *Jour. Ent. and Zool.,* 19: 1-69, figs., pls. i-iv. (Odonata—pp. 5-39, figs. Keys to genera and some spp.)

TILLYARD, R. J. 1910. Monograph of the genus *Synthemis. Proc. Linn. Soc. N. S. Wales* 35 (2): 312-377, pls. iv-ix, 3 figs. (Table of differentials of nymphs 3 spp. of *Synthemis,* 1 sp. of *Metathemis,* 1 sp. of *Choristhemis,* p. 373.)

ID. 1911. On the genus *Cordulephya. Proc. Linn. Soc. N. S. Wales* 36 (2): 388-422, pls. xi, xii. (Larvae of 2 spp. described, compared with each other, p. 405, and with other Corduline larvae, pp. 406-409.)

ID. 1912. On the genus *Diphlebia,* with descriptions of new species, and life-histories. *Proc. Linn. Soc. N. S. Wales* 36 (3): 584-604, pls. xix, xx. (Comparative descriptions of nymphs of *D. lestoides* and *D. nymphoides*, pp. 597-599.)

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TILLYARD, R. J. and FRASER, F. C. 1939. A reclassification of the order Odonata. Based on some new interpretations of the venation of the dragonfly wing. By R. J. Tillyard. Continuation thereof. By F. C. Fraser Part II. *Australian Zool.* 9 (3): 195-221, 11 figs. (Characters of larvae of families Amphipterygidae, p. 204, Chlorocyphidae, p. 206, Polythoridae, p. 208, Epallagidae, p. 210, and Agriidae, p. 211.)

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Eisenach, M. Wilckens. Pp. [2], 308. (Diagnoses of the spp. of the larvae of Odonata, pp. 69-72.)

Id. 1908. (Same title) Neue billige Ausgabe mit einem Anhang: Neuere Beobachtungen. Gotha Friedrich Emil Perthes. Pp. [4], 324, 96 textfigs., 23 pls. (Diagnoses of the spp. of larvae of Odonata, pp. 69-72, taf. 12.)

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Id. 1913. New nymphs of Canadian Odonata. *Can. Ent.*, 45: 161-170, pls. i, ii. (Key to two species of *Boyeria* p. 164, comparisons of spp. of *Nehalennia*, *Enallagma*, *Neurocordulia*, *Tetragoneuria*, *Somatochlora*, *Leucorrhinia*.)

Id. 1914. The known nymphs of the Canadian species of *Lestes*. *Can. Ent.*, 46: 189-200, pls. xiii, xiv. (Key to species pp. 190-191).

Id. 1914. New and little known nymphs of Canadian Odonata. *Can. Ent.*, 46: 349-356, 369-377, pls. xxiii, xxv. (Key to two species of *Lestes*, p. 349, comparative table of *Aeshna palmata* and *umbrosa* p. 373.)

Id. 1915. Notes on the Odonata of the vicinity of Go Home Bay, Georgian Bay, Ontario. Suppl. *47th Ann. Rep. Dept. Marine & Fisheries, Fish. Branch*: 53-94, pls. iii-ix. (Many comparative notes on nymphs, key to *Boyeria* 2 spp., p. 74.)

Id. 1916. The nymphs of *Enallagma cyathigerum* and *E. calverti*. *Can. Ent.* 48: 192-196, pl. ix.

Id. 1916. The nymphs of the North American species of *Leucorrhinia*. *Can. Ent.*, 48: 414-422, pls. xii, xiii. (Key to 6 spp., pp. 415-416).

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Id. 1932. The nymph of *Gomphus quadricolor* Walsh. *Can. Ent.* 64: 270-273, pl. 9.

Id. 1933. The nymphs of the Canadian species of *Ophiogomphus. Can. Ent.* 65: 217-229, pls. 11-14. (Key to 8 species, p. 219).

Id. 1934. The nymphs of *Aeschna juncea* L. and *subarctica* Wlk. *Can. Ent.* 66: 267-274, 2 figs., pls. 11, 12.

Id. 1937. A new *Macromia* from British Columbia (Corduliidae). *Can. Ent.* 69: 5-13, 4 figs., pl. 1. (Comparative notes on nymphs of 2 spp., pp. 10-11.)

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Williamson, E. B. 1900. The dragonflies of Indiana, 24th *Ann. Rept. Indiana Dept. Geol. and Nat. Resources*, pp. (3), 233-333, 1003-1011, 7 pls. (Uses Calvert's 1893 key to genera, pp. 244-246).

Two New Texas Buprestidae (Coleoptera).

By Josef N. Knull, The Ohio State University, Columbus.

Acmaeodera gillespiensis n. sp.

♀.—Slightly more robust than *A. obtusa* Horn., but of same general form. Head, pronotum and ventral surface bronze, elytra dark blue with yellow markings as follows: basal three-fourths of sides of pronotum, an irregular transverse basal band exclusive of umbone and scutellar regions, an irregular transverse median band, also one on apical fourth and one at apex, none of bands touching suture.

Head with slight frontal depression; surface densely coarsely punctured, punctures separated by fine lines, densely pubescent; antennae reaching to middle of pronotum when laid along side, serrate from the fifth joint.

Pronotum convex, two median depressions and a basal depression each side; margins entire, not visible from above; wider at base than in front, widest in middle; sides broadly rounded; surface densely coarsely punctured, punctures larger than on head, a transverse basal corrugated stripe, pubescence dense. Scutellum not evident.

Elytra at base same width as base of pronotum, wider than pronotum just back of base which is widest point; sides expanded back of base, constricted in front of middle, widened back of middle, broadly rounded to rounded apices, apical margins serrate; disk somewhat flattened, with depression at scutellum, first and third costae raised; surface deeply, coarsely, densely punctured, punctures arranged in rows, separated by less than their own diameters, interspaces with finer punctures, pubescence not dense.

Abdomen beneath coarsely densely punctured, pubescent, last ventral without carina. Prosternal margin straight, not reaching front angles.

Length 10.3 mm.; width 4 mm.

Holotype female collected in Gillespie County, TEXAS, June 20, 1940, by D. J. and J. N. Knull, in collection of writer.

According to Fall's key* this species would come under the truncate group and should stand next to *obtusa* Horn. It is distinguished by the large densely placed punctures of the pronotum, much larger punctures of elytra, lack of carina on last ventral, raised third costa and very sinuate elytral margin when viewed from the side.

Mr. M. A. Cazier kindly compared the specimen with the type of *A. perforata* Caz.

Cinyra roburella n. sp.

♂.—Larger and more robust than *C. gracilipes* (Melsh.), pronotum and elytra dark bronze, head, ventral area and legs cupreous, more shining than above.

Head convex, a median line extending from pronotum one-third down front; surface rugose on front, with irregular smooth callosities, median one prominent, vertex finely punctured, pubescent; clypeus deeply emarginate; antennae reaching to extreme hind angles of pronotum when laid along side margins, scape stout, second joint twice as long as wide, third

* H. C. Fall, N. Y. Ent. Soc., V. 7, pp. 1-37, 1899.

joint longer than scape, fourth joint longest, following joints decreasing in length, joints four to eleven inclusive flattened, serrate.

Pronotum broader than long, widest at base, constricted at apex; sides broadly rounded in front, subparallel at base; disk convex, a transverse basal depression, faint median depression and lateral depression on each side, small pit in front of scutellum; lateral marginal carina extending nearly to front; surface confluently punctured, punctures larger than on vertex, pubescence lacking. Scutellum triangular, concave, glabrous.

Elytra wider than pronotum, widest back of middle; sides rounded in front, constricted at middle, broadly rounded posteriorly, apices truncate; disk convex, with irregular depressions; surface irregularly costate, densely punctured, punctures smaller than on pronotum, pubescence very short, inconspicuous.

Abdomen beneath densely punctured, pubescent; last abdominal truncate, outer angles produced. Posterior tarsi shorter than tibiae.

Length 16.3 mm.; width 5.5 mm.

♀.—Differs from male by antennae reaching just past middle of pronotum.

Holotype male collected from oak in the Davis Mountains, Texas, July 4, 1936, by the writer. In addition to the holotype, allotype and paratypes in collection of the writer from the same locality bearing dates June 13 to Aug. 20, collected by D. J. and J. N. Knull. Paratype labeled Chisos Mtns., Tex. July 17, H. A. Wenzel, in the Wenzel Collection at The Ohio State University.

This species should stand next to *C. gracilipes* (Melsh.) according to Chamberlin's key.** However it differs by being more robust, dull, and having a convex pronotum, more densely punctured dorsal surface and by structure of the male genitalia.

The writer is indebted to Mr. W. S. Fisher for comparing the species with the Schaeffer types.

** W. J. Chamberlin, Ent. News, V. 31, pp. 211-244, 1920.

A Preliminary List of the Culicidae of Michigan Part I. Culicinae (Diptera).*

By William H. Irwin.

This paper presents a list of the Culicidae, subfamily Culicinae, and the names of the counties of Michigan from which the author has records. Previously published records are included. This list includes 18 species new for the state and extends the knowledge of distribution of the previously reported species. This study was based upon a total collection of approximately 33,000 specimens of which about 15,000 are larvae and the remainder adults. Six hundred thirty specimens were loaned to the author from the collections of the Department of Entomology, Michigan State College, by Professor E. I. McDaniel. Also the writer had the privilege of examining a collection of 300 specimens made by C. W. Sabrosky, Michigan State College, and another of about 80 specimens made by R. R. Dreisbach, Midland, Michigan. All others were collected by the writer. Most of the collections by the author were made in the years 1935-1939. Every species included in this list is represented by specimens in the writer's collection. The names used are those employed by Edwards (1932).

1. Aedes aboriginis Dyar. Five females collected from Cheboygan County.

2. Ae. aurifer (Coquillett). Cheboygan and Emmet Counties. Also reported for Michigan by Matheson, 1924.

3. Ae. campestris Dyar and Knab. One female collected by R. R. Dreisbach in Midland County, 1937.

4. Ae. canadensis (Theobald). Algers, Cheboygan, Emmet, Genesee, Luce, Washtenaw, Wayne and Wexford Counties. Also reported for Michigan by Matheson, 1924.

5. Ae. cinereus Meigen. Cheboygan, Crawford, Emmet, Ingham, Midland, Presque Isle, and Washtenaw Counties.

6. Ae. communis (DeGeer). Algers, Cheboygan, Emmet, Luce, and Washtenaw Counties. Also reported for Michigan by Matheson, 1924.

* Contribution from the Biological Station and the Department of Zoology, University of Michigan.

7. AE. DIANTAEUS Howard, Dyar and Knab. Cheboygan County.

8. AE. EXCRUCIANS (Walker). Alpena, Berrien, Calhoun, Cheboygan, Emmet, Ingham, Kent, Keweenaw (Isle Royale), Lapeer, Leelanau, Livingston, Luce, Midland, Tuscola, and Washtenaw Counties. Also reported for Michigan by Matheson, 1924.

9. AE. FITCHII (Felt and Young). Algers, Alpena, Berrien, Cheboygan, Emmet, Ingham, Keweenaw (Isle Royale), Lapeer, Livingston, Luce, Midland, Montcalm, Presque Isle, Roscommon, Tuscola, Washtenaw, and Wayne Counties. Also reported for Michigan by Matheson, 1924.

10. AE. FLAVESCENS (Müller). Cheboygan, Ingham, and Midland Counties.

11. AE. IMPIGER (Walker). Algers, Cheboygan, and Washtenaw Counties.

12. AE. IMPLACABILIS (Walker). Cheboygan County.

13. AE. INTRUDENS Dyar. Algers, Cheboygan, Emmet, Ingham, Keweenaw (Isle Royale), Luce, Mackinac, Midland, Presque Isle, Roscommon, Washtenaw, Wayne, and Wexford Counties. Also reported for Michigan by Matheson, 1924.

14. AE. LATERALIS (Meigen). Algers, Cheboygan, and Wayne Counties.

15. AE. PULLATUS (Coquillett). Cheboygan, Midland, and Roscommon Counties.

16. AE. PUNCTOR (Kirby). Algers, Cheboygan, Emmet, and Luce Counties. Also reported for Michigan by Matheson, 1924.

17. AE. RIPARIUS (Dyar and Knab). Cheboygan and Emmet Counties.

18. AE. SPENCERI (Theobald). Cheboygan and Ingham Counties.

19. AE. STICTICUS (Meigen). Allegan, Arenac, Emmet, Luce, and Van Buren Counties. Also reported for Michigan by Matheson, 1924.

20. AE. STIMULANS (Walker). Calhoun, Cheboygan, Emmet, Ingham, Kent, Keweenaw (Isle Royale), Lapeer, Liv-

ingston, Midland, Washtenaw, and Wayne Counties. Also reported for Michigan by Pettit, 1903.

21. AE. TRICHURUS (Dyar). Cheboygan, Emmet, Lake, Midland, Oscola, and Roscommon Counties. Also reported for Michigan by Matheson, 1924.

22. AE. TRISERIATUS (Say). One specimen collected from Emmet County.

23. AE. VEXANS (Meigen). Alpena, Berrien, Cheboygan, Emmet, Genesee, Gratiot, Ingham, Kalamazoo, Kent, Washtenaw, Wayne, and Wexford Counties. Also reported for Michigan by Matheson, 1924.

24. ANOPHELES MACULIPENNIS Meigen. Cheboygan, Emmet, Genesee, Ingham, Kent, Midland, Presque Isle, Washtenaw, Wayne, and Wexford Counties. Also reported for Michigan by Pettit, 1903.

25. AN. PUNCTIPENNIS (Say). Cheboygan, Emmet, Genesee, Midland, Montmorency, Presque Isle, Washtenaw, and Wexford Counties. Also reported for Michigan by Pettit, 1903.

26. AN. QUADRIMACULATUS Say. Cheboygan, Emmet, Genesee, Ingham, Montcalm, and Washtenaw Counties.

27. AN. WALKERI Theobald. Cheboygan, Emmet, Genesee, Ingham, Kent, and Washtenaw Counties. Also reported for Michigan by Dyar, 1922.

28. CULEX APICALIS Adams. Cheboygan, Emmet, Genesee, Ingham, Wexford, and Van Buren Counties. Also reported for Michigan by Jewell and Brown, 1929.

29. C. PIPIENS Linnaeus. Cheboygan, Emmet, Genesee, Ingham, Washtenaw, Wayne, and Wexford Counties. Also reported for Michigan by Pettit, 1903.

30. C. PECCATOR Dyar and Knab. One specimen collected in Ingham County, August, 1938, by E. I. McDaniel.

31. C. SALINARIUS Coquillett. Cheboygan, Genesee, Ingham, and Midland Counties.

32. C. TARSALIS Coquillett. Cheboygan and Emmet Counties.

33. C. TERRITANS Walker. Cheboygan, Emmet, Genesee, Ingham, St. Joseph, Washtenaw, Wayne, and Wexford Coun-

ties. Also reported for Michigan by Matheson, 1924.

34. MANSONIA PERTURBANS (Walker). Cheboygan, Emmet, Mackinac, and Wexford Counties. Also reported for Michigan by Pettit, 1903.

35. PSOROPHORA CILIATA (Fabricius). Ingham, Kent, Livingston, and Wayne Counties. Also reported for Michigan by Pettit, 1903.

36. PS. FEROX (Humboldt). Collected from Ingham County, 1933. Also reported for Michigan by Pettit, 1903.

37. THEOBALDIA IMPATIENS (Walker). Cheboygan County. Also reported for Michigan by Jewell and Brown, 1929.

38. TH. INCIDENS (Thomson). Cheboygan and Emmet Counties.

39. TH. INORNATA (Williston). Cheboygan, Emmet, and Genesee Counties. Also reported for Michigan by Matheson, 1924.

40. TH. MELANURA (Coquillett). Wexford County.

41. TH. MORSITANS (Theobald). Cheboygan, Emmet, and Washtenaw Counties. Also reported for Michigan by Matheson, 1924.

42. URANOTAENIA SAPPHIRINA (Osten Sacken). Berrien, Cheboygan, and Ingham Counties. Also reported for Michigan by Pettit, 1903 and recorded for Washtenaw County by Hinman, 1935.

43. WYEOMYIA SMITHII (Coquillett). Cheboygan County. Also reported for Michigan by Matheson, 1924.

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Notes on the Nearctic Geosarginae (Diptera: Stratiomyiidae).

By MAURICE T. JAMES, Colorado State College, Fort Collins.

In a previous paper[1] I published an account of the Nearctic Geosarginae which, in the light of further study and with the accumulation of additional information, is in need of revision. The present paper attempts to bring this review up to date.

Revised Key to the Genera.

1. Scutellum spined—*Nothomyia* (belongs to Stratiomyinae).
   Scutellum unspined (Geosarginae) 2
2. Second segment of antennae produced into third in a finger-like process, especially visible on inner side, *Ptecticus*

[1] Canad. Ent., 47, pp. 267-275, 1935.

Second segment of antennae sometimes convex, but not produced into a finger-like process...............3

3. Eyes densely and conspicuously pilose........*Chloromyia*

Eyes bare 4

4. Anterior ocellus remote from other two by a distance much greater than length of base of ocellar triangle (except in *G. perpulcher*); distance from r-m to origin of R_{2+3} greater than length of r-m..........*Geosargus*

Ocelli approximately equidistant from each other.....5

5. Abdomen relatively short and broad, much wider than thorax and (excluding segment five) no longer than broad; eyes of male contiguous, divided into definite zones of different sized facets; distance from r-m to origin of R_{2+3} greater than length of r-m..........6

Abdomen barely, if any, wider than thorax, and two to three times as long as wide; eyes in both sexes separated and not divided into zones of different sized facets; origin of R_{2+3}, in American species known to me, before, at, or but slightly beyond r-m.........7

6. Discal cell small; posterior veins weak, evanescent toward wing margin; anal cell as broad as combined basal cells ....*Microchrysa*

Discal cell of usual size; posterior veins evident to wing margin; discal cell wider than basal cells individually, about two-thirds their combined width,

Cephalochrysa[2]

7. Lower squama with a strap-like projection (Neotropical and Old World) ....*Chrysochroma*

Lower squama without such a projection (Nearctic and Neotropical) ....*Merosargus*

Ptecticus trivittatus melanopus, ssp. nov.

In all respects a typical *P. trivittatus*, except that the tarsi and the apical two-thirds of the hind tibiae are black, the front and middle tibiae are blackish anteriorly on the apical two-fifths; and each antenna bears on the inner side of the third segment a pair of black spots, one near the base of the arista, the other at the opposite apical corner.

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[2] See Ent. News, 50, p. 218, 1939.

Holotype, ♂, Columbus, OHIO, Sept. 1, 1939 (J. Enke) Ohio State University collection.

CHLOROMYIA FORMOSA Scopoli. Two males, Rochester, New York, July 16, 1939 (Amer. Mus. Nat. Hist.). This is the first record in America of this common Palaearctic species.

GEOSARGUS LUCENS Loew.

Sargus lucens Loew, 1866, Cent., VII, 11 (♂).

Sargus tricolor Loew, 1866, Cent., VII, 12. (♀).

Macrosargus clavis Williston, 1895, Canad. Ent., 17: 123 (♂; ♀).

A widely distributed and somewhat variable species. I have seen a female from Clarksville, Tennessee, which agrees with the form described as *tricolor,* but I believe this is merely a color variation.

MICROCHRYSA POLITA L. and M. FLAVICORNIS Meig. are both widely distributed throughout the United States, but evidently neither is of common occurrence.

CEPHALOCHRYSA Kertész. To this genus belong the four species which in my previous paper I assigned to *Isosargus.*

MEROSARGUS CAERULIFRONS Johnson. This species, formerly placed in *Geosargus,* is a true *Merosargus.*

Merosargus beameri, n. sp.

♂. Head black, with a green cast, especially on the face; the vertex, post-vertical area, and middle of front as far as the frontal calli, however, metallic green; frontal calli ivory white, subinterrupted; black areas of front densely punctured. Front broadest below; ratio of vertex on posterior margin, front anterior to unpaired ocellus, and front at calli, 11 : 9 :11. Pile on upper part of front black and brownish-yellow intermixed, on lower part of front and face short, black; on cheeks, longer, yellow. Antennae brownish-yellow, their pile black; arista at base somewhat more blackish, thickened, and black-haired; segments subequal in length.

Thorax, except a slender notopleural margin, wholly metallic green, the dorsum, however, especially behind the suture and on the scutellum and metascutellum with a decided violet cast; dorsum with short, inconspicuous, erect, black pile and with longer, rather conspicuous, appressed yellow pile; pile elsewhere white, except on the metanotal slopes, where there is some long black pile intermixed with the more abundant white.

Legs yellow, except the last two or three segments of the front and hind tarsi, the apical three-fifths of the hind tibiae, and the apical three-fourths of the hind femora (especially above); pile in general black on black areas and also on apical segments of middle tarsi, otherwise yellow.

Halteres yellow, somewhat darkened on knob. Wings hyaline; veins brown, almost black in places; R_{2+3} arising slightly beyond r-m, converging somewhat toward R_1 but ending independently of it.

Abdomen widening gradually to apex of fourth segment; length almost three times maximum width; color metallic green with violet reflections, unmarked with yellow except narrow base of second and narrow apex of fourth segments of venter, and genitalia, the latter wholly bright yellow; pile short, black, inconspicuous; the basal three segments, and to a much less extent the fourth and base of the fifth segments, have, in addition, on the sides of the terga a long, pale yellow pile which greatly obscures the black. Length, 8.5 mm.

Holotype, ♂, Baboquivari Mountains, Arizona, July 19, 1932 (R. H. Beamer). Snow Entomological Collection, University of Kansas.

Runs in Curran's key (Amer. Mus. Nov., 534, p. 1-2) to *cingulatus* Schiner; but the lack of extensive yellow markings will readily distinguish it from *cingulatus*, the described Mexican species not included in Curran's key, and, indeed, from most other described species of the genus. *M. caerulifrons*, which also has the unicolorous abdomen, may at once be distinguished by its yellow pleura.

Henry Clinton Fall Memorial Publication Fund.

The Pacific Coast Entomological Society has recently received a gift of securities valued at $1000. from the estate of the late H. C. Fall, to be known as the Henry Clinton Fall Memorial Publication Fund, according to the January issue of the *Pan-Pacific Entomologist*.

A note on Noctuid larvae found in Ant's Nests (Lepidoptera; Hymenoptera: Formicidae).

A collection of a part of a colony of *Formica rufa obscuripes* Forel, together with some of the material of the nest was made at Seattle, Washington, in March, 1939. This material, including the ants, was placed in an observation nest in the laboratory and kept for two months. The ants were given generous amounts of honey and water, as well as bits of insects for food. During this time 6 female and 4 male moths emerged from pupal cases in the rubble of the nest. Examination of the nest material revealed 12 pupal cases still occupied, and 8 larvae not yet pupated. The pupal cases of the moths were made from fragments of the nest—straw, leaves, etc., held loosely together by silk. When a newly emerged moth alighted in the nest a passing ant would attack it, but the numerous larvae and pupae were undisturbed by the ants.

Noctuids of the genus *Episcuxis* are known to lay eggs in decaying leaves (Holland, W. J. "The Moth Book" 1937) and other forest detritus. C. V. Riley (Amer. Naturalist; vol. 17, 1883 also Insect Life; vol. 4, 1892) reports the common occurrence of the larvae of *E. americalis* Guenée in nests of *F. rufa*. Wheeler (Ants, 1910) describes the caterpillars as neutral synoeketes, obtaining their food as scavengers in the middens of the nests.

It is remarkable, however, that the adults of these moths which are evidently subject to attack by the ants, would have an opportunity to oviposit on an ant mound.

Several of the moths which emerged in the laboratory were sent to Prof. Wm. T. M. Forbes, who confirms my identification in saying that these are probably a pale western race of *Episcuxis americalis* Guenée.—Falconer Smith, B-258 Biological Laboratory, Harvard University, Cambridge, Mass.

War Damage to Entomology.

An identical note in the January, 1941, issues of the *Entomologists' Monthly Magazine* and *The Entomologist*, London, states that "Owing to enemy action almost the whole of the archives of the Society for British Entomology and practically the whole of the stock of back numbers of *Transactions* and *Journal* have been completely destroyed, including the current list of names and addresses of members." Our sympathy to our British colleagues.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.

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.—Goodnight, C. J.—Insects taken by the southern pitcher plant. [Trans. Ill. State Acad. Sci.] 33: 213. **Hayes, W. P.**—Some recent works on the classification of immature insects. [103] 14: 3-11. **Lutz, Adolpho.**—Obituary with portrait by T. Borgmeier. [105] 11: 963-966. **McColloch, James Walker.**—Obituary by G. A. Dean. [103] 14: 1-2. **Murphy, M.**—Household Insects. [Georgia Dept. Ent.] Bull. 21: 1-39, ill. **Needham. J. G.**—Insects from the seed pods of the primrose willow, Jussiaea angustifolia. [10] 43: 2-6, ill. **Pinto, C.**—(See under Diptera). **Plaumann, F.**—Ueber das Sammeln im brasilianischen Urwald. [105] 11: 908-920. **Shelford & Twomey.**—Tundra animal communities in the vicinity of Churchill, Manitoba. [84] 22: 47-69. ill. **Smart, J.**—Notes on the localities [in British Guiana and Trinidad] from which the Ceratopogonidae mentioned in Dr. Macfie's paper were taken. [107] A, 9: 194-195. **Smart, J., et al.**—Instructions for Collectors. No. 4a. Insects. vi + 164 pp., ill. London, British Mus. (Nat. Hist.). **Spencer, J. G.**—The control of human lice under war conditions. [4] 73: 20. **Travassos, L., et al.**—Relatorio da excursao cientifica do Instituto Oswaldo Cruz realizada na zona da Estrada de Ferro Noroeste do Brasil, em outubro de 1938. [Bol. Biol., Brasil] 4 (1939): 208-315, ill.

ANATOMY, PHYSIOLOGY, ETC.—**de Beaumont, J.** —Le determinisme des metamorphoses chez les Insectes (Hormones de metamorphose). [41] 18: 49-57. **Bolwig, N.**—The reproductive organs of Scatophila unicornis (Diptera). [107] A, 15: 97-102, ill. **Bouvier, G.**—Note sur l'Armature genitale des Tabanides. [41] 18: 57-61, ill. **Burt, E. T.**—A filter-feeding mechanism in a larva of the Chironomidae (Diptera). [107] A, 15: 113-121, ill. **Cope, O. B.**—The morphology of Esthiopterum diomedeae (Mallophaga). [117] 5: 117-142, ill. **Eltringham, H.**—The larval gland in Lachnocnema bibulus (Lepidoptera: Lycaenidae). [36] 90: 452-453, ill. **Fox, I.**—The Siphonapteran thorax. [10] 43: 6-10, ill. **Fraser, F. C.**—A comparative study of the penes of the family Gomphidae (Odonata). [36] 90: 541-550, ill. **Mitchell, R. T.**—The alimentary tract of Vespula maculifrons (Hymen.: Vespid.). [43] 41: 29-38, ill. **Pereira, C.**—Sobre a diafanizacao dos artropodos. [105] 11: 642-644. **Pickel, D. B.**—Dermatite purulenta produzida por duas especies de Paederus (Col.: Staphylinid.). [105] 11: 775-793. **Pickles, W.**—Fluctuations in the populations, weights and biomasses of ants at Thornhill, Yorkshire, from 1935-1939. [36] 90: 467-485. **Salt, G.**—Experimental studies in insect parasitism. VII: The effects of different hosts on the parasite Trichogramma evanescens (Hymen. Chalcid.) [107] A, 15: 81-95, ill. **Stahel & Geijskes.**—Observations about temperature and moisture in Atta nests (Hymen: Formicidae). [105] 11: 766-775, ill. **Stanley, J.**—A mathematical theory of the growth of populations of the flour beetle Tribolium confusum. IV: A modified theory descriptive of the relations between the limiting value of egg-populations in the absence of hatching, and the volume (or weight) of flour used in the culture. [84] 22: 23-37, ill. **Wright, G.**—Observations on the fertility of the black widow spider. [Trans. Ill. State Acad. Sci.] 33: 225.

ARACHNIDA AND MYRIOPODA.—**Buecherl, W.**—Dois novos quilopodos do subgenero Parotostigmus, da colecao do Instituto Butantan. [Bol. Biol., Brasil] 4 (1939): 444-447, ill. **Chamberlin & Ivie.**—Spiders collected by L. W. Saylor and others, mostly in California. [Bull. Univ. Utah] 31: 49 pp., ill. **Heriot, A. D.**—A new character distinguishing Tetranychus pacificus from T. telarius. (Acarina). [4] 73: 1, ill. **Jones, S. E.**—An annotated list of the spiders of an east central Illinois forest (Wm. Trelease

Woods, University of Illinois). [Trans. Ill. State Acad. Sci.] 33: 216-220. **Knight, K. J.**—Illinois distribution records of the black widow spider. [Trans. Ill. State Acad. Sci.] 33: 214-215, ill. **de Mello-Leitão, C.**—Dois gêneros e sete espécies de Goniléptidas sulamericanos. [Bol. Biol., Brasil] 4 (1939): 345-351, ill. Opiliões coligidos pelo Dr. Henry Leonardos no xingú. [Bol. Biol., Brasil] 4 (1939): 352-357, ill.

THE SMALLER ORDERS OF INSECTS.—Arle, R.—Novas espécies de Pseudachorutini do Rio de Janeiro e Arredores. [Bol. Biol., Brasil] 4 (1939): 67-72, ill. **Berner, L.**—Baetine mayflies from Florida. [39] 23: 33-45; 49-62, ill. (*). **Fryer & Edelsten.**—Psectra diptera (Neuroptera: Hemerobiidae) at Woodwalton Fen, Hunts. [8] 76:271. **Ross, H. H.**—N. spp. of Trichoptera from Canada and northern United States. [4] 73: 15-19, ill. **Tillyard, R. J.**—A reclassification of the order Odonata, based on some new interpretations of the venation of the dragonfly wing. Part III. Suborder Anisozygoptera. [Australian Zool.] 9: 359-396, ill. (*k). **Werneck, F. L.**—Notas sobre anopluros. [105] 11: 722-729, ill. (S*).

ORTHOPTERA.—Burks, B. D.—(see Hymenoptera). **Rehn, J. W. H.**—A new genus of mellierid mantid from Venezuela (Manteidae). [Notulae Naturae] No. 70: 4 pp., ill.

HEMIPTERA.—Balduf, W. F.—Ambush bug studies. A summary. [Trans Ill. State Acad. Sci.] 33: 206-208. **Beamer, R. H.**—Two n. sp. of Erythroneura (Cicadell.). [103] 14: 18-19. **Compere, H.**—Parasites of the black scale, Saissetia oleae, in Africa. [Hilgardia] 13: 387-425, ill. **da Costa Lima, A.**—Espécies de Pseudococcus observadas no Brasil. [Bol. Biol., Brasil] 4 (1939): 1-10, ill. **Curtiss, C.**—The alfafa plant bug, Adelphocoris lineolatus, found in Kansas. [103] 14: 25-26. **Lent & Pifano.**—Sobre a identidade dos generos Panstrongylus Berg, 1879 e Mestor Kirkaldy, 1904. Redescricao de Panstrongylus rufotuberculatus encontrado, na Venezuela, naturalmente infestado pelo Schizotrypanum cruzi. [105] 11: 629-639, ill. (S). **Lent & Viana Martins.**—Estudos sobre os Triatomideos do Estado de Minas Geraes, com descricao de uma especie nova. [105] 11: 877-886, ill. **Mendes, L. O. T.**—Dysdercus da coleção da escola nacional de Agronomia. [Bol. Biol., Brasil] 4

(1939): 98. **Monte, O.**—Sphaerocysta brasiliensis (Tingitid.). [Bol. Biol., Brasil] 4 (1939): 516-518, ill. **Sailer, R. I.**—Additional notes on Galgupha loboprostethia (Thyreocorinae). [103] 14: 19. **Usinger, R. L.**—A n. sp. of Aradus from Brazil. [105] 11: 639-642, ill.

LEPIDOPTERA.—Bourquin, F.—Contribution al estudio de la metamorfosis de los lepidopteros argentinos. [105] 11: 809-820, ill. **Davenport, D.**—The butterflies of the Satyrid genus Coenonympha. [Bull. M. C. Z.] 87: 215-349, ill. (b*). **Ferreira d'Almeida, R.**—Contribuicao ao estudo dos Mechanitidae. [105] 11: 758-766, ill. (S*). Revisão do gênero Appias (subgen. Glutophrissa). [Bol. Biol., Brasil] 4 (1939): 50-66, ill. Revisao do genero Aphrissa. (Pierid.). [Bol. Biol., Brasil] 4 (1939): 423-443, ill. **de Figueiredo, E. R., Jr.**—Notas sobre a Thridia themisto Huebn., 1823, praga do manaca [Bol. Biol., Brasil] 4 (1939): 512-515, ill. **Hayward, K. J.**—N. sp. of Neotropical Hesperiidae from Ecuador. [105] 11: 861-877, ill. **Jordan, K.**—Results of the Oxford University Biological Expedition to the Cayman Islands, 1938: Sphingidae. [8] 76: 275-277. **Kaye, W. J.**—Additions and corrections to the recorded species of Trinidad butterflies. [36] 90: 551-573. **Santos, N.**—Contribuiçã ao conhecimento dos Euchromiidae. [Bol. Biol., Brasil] 4 (1939): 87-97, ill. **Stallings, D. B.**—New records of Lepidoptera for Sumner Co., Kansas. [103] 14: 16. New records of butterflies for Kansas. [103] 14: 21. A freak butterfly. [103] 14: 26. **Stephan, J.**—Clothilda (Rhopal.). [18] 54: 181-184, (S). **Travassos, L.**—Contribuicao ao conhecimento dos Adelocephalidae. [105] 11: 682-690, ill. (*). Contribuicao para o conhecimento dos Euchromiidae. V. Genero Isanthrene. [Bol. Biol., Brasil] 4 (1939): 454-472, ill.

DIPTERA.—Aitken, T. H. G.—The gen. Psorophora in California (Culicidae). [105] 11: 672-682, ill. **Alexander, C. P.**—Further observations on the Psychodid subfam. Bruchomyinae. [105] 11: 793-799, ill. (kS*). Records and descriptions of Tipulidae from tropical America. Pt. 3. [105] 11: 894-908, ill. **Antunes & Coutinho.**—Notas sobre Flebotomos Sul-Americanos. Descricao de Flebotomus whitmani n. sp. e da armadura bucal de algumas especies. [Bol. Biol., Brasil] 4 (1939): 448-453, ill. **Antunes & Ramos.**—Culex (Carrollia) iridescens, bonnei e soperi (Culicid.). [Bol. Biol., Brasil] 4 (1939): 374-385, ill.

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SPECIAL NOTICES.—Adaptive Coloration in Animals. By Cott, H. B., xxxii + 508 pp., ill. Methuen & Co., London. **Insetos do Brasil.** By da Costa Lima, A., vol. 2: Hemipteros. 351 pp. Rio de Janeiro. **New Systematics.** By Huxley et al. 583 pp. Oxford, Clarendon Press.

Entomophagous Insects By Curtis P. Clausen. First Edition McGraw-Hill Book Co., New York and London 1940 pp. x+688. 257 figures. Price $7.50. In the study of insect biology, the unusual and amazing seems almost to be the usual state of affairs; and perhaps nowhere is there a greater assemblage of remarkable adaptations, a greater variety of intricate modification of structures, developmental peculiarities and behavior than among the entomophagous insects described in this book. Most of the forms dealt with are the parasitic insects, those sometimes referred to as predaceous parasites, for the planidium larva, which pounces upon a caterpillar and proceeds to devour it or some other parasite already present, is, in a sense, also a predator. But Dr. Clausen prefers the established terminology and avoids even the term "parasitoid." Indeed, he shows little concern regarding definitions and theories for he is anxious to get on with his job, a very sizable one, that of telling us what is actually known of the biology of all the insect-eating insects. Proceeding at once with the Hymenoptera, he first makes what generalizations are possible on the habits of this group as to egg placement, feeding, sex, reproduction, phoresy and then he describes the types of immature stages, cites the effect upon the host and discusses sex ratios. There is a great deal of detailed information on numerous species—the anatomy of the larvae, their development and host relationships—all presented not as a mere compilation but in a thoroughly digested and integrated form. The many curious forms of larvae are illustrated by figures as are also representative adult types. Then follow the aculeate Hymenoptera containing both predaceous and parasitic forms as well as many that are difficult to classify. The Diptera are discussed according to the same plan as the Hymenoptera. The Lepidoptera, Coleoptera, Hemiptera and 10 smaller orders are taken up in turn; and in each case most attention is given to the forms that are most highly specialized in their host relationships. Altogether this volume will be of great value to entomologists and parasitologists, for it represents the compilation and synthesis of a great mass of information from numerous sources, including many foreign entomological and agricultural publications and reports, that is not otherwise available to the working investigator. The book will be of use also to those interested in general biological problems such as sex determination, sex ratios, reflexes, behavior, diapause, polyembryony, etc. On each of these topics there is much information included under the families concerned and so indexed, usually, rather than as first-place index entries. The list of references, all cited in the text, takes up 47 pages. The index lists all forms mentioned, including host species.—R. G. SCHMIEDER.

PLANT GALLS AND GALL MAKERS by EPHRAIM PORTER FELT, Director and Chief Entomologist, Bartlett Tree Research Laboratories, etc., Ithaca, New York. Comstock Publishing Co., Inc., 1940. Pp. viii, 364, 344 text figs., 41 plates. $4.00.—Dr. Felt says in his preface: "This work is an extended revision, a rewritten version with much additional matter, of the author's 'Key to American Insect Galls' which appeared as New York State Museum Bulletin No. 200 in 1917 [1918]. The demand for the bulletin was so great that the edition was speedily exhausted." The bulletin of 1918 comprised 310 pages, including 16 plates and 250 text-figures, so that the net increase in the present volume is 62 pages. The plates in 1918 were massed near the end of the book, just before the index; here they are interspersed throughout the text. *Plant Galls and Gall Makers* is divided into two parts: I. Introduction pp. 4-35, II. Key to the galls of the various plant families pp. 37-338. Following is a bibliography pp. 339-340 and the index pp. 341-364. The introduction is much more extensive than the 14 pages similarly labeled in the 1918 bulletin, except that the tabulation of plants and American insect galls (p. 31) is a very much compressed summary of tables occupying 14 pages (215-228) in 1918. The introduction discusses galls and gall types, gall producers, injurious and valuable galls, honeydew producing galls, how galls are produced, life history of gall producers, alternation of generations*, insects and fungous galls, distribution and abundance of gall insects, gall insects in different parts of the world (especially those of Asia, the Dutch East Indies, southern Europe, middle Europe, Moravia, North, South and Central America), gall insect preferences for host plants in America, natural checks, collecting galls and studying gall insects—an interesting summary. The main body of the book, the key to the galls, follows in general the treatment of 1918, but with frequent differences in detail, or in minor sequence.

* In this section Dr. Felt remarks: "Investigations in Europe show that a relatively large number of oak gall wasps have alternating generations. There are probably more than 600 oak galls occurring upon American oaks and as yet the direct connection between the two generations has been established for relatively few." This is illustrated by his list of "The known agamic and bisexual forms of American gall wasps" (pp. 22-25) which contains 17 species and varieties.

The references to the descriptions of each gall or its maker are, however, omitted. At the head of each plant family a general discussion of its galls and gall makers has been added. Most (all?) of the illustrations of 1918 are reproduced but are often redistributed; many others, principally from the works of Kinsey and of Weld, have been added. Under "Bibliography," Dr. Felt says "The author has given an extended bibliography in his . . . Bulletin No. 200, 1918. The following is limited to the more important works which have appeared subsequently." It is composed of 18 titles from 1920 to 1938, arranged chronologically. The earlier list of 282 titles runs from 1841 to 1918. How far the present work is a betterment of its predecessor must be left to the specialists to decide, but it appears to be a very useful volume, and the bulletin of 1918 may be still be kept alongside it, for bibliographical assistance.—P. P. Calvert.

OBITUARY

Hermann Schwarz died suddenly at Webster Groves, Missouri, on March 21, 1940. He was born in Osnabruck, Germany, March 27, 1876 and came to America when 9 years old. He was the youngest of four brothers, all naturalists. Entirely self-educated, he eventually attained to the leadership of the naturalists of St. Louis and surrounding territory. Interested in all phases of natural history, he belonged to many nature study and scientific societies, being one of the organizers of the St. Louis Naturalists Club and the St. Louis Entomological Club. In recent years he was very active in Boy Scout work, being a member of the Court of Honor and chairman of the Science Section. It was while making the awards to four Eagle Scouts that he collapsed and almost immediately afterwards died. Mr. Schwarz was in the printing business, but for a number of years conducted the Mid-West Nature Supply House as a hobby. He contributed the following articles to Entomological News: "A Setting-block for Lepidoptera" (1898), "The Art of Collecting Catocala" (1899), "A Convention of Entomologists at the home of Dr. Wm. Barnes" (1910), "The St. Louis Entomological Club" (1911), "Miss Mary Murtfeldt" (1913), and jointly with Henry McElhose

"List of 110 Species and Varieties of Butterflies taken by Members of the St. Louis Entomological Club in the Vicinity of St. Louis, Mo." (1907). He had a collection of butterflies taken in Missouri.—EDWIN P. MEINERS.

Dr. GEORGE W. BOCK died in St. Louis, Missouri, July 22, 1940. He was at one time a very enthusiastic beetle collector and carried on a rather extensive correspondence with many of the older collectors. He built up a collection said to number about 45,000 specimens. Born in Hamelin, Germany, June 23, 1856, he came to the United States when he was 24 years of age. Eventually he settled to the practice of medicine in St. Louis, in which he continued until a few years ago, being compelled to retire due to the infirmities of age. Dr. Bock collected principally in the vicinity of St. Louis, but in his early years made two rather extensive collecting trips, one to Guatemala and another to Mexico. He was one of the organizers of the St. Louis Naturalists Club and at one time a member of the St. Louis Entomological Club. He contributed an article to the December, 1907, number of ENTOMOLOGICAL NEWS on "An absolutely sure method of preservation of Natural Scientific collections against insect enemies".—EDWIN P. MEINERS.

AUGUST KNETZGER died at his home in Alton, Illinois, on July 2, 1940, at the age of 73 years. Mr. Knetzger, who was a musician by profession, was at one time an ardent student of the Lepidoptera and contributed the following articles to ENTOMOLOGICAL NEWS between the years 1907 and 1912: "St. Louis Butterflies", "Migration of Anosia plexippus", "Notes on Missouri Lepidoptera", and "Observations on the Lepidoptera of St. Louis, Mo. and vicinity during 1911". He was at one time a member of the Heink Entomological Club and the St. Louis Entomological Club. He recently gave his collection of 8,000 butterflies to the Pere Marquette State Park at Grafton, Illinois.—EDWIN P. MEINERS.

CHARLES L. HEINK died at his home in St. Louis, Missouri, on June 8, 1940. Although not a scientist in the strict sense of the word, Mr. Heink did much to interest others in the study of insects. He was particularly concerned with the Lepidoptera, of which he formed a considerable collection. He was much interested in the early stages and reared many of his specimens from the egg and larvae. All of his collecting was done in the region around St. Louis, his collection being built up through the exchange of his duplicates.

EDWIN P. MEINERS.

A memorandum on the back of Mr. Heink's photographic portrait, in the collection of the American Entomological Society, states that he was born February 9, 1869, at Stonyhill, Gasconade County, Missouri, and organized the Heink Entomological Club, December 15, 1907.—E. T. CRESSON, Jr.

Mrs. VITAE KITE died at Hollister, Taney County, Missouri, February 14, 1940. "A Calendar of Ozark Butterflies" appeared from her pen in ENTOMOLOGICAL NEWS for February, 1934. Starting late in life to form a collection of butterflies, she built up a collection of about 10,000 specimens, mostly locals and exotics. This collection has been given to The School of the Ozarks at Point Lookout, Missouri.—EDWIN P. MEINERS.

DR. CLARENCE PRESTON GILLETTE, director emeritus of the Colorado Agricultural Experiment Station and emeritus professor of entomology and zoology at Colorado State College of Agriculture and Mechanical Arts, died at his home in Fort Collins, Colorado, on January 4, 1941. Born in Ionia County, Michigan, April 7, 1859, he attended the Michigan public schools, then Michigan State College, where he received the B.S. in 1884, the M.S. in 1887 and the honorary Sc.D. in 1918. He was assistant in zoology, Michigan State College, until 1888, when he became entomologist of the Iowa State College Experiment Station at Ames, Iowa, and in 1891, head of a new department of zoology, entomology and physiology at Colorado State College. In 1907, he became Colorado's first state entomologist, and in 1910, also director of the Colorado Experiment Station, until his retirement in 1932. His papers include lists of the Orthoptera and Hemiptera of Colorado, many articles dealing with Cynipidae, Cicadellidae and Aphidae, and his last important work, the Aphidae of Colorado, published jointly with Miss Miriam A. Palmer. (From obituary by DR. GEO. M. LIST in *Science* for February 28, 1941.)

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—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 852, La Paz, 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., Birmngham, 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1941, 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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On A New Subgenus of Pemphilidine Wasps From Cuba (Hymenoptera: Sphecidae)

By V. S. L. Pate, Cornell University, Ithaca, New York.

The Pemphilidine wasps are divisible into a dozen or more discrete generic entities, despite the asseverations of various competent authorities to the contrary. Some of these, such as *Dasyproctus,* are confined entirely to the Old World, while others like *Anacrabro* and *Entomocrabro* are restricted wholly to the western hemisphere. The great majority of the species, however, are referable to four large cosmopolitan genera: *Ectemnius, Crossocerus, Lestica* (olim *Solenius* seu *Ceratocolus*), and *Pemphilis* (olim *Crabro* F. nec Geof.), each of which comprises a number of distinct phyletic strains sufficiently discrete from one another by congeries of morphological, ethological, and biogeographical characteristics that they may be accorded subgeneric rank. The genus *Ectemnius* (olim *Crabro* Auctt., nec. F., nec Geof.) is separable at present into a number of such subgenera. To these may now be added the following striking and remarkable Antillean entity described herewith.

MEROSPIS[1] new subgenus.

The broadly expanded, thin and laminate, shield-like fore femora, the flattened fore tarsi, and the absence of an apical calcar on the middle tibiae of the males, distinguish *Merospis* from all the other subgenera of *Ectemnius.* The nearest affinities of the present distinctive entity appear to lie with the Old World subgenus *Metacrabro,* with which it agrees very closely in the venation of the fore wing and the slender elongate hind wing with the anal lobe vestigial. But in addition to the characters given above, *Merospis* differs from that complex in the finely punctate mesonotum, the strong inner basal mandibular

[1] *Merós* thigh + *aspís,* shield; in allusion to the expanded fore femora of the males.

tooth, and the sulcate ultimate abdominal tergite and emarginate antennal flagellum of the male.

Diagnostic Features.—Small forms. Head subquadrate in anterior aspect, transversely subrectangular to subquadrate in dorsal aspect. Eyes naked, much more coarsely facetted anteriorly than posteriorly; inner orbits very strongly convergent toward clypeus and antennal sockets. Malar space obsolete. Vertex flat; supraorbital foveae absent; ocelli normal, arranged in a low triangle. Temples wide above, tapering ventrad; postorbital and temporal carinae wanting. Front vertical, narrow, strongly concave between the inner orbits but the basin not margined dorsally by a transverse carinule. Antennae situated low on face on dorsal margin of clypeus, twelve-segmented in both sexes, the antennal sockets contiguous to each other and also to the nearest lower inner orbit; flagellum not dilated but emarginate in males. Maxillary palpi six-segmented, labial palpi four-segmented. Mandibles bifid apically, lower margin entire, inner margin armed at base with a very large, elongate, inwardly directed, acuminate tooth.

Thorax with pronotum narrow, transverse, crested anteriorly, humeral angles dentate. Mesonotum finely punctate; suture between mesonotum and scutellum simple. Prepectus anteriorly with a sharp epicnemium which is continued onto anterior face of mesopleura, mesopleura with a sharp vertical carina before middle coxae, impunctate but with coarse subparallel, subhorizontal costulae which are continuous onto the metapleura and the lateral and posterior faces of propodeum; dorsal face of propodeum with coarse, subparallel, longitudinal costulae.

Fore legs with opposing faces of coxae flat, closely appressed to one another and furnished anteriorly with a sharp longitudinal carina, the distal posterior margin projecting backward and downward in a thin, translucent, semicircular laminate plate. Fore trochanters flattened and somewhat expanded. Fore femora thin, flat, and dilated into an irregular trigonal shield, but without spines or teeth beneath. Fore tibiae strongly compressed and flattened, elongate trigonal in shape. Fore tarsi strongly flattened, the metatarsi as long as the four distal segments combined. Middle and hind legs normal; the metatarsi slender, elongate, longer than the four distal articles combined; middle tibiae of males without an apical calcar, hind tibiae with two. Fore wing with marginal cell broadly and somewhat obliquely truncate apically; transverse cubital vein straight, oblique, inclivous, received on radius at or a little before middle of marginal cell; recurrent vein joining the submarginal cell very close to apex of latter, the second abscissa of cubitus much shorter than the length of transverse cubital vein. Hind wings slender, elongate, costa absent; anal lobe very small, vestigial, not clearly delimited.

Abdomen sessile; finely, inconspicuously punctate; ultimate tergite of male without a pygidium, but with a median longitudinal furrow on apical two-thirds.

Genotype: *Ectemnius* (*Merospis*) *cyanauges* new species.

This interesting group is known at present from only the genotypic species.

Ectemnius (Merospis) cyanauges[2] new species.

The brilliant, metallic blue color, ivory maculations, and the distinctive shape of the fore legs will immediately distinguish the present species from all of its New World congeners.

Type.—♂; San Vincente, Pinar del Rio Province, CUBA. July 26-August 5, 1939. (C. T. Parsons.) [Museum of Comparative Zoölogy.]

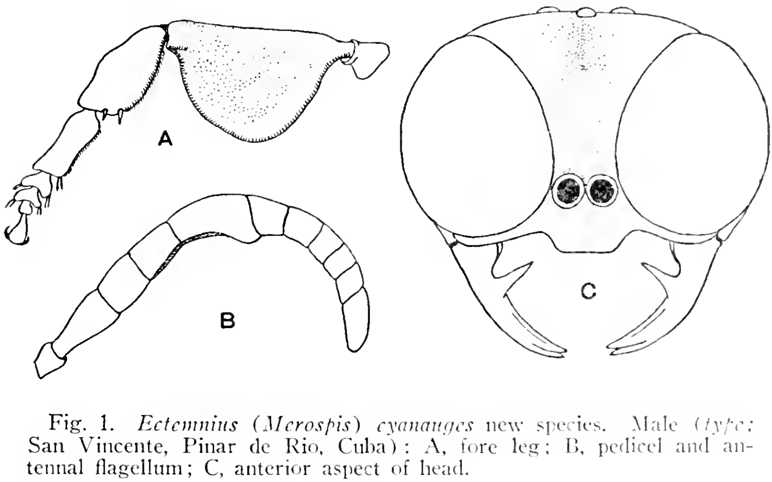

Fig. 1. *Ectemnius* (*Merospis*) *cyanauges* new species. Male (*type*: San Vincente, Pinar de Rio, Cuba): A, fore leg; B, pedicel and antennal flagellum; C, anterior aspect of head.

♂.—7 mm. long. Bright cyaneous; the following eburneous: scape anteriorly, mandibles on outer basal two-thirds, pronotum and tubercles above, postscutellum, all tibiae on outer faces, fore femora with a small spot at knee, middle femora beneath, fore metatarsi, abdomen with narrow elongate transverse spots later-

[2] *Kuanaugés,* of a bright blue color.

ally on first six tergites, those of second and fourth segments much longer and wider than the others. Black: scape behind, pedicel, flagellum, mandibles apically and on inner and lower margins. Tegulae, axillary sclerites, and middle and hind tarsi, dark brunneous. Fore trochanters, and fore femoral shield with fore and hind margins and a narrow discal streak, castaneous. Wings hyaline, infumated anteriorly particularly in marginal and submarginal cells; veins dark brunneous.

Head fulgid; clypeus with lower inner and posterior orbits densely clothed with shining, appressed silvery pubescence; vertex, occiput and temples with rather long, suberect, inconspicuous, dark grey pubescence. Front with scapal basin strongly concave, nitidous, glabrous, not margined dorsally by a transverse carinule. Vertex, occiput, and temples with fine, separated, setigerous acupuncturation; vertex bisected anteriorly by a strong furrow running forward from median ocellus into scapal basin of front; no trace of supraorbital foveae; ocelli situated in a very low triangle, the postocellar line six-tenths the length of ocellocular distance; temples without orbital or temporal carinae; occipital carina distinct, forming a complete circle which is tangent below to the hypostomal carinule. Antennae short, reaching about to occiput; scape cylindrical, four-sevenths the vertical length of eye; pedicel subcylindrical, short, one-half the length of first flagellar article; flagellum with first four articles elongate, the first one-and-one-half the length of second which is subequal in length to third, the fourth one-and-one-sixth the length of first, remaining segments, except last, but one-half the length of first, ultimate article simple, terete, subequal in length to two preceding segments combined, the third segment slightly, the fourth strongly emarginate beneath. Clypeus narrow, linear, flat laterally to weakly tectate discally, median length two-sevenths vertical length of eye, produced medio-apically into a short broad truncate lobe the apical width of which is subequal to median length.

Thorax fulgid; generally clothed with rather long, suberect, light pubescence. Pronotum narrow, transverse, situated on a level with mesonotum, anterior dorsal margin sharply transversely carinate for entire width save for a deep median notch, the lateral angles acutely dentate, posterior margin narrowly but deeply impressed. Mesonotum with well separated, distinct, setigerous acupuncturation throughout, anteriorly with a few transverse, curved, weak and indistinct striae, anterior half with three parallel well separated carinules; suture between mesonotum and scutellum simple, not foveolate; scutellum perfulgid, very sparsely acupunctate, flatly tumid, posterior margin abruptly and deeply impressed and foveolate; axillae not margined laterally; postscutellum transverse, linear, short, one-half length of scutellum, perfulgid, subnitidous, almost impunctate. Mesopleura impunctate but with fine and coarse subhorizontal and subparallel costulae more or less continuous onto metapleura and lateral and posterior faces of propodeum, episternal suture inconspicuously foveolate, descending from below tegula and curving forward onto anterior face of mesothora, mesopleural pit almost obliterated by striation, episternauli, hypersternauli, and sternauli not evident, posterior margin inconspicuously foveolate; prepectus anteriorly with a sharp epicnemium, the carina forking dorsally into carinules which parallel the lower and posterior margins of pronotal tubercles. Propodeum perfulgid; clothed with pubescence like thorax; entire dorsal face with an undemarcated transverse subrectangular area traversed by subparallel longitudinal costulae; posterior face bisected by a deep, narrow, nitidous sulcus, and crossed by horizontal parallel rugulae which are continuous from lateral faces; lateral carinae wanting.

Legs with tibiae unarmed with spines on outer faces; otherwise as in subgeneric diagnosis.

Abdomen sessile, perfulgid; tergites with sparse, well separated, very fine acupuncturation, the ultimate tergite somewhat more distinctly and closely punctate than preceding tergite and with a median longitudinal furrow; penult tergite with an inconspicuous, transverse median constriction, last tergite with a stronger more perceptible one. Venter with first three sternites flatly convex, perfulgid, subnitidous, glabrous, with microscopically fine cancellate sculpture; fourth, fifth and sixth sternites flatly concave, subopaque, with close fine acupuncturation; seventh and eighth sternites flat, densely pilose, seventh with a deep, roundly V-shaped emargination posteriorly, eighth with caudal margin shallowly, broadly, circularly emarginate.

♀.—Unknown.

This species is known only from the unique male described above.

The Malaria-carrying Anopheles gambiae.

Discussing the Malaria situation created by this mosquito in Brazil, President Fosdick in his Rockefeller Foundation Review for 1940 says: "No evidence of gambiae in Brazil was found during the last 47 days of 1940."

Additions to the List of Nevada Dragonflies (Odonata).

By Ira La Rivers, Reno, Nevada.

Since the publication of my "Preliminary Synopsis of the Dragonflies of Nevada" (1940), several less common and more localized species have been found along two portions of the State's boundary. As the author had previously suspected, there are a number of West Coast dragonflies, hitherto accredited only to the region west of the Sierra Nevada Mountains, to be found crossing the Nevada-California line at those points where spurs or isolated peaks of the Sierra Nevada system lie in Nevada. The two regions so-far most productive of new dragonfly records along this border are Lake Tahoe and Boundary Peak.

The lake, whose surface waters lie at an approximate elevation of 6,225 feet, is surrounded by a ring of high Sierra peaks which vary from 7,000 to nearly 9,000 feet in height, the taller summits lying on the California side and forming the crest of the range. However, the ecologic environments do not differ considerably, on the average, from one side of the lake to the other, and the characteristic odonate species of this montane lake occur indifferently on either side. The summit of the Sierras strikes tangent from the north-northwest towards the lake, and approaches the Nevada line most closely near the south end of the lake. The entire eastern shoreline, and nearly half of the northern, lies in Nevada, so that it was to be expected when the author's first list was prepared that a number of California species not yet accredited to Nevada, but occurring in the adjacent Sierra Nevadas, might well be found at Lake Tahoe. A favorable spring and summer's collecting season here has verified these conclusions.

Boundary Peak, the tallest point in Nevada, rises to a height of 13,145 feet, and lies exactly 117 miles southeast along the Nevada-California boundary from the southern tip of Lake Tahoe. It is the most northern summit of the lofty White Mountain Range which parallels the upper portion of the southern Sierras, and may properly be considered a part of that extensive system, although separated from the Sierras themselves by the long and prominent Owens Valley. Here in the vicinity of Boundary Peak, which lies just inside the Nevada line, the author has taken several species of dragonflies which Ahrens recorded in 1938 from nearby Yosemite, which lies but a scant 45 miles (in a straight line) from the peak.

New species have also turned up along the ever bountiful Rio Colorado, which forms Nevada's extreme southeastern border. This stream has been the gateway used by several subtropical species in their expansion northward into the Great Basin, and it is not unlikely that other southern forms will be found here in the future.

In the following list, most of those species already recorded for the State in the author's "Synopsis"; have been given a more extended range within it as a result of the last season's collecting. An asterisk (*) denotes species accredited to the area by other writers, but overlooked in the "Synopsis", a double asterisk (**) those species which have been taken, to the author's knowledge, in the State for the first time.

Subfamily Gomphinae.

Ophiogomphus morrisoni Selys—Ormsby and Washoe Counties (Marlette Lake).

**O. Bison Selys—Esmeralda County (Fish Lake Valley).

Herpetogomphus compositus Hagen—Churchill County (Fallon, Humboldt Sink); Pershing County (Rye Patch Reservoir); Washoe County (Wadsworth).

Gomphus intricatus Hagen—Churchill and Pershing Counties (Humboldt Sink).

G. olivaceus Selys — Churchill and Pershing Counties (Humboldt Sink).

**Octogomphus specularis (Hagen)—Esmeralda County (Boundary Peak).

Subfamily Aeshninae.

Anax junius (Drury)—Churchill County (Carson Lake, Carson Sink, Fallon, Lahontan Reservoir); Douglas County

(Gardnerville, Topaz Lake); Lyon County (Lahontan Reservoir, Sweetwater); Nye County (Beatty, Springdale).

**A. WALSINGHAMI MacLachlan—Clark County (Boulder Lake).

AESHNA CALIFORNICA (Calvert)—Lyon County (Sweetwater).

AE. MULTICOLOR Hagen—Churchill County (Carson Lake, Carson Sink, Fallon, Lahontan Reservoir); Esmeralda County (Fish Lake Valley); Nye County (Beatty, Springdale).

AE. UMBROSA Walker—Humboldt County (generally throughout the Santa Rosa Mountains).

**AE. WALKERI Kennedy—Esmeralda County (Boundary Peak).

AE. PALMATA Hagen—Washoe County (Truckee Meadows, Washoe Lake).

AE. CONSTRICTA Say—Churchill County (Humboldt Sink); Lyon County (Fernley); Pershing County (Lovelock); Washoe County (Washoe Lake).

AE. INTERRUPTA Walker—Humboldt County (National, Paradise).

**AE. VERTICALIS Hagen—Esmeralda County (Boundary Peak).

Subfamily CORDULEGASTERINAE.

CORDULEGASTER DORSALIS Hagen—Washoe County (Cody Basin. A single straggler from the High Sierras, first recorded in the author's "Synopsis." The other "Synopsis" records of this species belong to *C. erroneus*). Previous records: none.

*C. ERRONEUS Hagen—Lyon County (Sweetwater); Washoe County (Franktown, Peavine, Verdi). Previous records: Hagen-Selys, 1878; Fraser, 1929; La Rivers, 1940.

Subfamily MACROMIINAE.

MACROMIA PACIFICA Hagen—Lyon County (Sweetwater); Washoe County (Franktown).

M. MAGNIFICA MacLachlan—Nye County (Beatty).

Subfamily CORDULIINAE.

**SOMATOCHLORA SEMICIRCULARIS (Selys) — Esmeralda County (Boundary Peak).

**CORDULIA SHURTLEFFI Scudder — Esmeralda County (Boundary Peak).

Subfamily LIBELLULINÆ.

LIBELLULA SATURATA Uhler—Churchill County (Carson Lake, Carson Sink, Fallon, Humboldt Sink, Lahontan Reservoir); Esmeralda County (Fish Lake Valley); Lyon County (Lahontan Reservoir); Nye County (Beatty, Springdale).

**L. COMANCHE Calvert—Esmeralda County (Fish Lake Valley); Nye County (Beatty).

*L. PULCHELLA Drury—Douglas County (Gardnerville); Lyon County (Sweetwater); Washoe County (Truckee Meadows).

L. FORENSIS Hagen—Churchill County (Fallon, Lahontan Reservoir); Douglas County (Gardnerville, Genoa, Topaz Lake); Esmeralda County (Fish Lake Valley); Lyon County (Lahontan Reservoir, Smith Valley, Sweetwater, Yerington); Mineral County (Schurz); Nye County (Beatty, Springdale).

L. QUADRIMACULATA Linné—Douglas County (Gardnerville, Lake Tahoe); Ormsby County (Lake Tahoe, Marlette Lake); Washoe County (Lake Tahoe, Marlette Lake, Truckee Meadows).

L. NODISTICTA Hagen — Washoe County (Truckee Meadows).

L. COMPOSITA Hagen — Churchill County (Carson Sink, Fallon, Humboldt Sink).

**PLATHEMIS LYDIA (Drury)—Esmeralda County (Fish Lake Valley); Lincoln County (Pahranagat Valley); Lyon County (Sweetwater); Nye County (Beatty); Washoe County (Truckee Meadows, Wadsworth). Previous records: La Rivers, 1938.

P. SUBORNATA Hagen—Churchill County (Fallon, Lahontan Reservoir); Washoe County (Truckee Meadows).

SYMPETRUM CORRUPTUM (Hagen)—Churchill County (Carson Lake, Fallon, Humboldt Sink, Lahontan Reservoir); Douglas County (Genoa, Glenbrook, Minden); Humboldt County (generally throughout the Santa Rosa Mountains); Lyon County (Lahontan Reservoir, Sweetwater); Mineral County (Hawthorne); Ormsby County (Lake Tahoe, Marlette Lake); Washoe County (Franktown, Lake Tahoe, Marlette Lake).

S. ILLOTUM (Hagen)—Douglas County (Gardnerville); Lyon County (Sweetwater); Ormsby County (Carson City); Washoe County (Washoe Lake).

S. MADIDUM (Hagen)—Humboldt County (National).

S. PALLIPES (Hagen)—Churchill County (Fallon, Humboldt Sink); Humboldt County (Paradise Valley).

*S. OBTRUSUM (Hagen)—Elko and White Pine Counties (Ruby Valley). Previous records: Ahrens, 1938 (as S. decisum Hagen).

S. RUBICUNDULUM (Say)—Churchill County (Carson Sink, Fallon, Lahontan Reservoir); Washoe County (Wadsworth).

S. SEMICINCTUM (Say)—Churchill County (Carson Lake, Fallon, Humboldt Sink, Lahontan Reservoir); Humboldt County (Paradise Valley).

S. COSTIFERUM (Hagen)—Churchill County (Fallon).

S. DANAE (Sulzer)—Churchill County (Fallon).

S. ATRIPES (Hagen)—Douglas County (Gardnerville).

**LEUCORRHINIA HUDSONICA (Selys)—Esmeralda County (Boundary Peak).

L. GLACIALIS Hagen—Esmeralda County (Boundary Peak).

PACHYDIPLAX LONGIPENNIS (Burmeister) — Churchill County (Fallon, Lahontan Reservoir); Douglas County (Gardnerville, Topaz Lake); Washoe County (Verdi).

ERYTHEMIS SIMPLICICOLLIS (Say)—Churchill County (Fallon, Lahontan Reservoir); Douglas County (Gardnerville, Genoa); Lyon County (Lahontan Reservoir, Smith Valley, Sweetwater, Wabuska, Yerington); Washoe County (Verdi).

PANTALA HYMENEA (Say)—Esmeralda County (Fish Lake Valley); Nye County (Beatty, Springdale).

P. FLAVESCENS (Fabricius)—Douglas County (Gardnerville); Washoe County (Truckee Meadows, Washoe Valley).

TRAPEZOSTIGMA LACERATA Hagen—Nye County (Beatty).

T. ONUSTA Hagen—Washoe County (Lawton Valley).

(To be continued.)

A New Species of Coniontis from Nevada (Coleoptera: Tenebrionidae).

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

Coniontis lariversi new species.

Form oblong-oval to somewhat cuneate, nearly twice as wide, a little more than twice as long as the pronotum. Color deep black; luster dull and alutaceous. Pubescence absent from the superior surface; short, pale hairs are present beneath. Ventral surface more or less polished.

Head relatively small, widest across the posterior canthi and eyes, twice as wide as long before the post-ocular line; sides less prominent than eyes, margin arcuate over the antennal insertions, thence straighter and convergent to the rounded epistomal angles, not sinuate at position of the obliterated oblique sutures. Epistomal apex rather broadly, not deeply, arcuately emarginate. Frons not convex and without impressions, sides slightly convex and briefly declivous against the eyes; surface densely punctate, punctures moderately small and irregular, intervals densely and very minutely punctulate. Labrum transverse, about twice as wide as long; sides arcuate and continuously so with the apex, angles absent; apex rather deeply and arcuately emarginate at middle. Antennae slender, moderate in length, about attaining the posterior third of the pronotum; last four segments moderately compressed; segments two to seven inclusive obconical and more or less elongate; the second about one-half as long as the third; the latter two-and-one-half times as long as wide at apex; segments four, six, seven and eight subequal in length, and less than twice as long as wide at apex; eight obconico-subtriangular, ninth and tenth triangular and as long as wide; eleventh, slightly smaller and widest at middle, apex subacute.

Pronotum about one-third wider than long, widest in basal half; apex broadly emarginate between the bluntly rounded angles in moderate circular arc, marginal bead very narrow and inconspicuous; sides arcuately convergent anteriorly, less so behind the middle and parallel; base subtransverse, very broadly and feebly arcuate in middle two-fourths, thence broadly slightly sinuate to the moderately, posteriorly prominent angles. Disk evenly convex from side to side and rather antero-laterally declivous, sparsely and irregularly punctate, punctures smaller than on the head, the intervals indistinctly punctulate; lateral margins distinctly and moderately strongly beaded; submarginal grooves very narrow and rather deep; base not beaded.

Elytra oblong, a little more than twice as long as wide and two-and-two-sixths times as long as the pronotum at middle; base truncate, scutellum triangular and impunctate; humeri narrowly rounded and not prominent beneath the pronotal basal angles; sides straight, parallel or somewhat convergent to apical third, thence arcuately convergent to the subacute apex. Disk rather evenly arcuate from side to side, moderately and arcuately declivous apically; punctures small and inconspicuous, irregular, intervals with a number of fine, irregular feebly impressed lines; apical declivity slightly rugose. Marginal bead narrow and scarcely visible from above, except at humeri and apically.

Prosternum rather densely punctate, punctures moderately small becoming somewhat coarser on the intercoxal process, which is feebly and rather indistinctly margined laterally between the coxae, apex not margined. Propleurae smooth, coxal convexities finely and longitudinally rugose. Sterna very finely and sparsely punctate.

Abdomen polished and shining, sparsely punctulate and more or less irregularly but not strongly rugose.

Middle and posterior legs rather long, femora rather narrow and parallel; the metafemora two-fifths of their length longer than the mesofemora; tarsi long and slender.

Measurements.—(Types) Length 17-17.5 mm.; width 7-8 mm.

Holotype, female, No. 5077, and *allotype,* male, No. 5078, Museum of the California Academy of Sciences. Collected in the vicinity of Reno, NEVADA, by Ira La Rivers, to whom the species is dedicated. Paratypes in the Academy of Natural Sciences of Philadelphia. The author in 1902, collected a few specimens along the railroad toward Truckee from Verdi, Nevada.

♂♂.—Form narrower, often more or less cuneate. Prosternal intercoxal process slightly wider and feebly more convex, with the punctures a little coarser than in the opposite sex.

♀♀.—Form oblong-oval and broader. Prosternal process more finely punctate and the surface quite flat.

Lariversi does not belong to the Opaca Group of Casey, which contain some of the smallest species of the genus, and the size does not as far as known exceed 10 mm. One of the species, *nevadensis* Casey occurs at Reno, Nevada and was named from a single specimen. In the *abdominalis, strenua, robusta* Group of Casey,the body is large in size and much broader; the prosternal process is more apt to be margined throughout. Twenty-two specimens studied.

Addenda to the Odonata of Maryland.

By Herbert H. Moorefield,
The Natural History Society of Maryland, Baltimore.

Since the appearance of the recent "List of Maryland Odonata", by Elizabeth G. Fisher,* the writer has compiled a few further notes of interest on the Anisoptera of this State. The specimens listed below are deposited in the collection of the Department of Entomology, Natural History Society of Maryland, and were collected by the writer unless otherwise noted.

The majority of the important collecting stations were described in Fisher's report, and the only one of additional interest is Twin Lakes. These are two small, natural lakes near Lansdowne, Baltimore County.

Family Aeshnidae.

Aeshninae.

1. Gomphaeschna antilope (Hagen). Druid Hill Park, Baltimore City, June 5, 2 ♀, (D. N. Bachrach). A male of this species was taken on the eleventh floor of a downtown office building of Baltimore City on the same date.

Cordulegasterinae.

2. Cordulegaster obliquus (Say), Bengies, Harford Co., June 12, 1 ♀, (D. N. Bachrach). Cross Country Blvd., Baltimore City, July 5, 1 ♂. This species was depositing eggs in a fresh water stream on June 12, at Bengies, Md.

Family Libellulidae.

Cordulinae.

3. Somatochlora filosa (Hagen). Tolchester, Kent Co., August 16, 1 ♀.

* Ent News, 1940, Vol. LI, No. 2, pp. 37-42; Vol. LI, No. 3, pp. 67-72.

4. CORDULIA SHURTLEFFI Scudder. Mountain Lake Park, Garrett Co., June 26, 1 ♂, (H. C. Seibert).

Libellulinae.

5. CELITHEMIS MONOMELAENA Williamson. Twin Lakes, Baltimore Co., June 13, 1 ♂, 1 ♀ ; July 8, 1 ♀.

6. LADONA EXUSTA (Say). Lake Shore, Anne Arundel Co., May 28, 1 ♂.

7. L. JULIA (Uhler). Lake Shore, Anne Arundel Co., May 28, 2 ♂ ; June 2, 2 ♂. Twin Lakes, Baltimore Co., June 26, 1 ♀.

8. LIBELLULA AXILLENA Westwood. Twin Lakes, Baltimore Co., June 13, 1 ♀. Laurel, Prince George Co., July, 1 ♂.

9. LEUCORRHINIA INTACTA (Hagen). Hillendale, Baltimore Co., July 6, 1 ♀, (H. C. Seibert).

10. TRAPEZOSTIGMA CAROLINA (Linnaeus). Lake Shore, Anne Arundel Co., May 28, 1 ♂ ; June 2, 2 ♂ ; August 6, 2 ♂. Twin Lakes, Baltimore Co., June 13, 1 ♂, Tolchester, Kent Co., August 16, 1 ♂. This species was observed mating at Lake Shore, on June 2.

A New Species of Trox from Texas (Coleoptera: Scarabaeidae).

By MARK ROBINSON, Sharon Hill, Pennsylvania.

Trox (Omorgus) fuliginosus new species.

This interesting species is closely related to the well known *T. monachus* Herbst, but can readily be distinguished by the color differences and dissimilarity of the male genitalia. The elytra tubercules are usually a little higher and the wings a trifle longer in *monachus*.

Oblong; iron-gray opaque coating over entire body except head, thoracic and elytral tubercules, elytral umbones, tibiae and tarsi which have an ochraceous-yellow opaque coating. The opaque coating under a high magnification might be called granule-pollinose.

Clypeus triangular; vertex of head with two tubercules side by side, in front of each of which near the clypeal margin is a deep pit. Entire anterior and side margin of head strongly reflexed and fimbriate with ochraceous-orange hairs.

Thoracic ridges and tubercules as usual in this subgenus; side margins evenly rounded except near the hind angles where they are deeply incised, hind margin indicated with a raised line especially laterally. Dorsal surface of ridges and tubercles moderately not densely punctured, each puncture bearing a short ochraceous-orange scale like hair.

Elytral tubercules low, oval; arranged in four primary rows in addition to the sutural row; between each of these rows is a vague line of minute tubercles and between the rows of smaller and larger tubercles is a line of shallow punctures. Humeral and apical umbone prominent.

Scape of antenna black; bristling with rather long ochraceous-orange hairs; funicle reddish, glabrous; club ochraceous-yellow. Apical process of anterior tibiae unifid, side margin of tibiae without trace of denticles, plane. Abdominal plates with a few scattered punctures.

The male genitalia of the present species are generally wider and blunter than *monachus;* the inner margins of the claspers are expanded posteriorly until they form nearly parallel lines for one-fifth the length of the genitalia; in *monachus* this section of the genitalia forms an ovate figure. Viewed laterally, the tips of the claspers are longer and bent downward a trifle more than they are in *monachus.*

Wings: Length, 16.9 mm.; Breadth, 6.0 mm.

Length, 14.2 to 15.1 mm.; Breadth, 7.8 to 8.5 mm.

Type.—♂, New Braunfels, Comal County, TEXAS, April 10, 1902 (H. Mittendorf). [In the collection of the United States National Museum].

Allotype.—♀, With same data as type. [In collection of the United States National Museum].

Paratypes.—1 ♂, With same data as type. 1 ♀, Harris County, TEXAS, May 1909 (C. R. Oerto). [Both specimens are in the collection of the author].

Western Aphid Notes[1] (Homoptera: Aphididae).

By George F. Knowlton[2].

The following report adds to the known distribution of a number of aphids and includes the description of one apparently undescribed species of the genus *Aphis*.

Brevicoryne symphoricarpi (Thos.). Gallatin Valley, Montana, July 16, 1936 (Knowlton).

Cavariella capreae (Fab.). On *Salix*, Weber Canyon, Utah; on Umbelliferae at Puyallup, Washington, July 28, 1937 (H. C. Bennion).

C. essigi (Gill.). On *Heracleum lanatum* at Spring Hollow, Logan Canyon, Utah, June 19, 1938 (Knowlton-W. P. Nye).

Aphis heraclella Davis. On *Cicuta occidentalis* at Lewiston, Utah, July 13, 1923 (Knowlton).

Aphis tetradymia n. sp.

Apterous vivipara. Color bluish green; size, 1.3 mm. long and 0.75 mm. wide; antennae 0.81 mm. long, dusky to black; antennal III, 0.18 to 0.2 mm. long, with 0 to 4 sensoria on distal half; IV, 0.09 to 0.1 with 0 to 1 sensorium; V, 0.09 to 0.1; VI, 0.09+0.16 to 0.2 mm. long; rostrum reaching abdomen; rostral IV+V rather thick, 0.13 mm. long; hind tibiae 0.6 to 0.71 mm.; hind tarsi 0.1; cornicles blackish, imbricated, 0.11 to 0.13 mm. long, slightly wider toward base; cauda blackish with 4 to 5 hairs on each side and 3 on dorsal to dorsolateral surfaces.

Aphis tetradymia resembles *A. cryptus* P.-K., but differs in having shorter, thicker rostral IV+V, more slender body, and in possessing fewer conspicuous abdominal tubercles. It differs from *A. maidi-radicis* Forbes in being smaller in size, having longer antennae, fewer hairs on cauda, usually possessing sensoria on antennal III and IV of aptera, and having a darker bluish-green body color.

Described from wingless specimens collected upon *Tetradymia canescens* at Fisher's Pass, Tooele County, Utah, August 16, 1932 (G. F. Knowlton). *Type* in the collection of the writer.

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[1] Contribution from the Entomology Department, Utah Agricultural Experiment Station, Logan.

[2] Research associate professor.

EPAMEIBAPHIS ATRICORNIS G.-P. On *Artemisia*, usually *tridentata*, in Utah at Beaver Dam, Circleville, Hansel's Mountains and Maple Canyon; in Idaho at Preston and Rexburg, 1935 (C. F. Smith); in Colorado at De Beque, 1935, Cross Mountains and Elk Springs, June 25, 1937 (Knowlton).

E. UTAHENSIS K.-S. On *Artemisia vulgaris* in Utah at Blacksmith Fork Canyon, June 10, 1930; on *A. tridentata* at Providence, August 26, 1925, Raft River Mountains, and Woodruff Mountains (Knowlton); Levan, Salt Lake City, and Vernon (Knowlton-C. F. Smith).

FLABELLOMICROSIPHUM KNOWLTONI Smith. On *Artemisia tridentata*, Bountiful and Roy, Utah, June 4, 1937 (Knowlton-Smith).

F. TRIDENTATAE (Wilson). On *Artemisia tridentata* at Beaver Dam, Hansel's Mountains, Junction Valley, Manti and Portage, in Utah; Palisade, August 24, 1925 and Sunbeam, June 25, 1937, in Colorado (Knowlton).

PSEUDOEPAMEIBAPHIS ESSIGI K.-S. On *Artemisia tridentata* at Kelton and Morgan, Utah (Knowlton).

P. GLAUCA G.-P. On *Artemisia tridentata* in Utah at Bountiful, Butlerville, Peterson, Roy and Strawberry Valley (Knowlton-Smith).

P. TRIDENTATAE (Wilson). On *Artemisia tridentata* at Palisade, Colorado, August 24, 1935 (Knowlton); at Burly, Idaho, July 9, 1931 (D. E. Fox).

P. XENOTRICHUS K.-S. On *Artemisia tridentata* in Brigham Canyon, Utah, August 29, 1936 (Knowlton).

RHOPALOSIPHUM GRABHAMI Ckll. On *Lonicera involucrata*, Eden and Logan, Utah, June 1937 (Knowlton-Smith-F. C. Harmston); Mt. Vernon, Washington, June 8, 1935 (A. J. Hanson).

R. MELLIFERUM (Hottes). In Idaho at Blue Gulch, Castleford, Hollister and Wendell (D. E. Fox).

R. RHOIS Mon. On *Rhus* at Granite, Utah, August 1935 (Knowlton).

R. RUFOMACULATA (Wilson). On *Chrysanthemum* at Logan, Utah, in greenhouse, January 10, 1934 (C. F. Smith).

R. SCIRPIFOLII G.-P. Blue Gulch, Idaho (D. E. Fox).

MINUTICORNIS GRAVIDUS Knlt. On *Juniperus* at Pocatello, Idaho, June 18, 1936 (Knowlton).

TOXOPTERA VIRIDI-RUBRA G.-P. Wendell, Idaho, 1930 (Fox).

AMPHOROPHORA CRATAEGI (Mon.). Hollister, Idaho, 1930 (Fox).

A. GERANII (G.-P.). Buhl, Idaho, October 17, 1930 (Fox).

A. GRINDELIAE (Will.). On *Grindelia squarrosa*, Logan, Utah, July 4, 1935; and Franklin, Idaho (Knowlton).

A. RUBI (Kalt.). On raspberry, Hamilton, Montana (W. Shockley).

BIPERSONA TORTICAUDA (Gill.). On *Cirsium* at Salt Lake City, Utah, June 15, 1937 (Knowlton); and Florence, Montana (H. F. Dietz).

CAPITOPHORUS BITRICHUS K.-S. On *Artemisia tridentata*, Hyrum, Utah, August 23, 1938 (Knowlton).

C. GILLETTEI Theob. On *Polygonum*, Enumclaw, Washington, August 18, 1937 (H. C. Bennion).

C. POTENTILLAE (Walk.). On *Rosa nutkana*, near Forks, Washington, August 27, 1936 (W. W. Baker).

C. OESTLUNDI Knlt. On *Chrysothamnus nauseosus* at Elko, Nevada, June 16, 1934 (Knowlton).

C. PYCNORHISUS K.-S. On *Chrysothamnus viscidiflorus* at Riverdale, Idaho, July 24, 1936 (C. F. Smith).

C. QUADRITRICHUS K.-S. On *Artemisia tridentata* at Sunbeam, Colorado, June 25, 1937 (Knowlton).

C. ZOOMONTANUS K.-S. On *Artemisia vulgaris* at Afton, Wyoming, July 19, 1936 (Knowlton).

MACROSIPHUM CREELI Davis. On alfalfa, Mathews, Ephrata, Washington (A. C. Burrill).

M. EUPHORBIAE (Th.). Castleford and Hollister, Idaho, August 1930 (D. E. Fox).

Honor to an Entomologist.

Science for April 25, 1941, states that Hugh Scott, assistant keeper of entomology, British Museum (Natural History), has been elected a fellow of the Royal Society of London.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.

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.—Adamson, A. M.—The geographical distribution of insect pests. [Trop. Agric.] 18: 43-47. **Anon.** How to make an insect collection. [Ward's Nat. Sci. Est., Inc.] 1940: 30 pp., ill. **Berezina, V. M.**—A fragment to the method of investigating the part played by the light in the life of insects. [Bull. Plant Prot. Lenin Ac. Ag. Sci.] No. 3: 37-38. **Blatchley, W. S.**—Obituary with portrait, by W. T. Davis. [19] 36: 18-19. **Blatchley, W. S.**—Obituary. By V. M. Tanner. [120] 2: 33-35. **Calvert, P. P.**—Catalogues of current scientific literature. [Science] 93: 209-210. **Gillette, Clarence Preston.**—Obituary, with portrait, by G. M. List. [12] 34: 129-130. **Herrick & Griswold.**—Common insects of the household. [Cornell Ext. Bull.] No. 202: 66 pp., ill. **Jones, T. H.**—Obituary notice. By Hyslop & Graf. [10] 43: 60-62, ill. **Knowlton & Harmston.**—Insect food of the Chipping Sparrow. [12] 34: 123-124. **Martorell, L. F.**—Some notes on forest entomology IV. [The Caribbean Forester] 2: 80-82. **Silvestri, F.**—Importancia de la Entomologia en la Economia Mundial. [An. Esc. Nac. Cien. Biol. Mex.] 1: 301-315. **Smith, H. S.**—Racial segregation in insect populations and its significance in applied entomology. [12] 34: 1-13. **Spencer, G. J.**—Lead or tin tubes in a biological laboratory. [4] 73: 54. **Swingle, Gahan & Phillips.**—Laboratory rearing of certain leaf-eating insects.

[12] 34: 90-95, ill. **Warren, B. C. S.**—A few comments on some inconsistent criticism. [9] 74: 51-53. **Woodworth, Chas. Wm.**—Obituary with portrait, by E. O. Essig. [12] 34: 128-129.

ANATOMY, PHYSIOLOGY, ETC.—Abbott, C. E.—Concerning the musculature of the male genitalia in Panorpa nuptialis (Mecoptera). [6] 49: 43-46, ill. **Bryson & Dillon.**—Observations on the morphology of the corn seed beetle, Agonoderus pallipes (Carabid.). [7] 34: 43-50, ill. **Cumpston, D. M.**—On the external morphology and biology of Heteronychus sanctae-helenae and Metanastes vulgivagus (Scarab.). [Pro. Linn. Soc. N. S. W.] 65: 289-300, ill. **Ermolaev, M. F.**—The biology of Thrips linarius and control measures against it. [Bull. Plant Prot. Lenin Ac. Ag. Sci.] No. 3: 23-34, ill. **Geigy & Zinkernagel.**—Beobachtungen beim Aufbau einer technischen Grosszucht der Kleidermotte (Tineola biselliella). [41] 18: 213-232, ill. **Giral, F.**—Pigmentos fluorescentes de insectos y bacterias. [Rev. Soc. Mexicana Hist. Nat.] 1: 243-254, ill. **Hagmann, L. E.**—A method for injecting insect tracheae permanently. [Stain Technology] 15: 115-118, ill. **Hanstrom, B.**—Die chromatophoraktivierende substanz des insektenkopfes. [Lunds Univ. Arsskrift] 36: 20 pp., ill. **Hawley & Dobbins.**—Mortality among hibernating larvae of the Japanese beetle with special reference to conditions in the winter of 1935-36. [6] 49: 47-56, ill. **Hitchcock & Haub.**—The interconversion of foodstuffs in the blowfly (Phormia regina) during metamorphosis. I.—Respiratory metabolism and nitrogen excretion. [7] 34: 17-25; 32-37, ill. III.—Chemical composition of larvae, pupae and adults. **Holdsworth, R. P.**—The histology of the wing pads of the early instars of Pteronarcys proteus (Plecoptera). [5] 47: 112-120, ill. **Kozhanchikov, I. V.**—The importance of the physical conditions of environment upon the development of the eggs of the gipsy moth (Lymantria dispar). [Bull. Plant Prot. Lenin Ac. Ag. Sci.] No. 3 (1940) 3-16, ill. Effect of ecological factors upon the variability of certain Lepidoptera during the period of their growth and development. [Trav. Inst. Zool. Acad. Sci. URSS] 6: 64-114, ill. **Kozhantschikov, J. W.**—Influence of ecological factors on development and variability of lepidoptera. [Bull. Acad. Sci. URRS] 1940, 761-782, ill. **Lotmar, R.**—Das Mitteldarmepithel der Raupe von Tineola biselliella (Kleidermotte), insbesondere sein Verhalten wahrend der Hautungen. [41] 18: 233-248, ill. **Ludwig & Fox.**—Further studies of conditions influencing the survival of Japanese beetles through metamorphosis. [6] 49: 65-75. **Mickey, Carpenter, Cumley & Burdette.**—Experiments on culture media in regard to oviposition and mass production of Drosophila melanogaster. [6] 49: 77-84. **Nesbitt, H. H. J.**—A comparative morphological study of the nervous system of the Orthoptera and related orders. [7] 34: 51-81, ill. **Patton, Hitchcock & Haub.**—The interconversion of food-stuffs in the blowfly (Phormia regina) during metamorphosis. II.—Changes in composition as determined by the oxycalorimeter. [7] 34: 26-31, ill. **Putman, W. L.**—The feeding habit of certain leafhoppers (Homoptera: Cicadellidae) [4] 73: 39-53, ill. **Roth & Howland.**—Studies on the gaseous secretion of Tribolium confusum. I.—Abnormalities produced in Tribolium confusum by exposure to a secretion given off by the adults. [7] 34: 151-176, ill. **Shaw, F. R.**—Bee poisoning: a review of the more important literature. [12] 34: 16-21. **Strelnikov, I. D.**—The effect of solar radiation and hunger on the pulsation of the heart of the caterpillars of Phytometra gamma. [Trav. Inst. Zool. Acad. Sci. URSS] 6: 266-288, ill. **Sweetman, H. L.**—Tests for toxicity of arsenicals and sodium fluoride to the American roach, Periplaneta americana. [4] 73: 31-34. **Tshernova, O. A.**—Report on biology and morphology of Pleonomus tereticollis (Elateridae). [Trav. Inst. Zool. Acad. Sci. URSS] 6: 138-149, ill. **Weiss, Soraci & McCoy.**—Notes on the reactions of certain insects to different wave-lengths of light. [6] 49: 1-20, ill. **Wesson, L. G.**—See under Hymenoptera.

ARACHNIDA AND MYRIOPODA.—Chamberlain & Mulaik.—On a collection of Millipeds from Texas and New Mexico. [6] 49: 57-64 (*). **Chamberlin, R. V.**—New Polydesmoid Diplopods intercepted at quarantine [10] 43:32-35, ill. (S). **Lundblad, O.**—Weitere neue Wassermilben aus Brasilien und Paraguay. [28] 62: 122-126. **McGregor, E. A.**—A new spinning mite attacking strawberry on the mid-atlantic coast. [10] 43: 26-28, ill. **Michelbacher, A. E.**—Two genera of Symphyla new to the United States, with descriptions of three n. spp. [7] 34: 139-150, ill. **Parker, M. V.**—Preliminary list of spiders collected in the vicinity of Reelfoot Lake, Tennessee. [Jour. Tenn. Acad. Sci.] 16: 88-91. **Seyler, P. J.**—The generic and specific status of four Ohio spiders of the gen. Agelenopsis. [43] 41: 51-69, ill.

THE SMALLER ORDERS OF INSECTS.—Bick, G. H.—Life-history of the dragonfly, Erythemis simplicicollis (Odonata: Libellul.). [7] 34: 215-230, ill. **Bolivar y Pieltain, C.**—Estudio de un nuevo Zoraptero de Mexico. [An. Esc. Nac. Cien. Biol. Mex.] 1: 515-522, ill. **Claassen, P. W.**—A catalogue of the Plecoptera of the World. [Cornell Univ. Ag. Exp. Sta.] Mem. 232: 235 pp. **Coleman, T. C.**—The Poduridae of southern California. [13] 33: 1-12, ill. **da Costa Lima, A.**—Nota sobre as especies de "Tunga (Tungidae). [Acta Medica] 5: 4 pp. **Crampton, G. C.**—The mating habits of the winter Mecopteron, Boreus brumalis. [5] 47: 125-128, ill. **Davis, C.**—Taxonomic notes on the order Embioptera. [Pro. Linn. Soc. N. S. W.] 65: 323-352; 362-387, ill. **Denning, D. G.**—Descriptions and notes on new and little known spp. of Trichoptera. [7] 34: 195-203, ill. **Fox, I.**—New or little known North American Japygidae (Thysanura). [4] 73: 28-31, ill. **Hood, J. D.**—La causa y el significado del macropterismo y braquipterismo en ciertos Tisanopteros, y descripcion de una nueva especie Mexicana. [An. Esc. Nac. Cien. Biol. Mex.] 1: 497-505, ill. Un nuevo Teuchothrips (Thysanoptera) procedente de Mexico. [An. Esc. Nac. Cien. Biol. Mex.] 1: 507-511. **Kimmins, D. E.**—A revision of the osmylid sub-families Stenosmylinae and Kalosmylinae. [71] 42: 165-201, ill. **Spieth, H. T.**—The North American Ephemeropteran types of the Rev. A. E. Eaton. [7] 34: 87-98, ill. **Stahler, N.**—The life history of Phloeothrips (Hoplandrothrips) sycamoremsis (Thysanoptera). [55] 17: 31-33. **Tjeder, B.**—Some remarks on "The generic names of the British Neuroptera." [28] 62: 24-31, ill. Revisions of the Scandinavian Neuroptera (s. str.) and Mecoptera recorded by J. W. Zetterstedt, H. J. D. Wallengren and others. [Opuscula Ent.] 5: 67-114. **Walker, E. M.**—New record of Odonata from Manitoba. [4] 73: 35-36.

ORTHOPTERA.—da Costa Lima, A.—Um novo grilo cavernicola de Minas Gerais. (Phalangopsitid.). [Pap. Avul. Dept. Zool., Sao Paulo] I: 43-49, ill. **Dampf, A.**—Un caso de fitomimetismo en un Ortoptero Mexicano. [An. Esc. Nac. Cien. Biol. Mex.] 1: 525-532, ill. **Ebner, R.**—Orthopterologische studien in Sud-Portugal. [Broteria] 10: 5-28, ill. **Flock, R. A.**—The field roach, Blatella vaga. [12] 34: 121. **La Rivers, I.**—Response of Anabrus simplex to temperature. [12] 34: 121-122. **Rehn, J. A. G.**—Two new Ommexychid locusts of the genus Parossa, with a key to the species (Acrididae). [Notulae Nat.] No. 79: 11 pp., ill. **Rehn, J. W. H.**—A new genus of mellierid mantid from Venezuela (Manteid.). [Notulae Nat.] No. 70: 4 pp., ill. **Rehn & Rehn.**—The Orthoptera of the Philippine Islands, Part II. Acrididae; Cyrtacanthacrid; group Cyrtacanthacrides. [Proc. Acad. Nat. Sci. Phila.] 92: 245-287, ill. **Roberts, H. R.**—A new species of Philocleon from Mexico (Acridid.). [Notulae Nat.] No. 76: 4 pp., ill.

HEMIPTERA.—Balduf, W. V.—Life history of Phymata pennsylvanica americana (Phymat.) [7] 34: 204-214. **Cooper, K. W.**—Davispia bearcreekensis, a new cicada from the paleocene, with a brief review of the fossil Cicadidae. [Amer. Jour. Sci.] 239: 286-304, ill. **da Costa Lima, A.**—Novo Hemiptero Reduviideo da sub-familia Vesciinae. [Arq. Zool. Est. Sao Paulo] 1: 485-490, ill. **Um novo** Ceroplastes gigante (Coccid.). [Pap. Avul. Dept. Zool., S. Paulo] 1: 9-11, ill. **Craig, F. W.**—Observations on the periodical cicada. [12] 34: 122-123. **Davis, W. T.**—New Cicadas from North America with notes. [6] 49: 85-99, ill. **DeLong, D. M.**—The red-banded Osbornellus spp. of the auronitens group occurring in the United States (Cicadellidae). [7] 34: 179-180, ill. (*). The gen. Prescottia (Cicadellidae) in North America. [7] 34: 181-182, ill. (*). A n. gen. (Knullana) and two n. spp. of leafhoppers (Cicadellidae) from Mexico. [43] 41: 86-88, ill. Los Phlepsidos (Phlepsius y Texananus) de Mexico (Cicadellid.). [An. Esc. Nac. Cien. Biol. Mex.] 1: 379-404, ill. **DeLong & Knull.**—Two n. spp. of Osbornellus from the southwestern United States. (Cicadellidae). [7] 34: 177-178, ill. **Ferris, G. F.**—Contributions to the knowledge of the Coccoidea. IX. A forgotten genus of the family Margarodidae. X. Illustrations of eleven genotypes of the Diaspididae. XI. A new genus in the Pseudococcidae. [117] 6: 6-28, ill. A new species of Stomacoccus. [117] 6: 29-32, ill. **Hungerford, H. B.**—A remarkable new Naucorid water bug. [7] 34: 1-4, ill. **McKenzie, H. L.**—A new species of the genus Matsucoccus attacking Pinon Pine in California [117] 6: 2-5, ill. **Ossiannilsson, F.**—Some new Fulgorina (Homoptera) from Java and South America. [Opuscula Ent.] 5: 41-46, ill. **Pelaez, D.**—Los estadios ninfales de Umbonia crassicornis. [An. Inst. Biol. Mex.] 11: 611-632, ill. **Ruckes, H.**—Note on the feeding habits of Brochymena carolinensis in Florida (Pentatomidae). [19] 36: 27-28. **Usinger, R. L.**—Key to the subfamilies of Naucaoridae with a generic synopsis of the new subfamily Ambrysinae. [7] 73: 5-16, ill.

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THE EMBRYOLOGY OF INSECTS AND MYRIAPODS. The developmental history of insects, centipedes, and millipedes from egg desposition [sic] to hatching. By OSKAR A. JOHANNSEN, Professor of Entomology, Emeritus, Cornell University, and FERDINAND H. BUTT, Instructor in Insect Morphology, Embryology, and Histology, Cornell University. First edition. McGraw-Hill Book Co., Inc., New York and London, 1941. Pp. xi, 462, 370 figs. $5.00—This book is, we believe, the first in English, if not in any western European language, dealing exclusively with the comparative embryology of insects and myriapods. As such it is of first rate importance. It is based on instruction given for more than twenty years at Cornell University. It summarizes a wide range of literature; the bibliography occupies 37 pages (417-453) and contains perhaps 850 titles; few, if any, of importance are lacking. It is divided into two parts, which may be called general (pp. 1-164) and special (pp. 165-415) embryology. Chapter II, A type of embryonic development in insects (pp. 9-23), follows through "a brief outline of the development of a typical insect from the time of maturation of the egg nucleus to the emergence of the larva from the egg. . . . This account does not apply to any specific insect but rather to a generalized type that possesses characteristics common to many insects in most particulars." With this as a starting point, the reader is prepared for more detailed accounts of the egg, its differentiation, fertilization, maturation and cleavage (Chap. III), blastoderm, germ band, segmentation and the appearance of appendages (IV), embryonic membranes, dorsal organs and blastokinesis (V), gastrulation and germ layers (VI), development of the alimentary canal (VII), the ectodermal (VIII) and mesodermal (IX) derivatives. Chap. X is concerned with polyembryony and parthenogenesis, XI with micro-organisms in the egg and XII with experimental embryology (pp. 144-164). Part I is illustrated by 62 figures, of which 34 are described in the preface as copies of diagrams used in the authors' classes; the remaining 28 are taken from the writings of well-known embryologists from Hertwig, 1881, to Seidel, 1935. Part II consists of summaries of the embryonic development of representatives of taxonomic groups as described in the literature, and in original work of the junior author. "By the selection of illustrative species in the second part which are not especially stressed in the first part, undue repetition is avoided." Part II, therefore, will be very useful to those who have not easy access to the scattered memoirs upon which it is based. The taxonomic headings of its chapters, the examples described, the authors chiefly followed, their dates, and the number of figures drawn from their works are as follows. Chap. XIII. Oligoentomata and Aptilota: The springtail, *Isotoma cinerea*, Philiptschenko, 1912 37 figs.; *Campodea staphylinus*, Uzel, 1898, 9 figs.; the silver fish, *Lepisma saccharina*, Heymons, 1897, 4 figs. XIV. Ephemerida, Odonata, Plecoptera, Embiaria, Dermaptera, Hemimerina: the may fly, *Ephemera vulgata*, Heymons, 1896; dragonflies and damselflies, *Libellula pulchella*, *Erythemis simplicicollis*, *Plathemis lydia*, Butt, new, 12 (really 19) figs., *Calopteryx*, Brandt, 1869, 2 figs. (really 6, old stand-bys in embryological literature!), the stone fly, *Pteronarcys proteus*, Miller, 1939; *Embia uhrichi*, Kershaw, 1914, 1 fig. (so numbered, really 16); the earwig, *Forficula auricularia*, Heymons, 1895; *Hemimerus talpoides*, Heymons, 1912. XV. Orthopteroidea (Panorthoptera): *Paratenodera sinensis*, Hagan, 1917; the Croton bug, *Blattella germanica*, Wheeler, 1889, 1 fig., and L. C. 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All are clear and well printed throughout the book and the reference letters in each figure are explained beneath it. Their numbering is not uniformly logical, as is indicated in our list of those of Part II above. At the conclusion of each chapter is a list of references (authors and dates) pertaining to the subject thereof, for which the full data are given in the bibliography at the end of the text. In Part II these references are arranged, with the generic names of the insects in alphabetical order. The index, which occupies the final eight pages, is incomplete as regards Part I. None of the insects and myriapods mentioned therein appear in the index. This omission unfortunately vitiates much of the advantage of avoiding repetition by selecting for treatment in Part II those species not especially stressed in Part I, alluded to above. This serious defect can be readily supplied in a second edition, which will surely be called for in a short time.—P. P. CALVERT.

OBITUARY

Dr. HUGO KAHL, curator of entomology at the Carnegie Museum, Pittsburgh, until last January when he became curator emeritus, died on February 19, in his eighty-second year.—*Science*, April 18, 1941.

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—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 852, La Paz, 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 McDow ll 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1941, 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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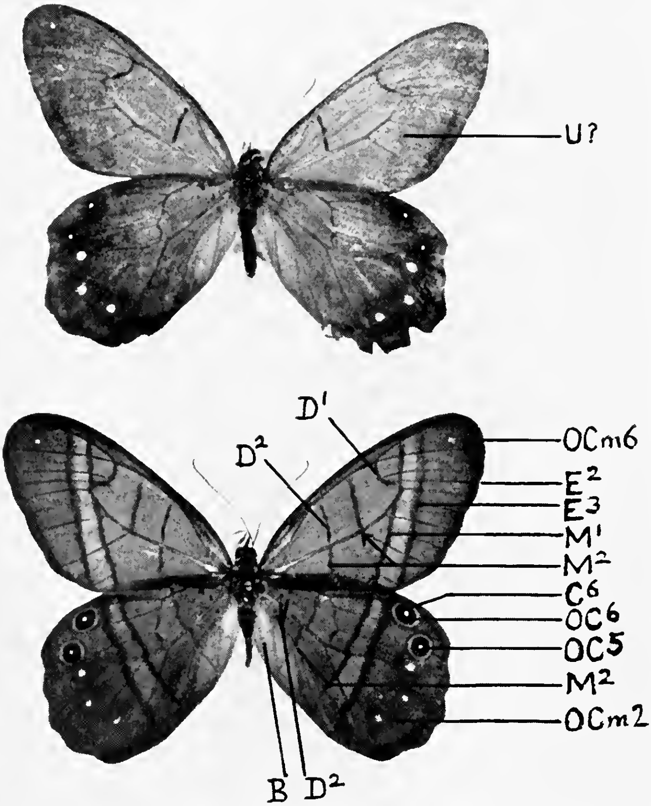

LINE-ELEMENTS IN BUTTERFLY PATTERNS.—Forbes.

Pierella astyoche, natural size.

Upper figure: Variety without line elements. Lower figure: Normal pattern.—(Bodenstein photo.)

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Line-Elements in Butterfly Patterns (Lepidoptera: Nymphalidae).

By WM. T. M. FORBES, Cornell University, Ithaca, New York.

(With Plate II.)

The pattern of the higher butterflies, and in particular of the Nymphalidae, (sensu lato) has been analysed into its chief components by Schwanwitsch, in a series of recent papers, of which I may mention especially one on the Pierella group of Satyrids, in the Zeits. Morph. Ökol. Tiere, x, pp. 433, ff., 1928. Since this system is less well known in this country than the pattern scheme of the Noctuid moths, I may present his system and tabulate the relations of the two. We may divide the pattern elements into four groups, *lines, spots, reactions* and longitudinal elements. The first are essentially transverse, and form a system each member of which is in some ways a mirror image of the one on each side of it. They comprise Schwanwitsch's E, M and B elements. The markings I call *spots* differ in being associated with single veins or interspaces, either limited between them, or only transgressing a little. They are his OC and D. The markings that I propose to call *reactions* are of a less definite character. While having a place in the patterns they are apt to lack sharp boundaries, and may be strongly influenced by neighboring patterns of a more definite character. Notable among these are elements U and G, but even more plastic elements of the same type are the numerous variations of ground color limited by the more positive pattern elements, and the shades of contrasting color which define the latter.

Some pattern elements do not lie quite sharply in one or other of these classes. Thus the terminal line (E^1 of Schwanwitsch) is controlled by the vestigial ambient vein, and accordingly shows the simplicity of a longitudinal element (V or I of Schwanwitsch), not entering into the mirror symmetry of the typical line elements. E^2 also tends to fade out, and might better be treated as a "reaction," but E^3 is a typical member of the line system. The ocelli (OC) are also surrounded by outer circles in many cases, the circuli (C) of Schwanwitsch, and we shall see that in one important way these circuli behave like lines, rather than the spots that they appear to be.

These pattern elements correspond rather closely to the familiar Noctuid pattern as the following table will show.

Nymphalidae	*Noctuidae*
E^1 Externa	Terminal
E^2 Externa	(Adterminal, or so-called subterminal of Notodontidae, etc.)
E^3 Externa	Subterminal (inner st. of some families)
OC Ocelli	Wanting
C Circuli	Wanting
U Umbra	Wanting or fused with st.
M^1 Media	Transverse posterior (Postmedial)
G^1, G^2 Granulosae	Media
M^2 Media	Transverse anterior (Antemedial)
D^1 Discal	Reniform
D^2 Discal	Orbicular
D^2l (part of discal lying below Cu)	Perhaps the Claviform
B Basal	Basal (Half-line)

Certain differences are clear, to be sure. Firstly the second discal of the Nymphalidae lies basal to the inner media; in all moths, so far as I know, the orbicular lies distal to the antemedian, but this is to be expected, since the position of the orbicular is controlled by the forking of the median vein in the cell and this takes place much nearer the base in the butterflies. Then the granulosa, when present, is commonly divided into two bands, one accompanying each media, and if undivided forms a general filling of the median area, while the "media" of the Noctuidae is a narrow, though diffuse line. The homology of the claviform with the lower part of the inner discal can only be called doubtful, and the subterminal element in those higher Noctuidae that we think of as typical is single, and does not enter the symmetry system of the other lines,—but this last can be explained as the result of fusion of E^3 (clearly present in many more primitive Lepidoptera) with

E^2, U or both. Most striking is the total absence of the OC system, but this last has not been identified yet, even in other butterflies.

The normal specimen of *Pierella astyoche* shown here (Plate II, lower figure) shows the following pattern-elements, using Schwanwitsch's formula:

$$\frac{E^2\ E^3\ OCm6\ M^1\ D^1\ M^2\ D^2}{E^2\ E^3\ OCm2,\ 3,\ 4\ OC5,\ 6,\ 7,\ M^1\ D^1\ M^2\ D^2\ B1}$$

But the following points should be noted in which I differ from Schwanwitsch: I take the outer of the two lines across the wing at ¾ to be the innermost externa, rather than umbra. It shows every feature of a true line-element (as will be noted below), there is no other element to represent E^3, and as Schwanwitsch has noted himself in the case of *Prepona* (Acta Zoologica xi, 263 ff, 1930) it is perfectly possible for a line to cross the series of ocelli, leaving both intact;—in fact OC7 still lies on the basal side of the line. Further I take the minute dot near the base of fore wing below and the corresponding three dots on the hind wing to be dislocated parts of D^2, and only the little bar from the fold to the inner margin to be truly B. Note also what Schwanwitsch calls the *pierellization* of M^2 in the fore wing,—i. e., that the part of it below the cell is completely cut off from the upper part and has dropped back into perfect line with D^2.

The upper specimen figured on Plate II illustrates and dramatizes this interpretation. If this is correct every line-element in the pattern has dropped out, doubtless as the result of a single factor-change, while every spot-element is intact. It is for this reason I interpret all the black dots[1] at the base of the wings as parts of D_2, since they remain, while the little basal line has vanished. It is also possible that the reaction-elements survive, somewhat blurred, since the position of E^2 is taken by a distinct though diffuse band, and where the umbra should be there is a very perceptible dark cloud.

A further point of interest is the *circuli*, the black rings surrounding ocelli 5, 6 and 7 on the hind wing. These have completely disappeared in the upper specimen, leaving the black ocellus proper undefined. This implies that these circuli may yet turn out to be morphologically line-elements, formed much as Schwanwitsch explains the similar but empty circles on the fore wings of many Preponas (1. c. pp. 323-330, figs. 33 etc., E^3c). If this is true it may help us in connecting the Nymphalid pattern to that of lower butterflies, and especially the Papilionidae, where ocelli as such do not appear. We may suggest, for instance, that the white or blue pupils of the ocelli represent vestiges of the blue submarginal spots of the Parnassiinae, and that their red or orange bands appear vestigially in the yellow rings that so often (also here) appear between the ocellus proper and its circulus. Another point of likeness is that, as in some other species of *Pierella*, *Papilio* and at least many of the other Papilionidae have the postmedial (M^1) of the fore wing "pierellized," as rather plainly shown in *Thais rumina* and *Papilio machaonides*. This latter point may do much to clear up Schwanwitsch's difficulty with the fore wings of the Papilionidae.

HOW TO MAKE AN INSECT COLLECTION. Containing suggestions and hints designed to aid the beginning and less advanced collector. This booklet is based on the experience and methods developed during years of collecting insects by members of WARD'S ENTOMOLOGICAL STAFF. Published in the service of Entomology by Ward's Natural Science Establishment, Inc. 302 Goodman St., North, Rochester, New York, 1940. 32 unnumbered pages, 43 figures. It is stated that this booklet is designed to replace *Directions for Collecting and Preserving Insects*, by Dr. A. B. Klots, which is now out of print. The extensively illustrated text gives directions and suggestions for collecting, killing, pinning, mounting, labeling, displaying, rearing, identifying and caring for insects. It should be very helpful to all interested in this subject.—P. P. CALVERT.

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[1] A similar disruption of the orbicular (D^2) appear in several Amathusiinae, and strikingly in the fore wing of *Enispe cycnus*. In *Pierella ocreata* these markings have fused into an apparent complete basal line, but the portion belonging to D^2 is more intensely black than the fragment of true B.

Additions to the List of Nevada Dragonflies (Odonata).

By IRA LA RIVERS, Reno, Nevada.

(Continued from page 130.)

Subfamily AGRIINAE.

AGRION AEQUABILE (Say) — Humboldt County (near National).

**A. MACULATUM Beauvais—Elko County (Rowland).

HETAERINA AMERICANA (Fabricius)—Nye County (Beatty).

Subfamily LESTINAE.

LESTES CONGENER Hagen—Churchill County (Carson Lake, Fallon, Lahontan Reservoir); Douglas County (Gardnerville); Lyon County (Lahontan Reservoir); Washoe County (Verdi, Washoe Valley).

L. UNGUICULATUS Hagen—Churchill County (Carson Sink, Fallon, Humboldt Sink); Washoe County (Washoe Valley).

**L. FORCIPATUS Rambur—Esmeralda County (Boundary Peak).

L. DRYAS Kirby—Churchill County (Carson Lake, Carson Sink, Fallon); Lyon County (Yerington); Pershing County (Rye Patch Reservoir[1]); Washoe County (Washoe Valley). Previous records as *L. uncatus*.

Subfamily COENAGRIONINAE.

ARGIA ALBERTA Kennedy—Eureka County (near Beowawe).

A. EMMA Kennedy—Churchill County (Fallon, Humboldt Sink); Douglas County (Gardnerville); Lyon County (Wabuska); Humboldt County (Paradise Valley); Pershing County (Humboldt Sink); Washoe County (Dry Lake).

A. VIVIDA Hagen—Esmeralda County (Fish Lake Valley); Lyon County (Wabuska); Nye County (Beatty); Washoe County (Truckee Meadows).

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[1]The Rye Patch Reservoir locality for this species was erroneously listed as being in Churchill County in the first list.

AMPHIAGRION SAUCIUM (Burmeister) — Churchill County (Carson Lake, Carson Sink, Fallon, Lahontan Reservoir); Douglas County (Gardnerville); Humboldt County (Paradise Valley); Lyon County (Lahontan Reservoir, Mason Valley); Washoe County (Washoe Valley).

ENALLAGMA BOREALE Selys—Douglas County (Genoa, Glenbrook); Lyon County (Sweetwater); Ormsby County (Lake Tahoe, Marlette Lake); Washoe County (Lake Tahoe, Verdi).

E. CLAUSUM Morse—Washoe County (Washoe Valley).

**E. CYATHIGERUM (Charpentier)—Douglas County (Lake Tahoe); Esmeralda County (Boundary Peak); Ormsby County (Lake Tahoe, Marlette Lake); Washoe County (Lake Tahoe, Marlette Lake).

E. CARUNCULATUM Morse—Churchill County (Fallon, Lahontan Reservoir); Lyon County (Fernley, Lahontan Reservoir, Yerington); Washoe County (Washoe Valley).

E. CIVILE (Hagen)—Douglas County (Gardnerville); Lyon County (Smith Valley, Sweetwater); Washoe County (Truckee Meadows, Washoe Valley).

E. PRAEVARUM (Hagen)—Esmeralda County (Fish Lake Valley); Nye County (Beatty).

E. ANNA Williamson—Churchill County (Fallon, Humboldt Sink, Lahontan Reservoir); Douglas County (Gardnerville); Lyon County (Sweetwater, Wabuska); Washoe County (Washoe Lake).

ISCHNURA DENTICOLLIS (Burmeister)—Churchill County (Carson Sink, Fallon, Lahontan Reservoir); Lyon County (Fernley, Yerington); Pershing County (Rye Patch Reservoir; Washoe County (Washoe Valley).

I. PERPARVA Selys — Churchill County (Fallon, Lahontan Reservoir); Douglas County (Gardnerville); Lyon County (Smith Valley, Yerington); Humboldt County (Paradise Valley); Pershing County (Lovelock, Mill City); Washoe County (Franktown).

I. CERVULA Selys — Churchill County (Fallon, Lahontan Reservoir); Douglas County (Gardnerville); Lyon County (Fernley, Smith Valley, Sweetwater, Yerington); Mineral

County (Schurz); Washoe County (Washoe Valley).

The total number of species now known to the author for Nevada is 78.

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Some New Syrphid Flies from North and South America (Diptera).

By FRANK M. HULL, University of Mississippi.

In this paper I present the descriptions of several new world species of Syrphidae. Two of these I collected on low growing herbage about the clearings of Barro Colorado Island. Others have been received from various sources. Types, unless otherwise stated, are in the author's collection.

Planes chrysopressa n. sp.

Related to *vagans* Wied. Distinguished by the pile of the third and fourth abdominal segment; face black, a brownish-yellow stripe from eye to epistoma; mesonotum blackish and opalescent with a pair of stripes of yellow pile.

♀. Length 7 mm. *Head*: the vertex is shining brownish-black, the upper portion of the occiput dark brassy brown; viewed from the side it is covered with yellow pubescence. The upper part of the front is shining brassy black, bare of pubescence; there is a broad pale yellowish-brown transverse band of pubescence from eye to eye across the middle of the front, down the middle of which runs a very narrow almost bare line; the extreme lower front above the antennae is shining and bare of pubescence except for a narrow extension from the transverse band above it. Face metallic brassy black in ground color, except that along the anterior margin and front of the cheeks is a light brownish-yellow diagonal band from eye to epistoma. The face is broadly covered with pale yellow pubescence from lower edge of front down to the oral margin. Antennae elongate, the third joint half again longer than the first two joints, dark brown in color the arista pale yellowish brown. Pile of vertex and front light brassy yellow.

Thorax; mesonotum shining brownish black with a translucent coppery luster, a prominent almost whitish patch of pubescence on the inside of the humeri and viewed from behind a pair of widely separated, conspicuous, light silky yellow, short pilose vittae, that do not appear unless viewed in the proper light, and which run from the anterior margin back to where they are confluent with a wide, transverse area of similar pile lying in front of the scutellum. Between the pair of longitudinal vittae there is a much narrower, shorter median vitta of pile. Also on the posterior margin of the transverse suture there is a similar band of brassy pile confluent with the longitudinal stripes. Between all of these areas of pale pile there is considerable dense short black pile. Pile of the pleurae wholly pale yellowish beneath which is almost whitish pubescence. Scutellum brassy, almost coppery-black, with short pale pile and a pair of very delicate, slender pale yellow bristles on the posterior margin and more anteriorly along the margin two or more pairs of still shorter bristles.

Abdomen: first segment shining greyish black, perhaps slightly bluish. Second segment a little longer than wide, almost opaque black but with a faint shining steel-bluish luster present broadly over the middle. There is a small triangular, sublateral, obscure brownish-yellow spot on either side of the segment, very widely separated; the extreme lateral margin of the segment is bright brassy. Whole of third and fourth segments brilliant brassy or golden, with pile somewhat the same color; the golden pile of the fourth segment is somewhat appressed and directed obliquely towards the midline.

Legs: femora black, the apices narrowly yellowish, the hind pair enormously thickened, its pile chiefly pale yellow with, along the ventral edge, numerous short black spines, and just outside of this on the apical portion on the outside several longer black spines and upon the inside five or six still longer ones. Hind tibiae very dark brown, the base almost whitish, the apex with a long sharp spur, the middle and anterior tibiae brown with the basal fourth whitish yellow. Hind tarsi dark brown, fore and middle tarsi with the first two joints quite pale yellow, the remaining joints blackish.

Wings: pale grey, the stigma dark brown. *Holotype:* One female. Barro, Colorado, Canal Zone, PANAMA. F. M. Hull collector.

Planes cuprescens n. sp.

Fourth abdominal segment sparse, golden, appressed pilose, the third segment brown pilose; mesonotum and scutellum with a strong reddish-brassy lustre. Related to *vagans* Wied., but not closely.

♀. Length 7 mm. *Head:* front and vertex shining black, quite narrow above, barely half as wide as in *chrysopressa,* the middle of the front yellowish-white pubescent, the lower portion shining bare with in the midline a very tiny tubercular bump. In some lights the broad transverse pubescent area is separated by a narrow median line. The pile of the lower half of the front is sparse and pale yellow; of the upper half of front and vertex black. Face extensively pale yellowish white pubescence, the carina not sharply marked, the entire lower half of face in front and along the sides as far back as the edge of the cheeks light brownish yellow. Antennae elongate, the third joint about one and one-half times as long as the first two joints, the apical and dorsal half of the third joint dark brown, the basal and ventral portion light orange, the first two joints light brown, the arista pale yellow, a little darker towards the apex.

Thorax: mesonotum with three pairs of longitudinal bands of pile, the ground color of which is light brassy, almost greenish, the middle one of which is very narrow and all three stripes are evanescent just past the middle of the mesonotum. There is a patch of golden pile on the posterior margin of the notapleurae which is confluent with a similar patch upon the lateral margin of the mesonotum just posterior to the suture. The pile is also brassy in front of each postcallus and in front of the scutellum. The mesonotum is bright brassy for some distance in front of the scutellum and the yellow pile in front of the scutellum gives way to black anteriorly. Between the yellow pilose stripes above described, the mesonotum is coppery in color. Scutellum light brown in ground color with a bright golden luster and sparse pale pile and a single pair of delicate long yellow bristles, and anteriorly one or more pairs of short yellow bristles. Pile and pubescence of meso- and sternopleurae pale yellow, almost white. There is a prominent almost whitish patch of pubescence on the inside of each humeri.

Abdomen: first segment light brown, yellowish in the middle with a brassy luster; second segment with a pair of large subrectangular light brownish yellow spots which reach the full width over the lateral margin and, along the margin, extend almost to the extreme end of the segment. These light colored spots are divided by the parallel-sided median anterior prolongation of a dark brown posterior border upon the segment which, however, reaches the lateral margins only very narrowly. The anterior prolongation does not quite reach the anterior margin. Third segment somewhat similar to the second segment, although here the segment is barely wider than long, whereas the second segment is barely longer than wide. The large basal lateral spots are almost as pale as those of the third segment; the median brown prolongation is somewhat evanescent and the posterior marginal spot or band of rich brown nowhere reaches the lateral margin. Fourth segment rich shining brown with slight golden reflections; the pile of the dark brown area of second and third segments sepia in color, that of the paler areas and of the fourth segment sparse, brassy yellow; the pile is flat appressed upon the fourth segment.

Legs: hind femora shining black with brassy cast, grossly thickened in the middle, its extreme base brownish, the narrow apex yellowish brown. Fore and middle femora brown, the apex yellowish. Hind tibiae pale yellow basally, brownish on the remainder and the apex has a long sharp spine; the hind tarsi are light brownish yellow, the last two joints dark brown, the whole of the fore and middle tibiae and tarsi pale yellow, their last two tarsal joints barely darker.

Wings: almost hyaline, the stigma pale yellow. *Holotype*: one female, Barro, Colorado, PANAMA. F. M. Hull Collector.

Baccha sepia n. sp.

Entirely dark, sepia, spatulate flies, except for pairs of small, diagonal, yellowish-brown fascia upon the abdomen. Sides of face and front diffusely brownish yellow; wings dark brown. Suggestive of *gastroctacus* Wied. in the non-petiolate abdomen.

♂. Length 11 mm. *Head*: vertex and all of front except the narrow brownish-yellow sides, dark sepia-brown with pile of the same color. The face is broadly dark brown in the middle and over the tubercle, the color extending down narrowly about the epistoma to cover the cheeks. The sides of the face are broadly brownish-yellow pollinose and this color extends narrowly up along the sides of the front but at the top of the front does not join the extension from the other side. The facial pile is dark brown. The first and second joints of the antennae are brown, the lower basal margin of the short rounded third joint narrowly reddish-brown, the remainder of the third joint and the arista dark brown. The occiput is grey pubescent with a single row of black hairs on the upper third and three or four rows of yellowish white pile below.

Thorax: mesonotum bright shining brassy-brown, covered with dark brown pollen and sparse brown pile. There are quite obscure suggestions of narrow vittae upon the thorax; posteriorly there appear to be three narrow shining chocolate pollinose vittae and viewed from in front there appears to be a single narrow black median streak which probably, however, divides the median pollinose vittae into two parts. Scutellum light brown, the immediate base very narrowly yellowish-brown, the discal pile sparse, long, delicate and black. The ventral fringe pile consisting of seven very long, blackish hairs.

Abdomen: spatulate; but little less wide upon the base than upon the apex. The second segment is barely longer than the third; the third segment one-sixth or one-eighth longer than the fourth segment; fifth segment not quite as long as wide: the first segment is quite short. The color of the abdomen is dark sepia-brown and shining, barely lighter upon the second and third segments. The pile upon the first and second segments is brownish black and the pile upon the posterior part of the abdomen is black. In the middle of the second segment, upon either side, is a diagonal, long, quite slender brownish-yellow fascia that fails to reach the margin and does not join the midline. Just before the middle of the third segment there is a fascia similar in every respect, except that it is wider upon its inner or median half and in fact is gradually drawn out from its medial wider base to a narrow point as it approaches the line of the margin which it does not reach. Upon the fourth segment just before the middle is a similarly colored, though slightly darker, small, irregularly triangular-shaped spot. Upon the fifth segment, separated by a distance equal to those of preceding spots is a pair of brown, basal, elongate, small spots which are drawn out posteriorly.

Legs: the femora are quite slender, dark brown and blackish-brown pilose, the apices of the middle femora lighter brown and the fore pair of femora are noticeably lighter in color than the hind pair. Fore and middle tibiae light brown with a suggestion of a obscure narrow darker annulus near the middle. The hind tibiae are wholly blackish brown with similarly colored pile. All of the tarsi except the basal two-thirds of the hind basal tarsi are light brownish yellow with similarly colored pile.

Wings: broad, but the alula narrow and strap-like; the entire wing including the whole of the stigmal cell is deeply suffused with brown.

Holotype: one male. Sao Paulo, BRAZIL, April 6-8, 1934. J. Lane collector. *Paratype*: one male in Lane's collection; same data.

Mixogaster johnsoni n. sp.

This species is related to *breviventris* Kahl, but the antennae are lighter; the yellow, lateral, thoracic stripe is interrupted and the pattern of the abdominal spots differs.

♀. 10 mm. exclusive of antennae. *Head*: face pale yellow, the cheeks and a median stripe dark brown. Front and vertex dark blackish brown. A pale yellow spot on the eye margins opposite the ocelli and the transverse black band in front of antennae pitted. Antennae black, the base of the third joint narrowly orange and the first two joints dark brown.

Thorax: Mesonotum dully shining black, the humeri, a small spot just before and behind the suture, the postcalli, all of the scutellum except the posterior corners, a prominent vertical stripe on mesopleurae, sternopleurae and almost the whole of the metapleurae pale yellow. A large red spot on the middle of the pteropleurae confluent with the metapleural yellow spot. Metanotum black.

Abdomen: black with slender post marginal yellow borders that expand a little in the posterior corners. First segment almost wholly black, the anterior corners of the second segment obscurely and diffusely yellowish, merging into red and then into black.

Legs. chiefly light reddish brown, the basal two-thirds or less of the hind tibiae or more of the middle tibiae, the apex of the middle femora, front femora and basal half of the front tibiae pale yellow. Tarsi brownish but light in color.

Wings: hyaline, appearing grey from dense grey vittae. The veins very narrowly and inconspicuously margined with brown without definite anterior brown borders.

Holotype: One female, Dennisport, MASSACHUSETTS, Sept. 3, 1935 (J. Bequaert); this specimen is in the collection of the author, presented to the author through the kindness of Dr. Bequaert. *Paratypes:* One female from Lucaston, NEW JERSEY, Aug. 27, C. W. Johnson collector; this is in the Museum of Comparative Zoology; a specimen in the Boston Society of Natural History from Wallingford, CONNECTICUT, July 1, 1922; the Museum of Comparative Zoology at Harvard contains a specimen from Nantucket, MASSACHUSETTS, Sept. 8. All four specimens are females.

On the suggestion of Mr. Nathan Banks, I take pleasure in naming this species in honor of the well known dipterist, Dr. C. W. Johnson, to whom I owe much for early encouragement in the study of Diptera.

Two New Species of Hesperiidae from North America. (Lepidoptera).

By E. L. BELL, Flushing, New York.

Undescribed species of *Hesperiidae* still turn up occasionally in the North American fauna despite the fact that the butterflies of this region have been extensively collected and studied for a great many years. This is partially due to the close superficial resemblance of the overlooked species to other closely related species which have already been described and because they occur in areas not usually visited by collectors or by those collectors not interested in collecting *Hesperiidae*.

Many species of *Hesperiidae* are quite locally restricted to a certain type of environment and this may occupy a very limited area and be easily passed by. Our southern and southwestern States seem still to offer interesting possibilities for the collector, as they apparently contain large areas over which little if any collecting has been done.

ANTIGONUS PULVERULENTA Felder (Fig. 1).

1869. *Leucochitonea pulverulenta* Felder, Verhandlungen der Kaiserlich Königlichen Zoologisches-Botanischen Gesellschaft in Wien, xix, p. 478. Orizaba, Mexico.

1876. *Hesperia zampa* Edwards, Transactions American Entomological Society, v, p. 207. South Apache, Arizona.

1884. *Tagiades taeniatus* Plotz, Jahrbücher des Nassauischen Vereins für Naturkunde, xxxvii, p. 41. Oaxaca, Mexico.

1895. *Systasea pulverulenta* Godman and Salvin, Biologia Centrali-Americana, Rhopalocera, ii, p. 413; pl. 87, figs. 24, 25. Arizona; Mexico; Guatemala.

1923. *Systasea pulverulenta* Draudt, in Seitz Macrolepidoptera of the World, v, p. 904; pl. 176e.

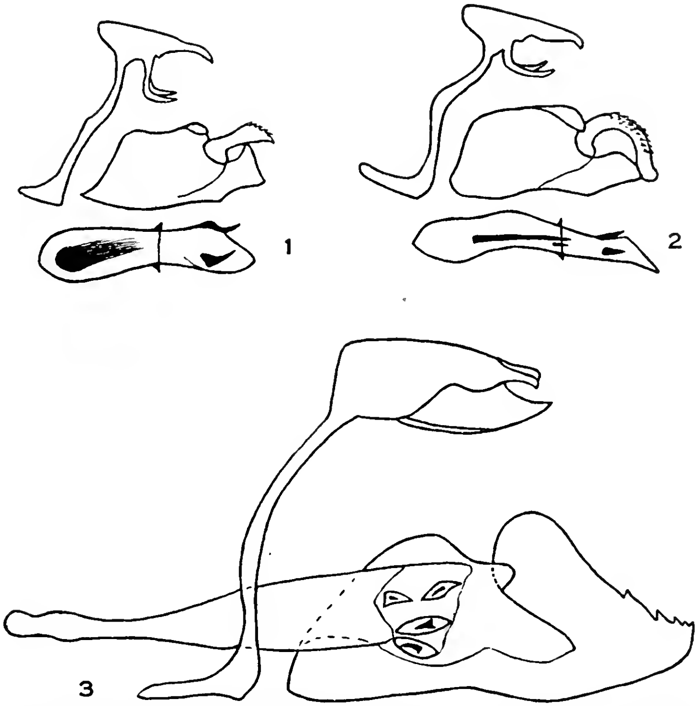
1923. *Systasea pulverulenta* Skinner and Williams, Transactions American Entomological Society, xlviii, p. 299; p. 300, fig. 23 male genitalia.

1930. *Systasea pulverulenta* Holland, Butterfly Book, Revised Edition, p. 344; pl. 46, fig. 1 type of *Hesperia zampa* Edwards.

Brigadier W. H. Evans of the British Museum has called the attention of the writer to the fact that two species have been confused under the name *pulverulenta* and that these two species while quite similar in appearance have a constant difference in the maculation of the primaries and a different form in the male genitalia.

Examination of a considerable number of specimens in the collections of the American Museum of Natural History, the Academy of Natural Sciences of Philadelphia and the National Museum in Washington shows Brigadier Evans to be correct, and that *pulverulenta* appears to be the predominant species in Mexico, extending into the United States in Texas and Arizona. Only one specimen of the other species was found bearing a Mexican label and that Sonora, in the northern part of the Country.

The specimens of *pulverulenta* which were examined came from the following localities: TEXAS: Corpus Christi, San Antonio, Kerrville, Sabinal, Brownsville, Del Rio, New Braun-



Genitalia of: 1. *Antigonus pulverulenta* Felder, 2. *Antigonus evansi* n. sp., 3. *Atrytone berryi* n. sp.

fels: ARIZONA: Tucson MEXICO: Jalapa, Chichen Itza, Rinconada, Oaxaca, Mazatlan, Misantla.

The genitalia of a male specimen from San Antonio, Texas, are figured. The apex of the claspers is very broad, the lower corner produced into a short triangle, the upper into a broad triangular tooth, above which a broad dorsal arm projects obliquely outward, extending a little beyond the apex and carrying some small dorsal teeth in the apical part. The aedoeagus is very large and carries a huge cluster of internal spines near the base and has two horn-like projections near the apex.

Antigonus evansi new species (Fig. 2).

It is this insect which so closely resembles *pulverulenta* Felder and has been confused with it. In general most specimens of *evansi* are of a somewhat lighter shade of color and average slightly larger in size than *pulverulenta* but both species are variable in these characters and reliance cannot be placed upon them for accurate identification.

In *evansi* the cell spot of the discal band of the primaries and the spot immediately below it, in interspace 2, are not in a straight line on their inner edges but that edge of the spot in interspace 2 is always further inward toward the base of the wing and the continuity of the band is thus broken at this point. In *pulverulenta* the inner edge of these two spots forms an even line and the band is not broken at the point of junction. This difference seems to be the only outstanding superficial character by which the two species may be separated.

The figure of the male genitalia is from a specimen from Texas. The claspers terminate in a bluntly triangular apex, back of which rises a very long dorsal arm, curving outward and then downward with its rounded tip extending over the apex of the clasper. The aedoeagus is a little longer and less thick than in *pulverulenta* and instead of the very large cluster of internal spines of that species, carries one very long heavy spine (or perhaps a narrow, closely appressed cluster) and one small spine. The two horn-like projections near the apex are also much less developed in *evansi*.

Brigadier W. H. Evans of the British Museum has called the attention of the writer to the fact of the confusion of this species with *pulverulenta* and it is with great pleasure that the new species is named for him.

Expanse: male, 25 mm. to 36 mm., female, 36 mm. to 38 mm.

Type material.—Holotype male, Baboquivari Mountains, ARIZONA; *allotype* female, El Paso, TEXAS, in collection of the American Museum of Natural History. *Paratypes*: 84 males and 10 females distributed as follows, 24 males, 2 females, American Museum of Natural History; 19 males, 2 females, Academy of Natural Sciences of Philadelphia; 9 males, 6 females, United States National Museum; 32 males in collection of Cyril F. dos Passos. The paratypes are from the following localities: ARIZONA: (roughly north to south) Coyote Mountains; Verde River, Jerome; Congress Jc.; San

Carlos Lake; wheatfields near Globe; Redington; Tucson; Baboquivari Mountains; Cochise County; Huachaca Mountains, south Arizona. Fresnal Canyon; Tuscon; Paradise; Santa Rita Mountains; TEXAS: Alpine; Big Bend; Davis Mountains. NEW MEXICO: Alamogordo. CALIFORNIA: Palm Springs; San Diego County; Colo. desert of California. Mexico: Sonora; Baja California.

Atrytone berryi new species (Fig. 3).

♂. Upper side. Primaries bright fulvous with a broad blackish brown border, a blackish brown spot beyond the end of the cell, base dark brownish and covered with fulvous hairs, inner margin below vein 1 blackish brown with fulvous hairs in the basal half; a broad, black, oblique stigma of two parts across interspaces 1 and 2; two fulvous subapical spots. Fringes pale fulvous or pale brownish fulvous, sometimes becoming whitish at the tip.

Secondaries with broad blackish brown costal and outer borders, abdominal fold blackish brown covered with fulvous hairs; the discal area fulvous, cut into three elongate spots by the black veins; long fulvous hairs extend from the base over and below the cell. Fringes fulvous becoming whitish at the tip.

Under side. Primaries brownish fulvous in the apical half, the base black from the cell downward, a black stripe indicating the stigma of the upper side, inner margin black below vein 1, outer margin black in interspace 1, a black spot in interspace 2 not reaching the margin. Three discal spots and the apical half of the cell brighter fulvous. The lower of the two subapical spots dimly visible.

Secondaries darker fulvous, immaculate; all the veins distinctly paler yellowish fulvous.

Upper side of the body with fulvous brown hairs. Top of head and palpi fulvous or fulvous brown. Beneath the palpi and pectus are fulvous, sometimes a few black hairs in the palpi; thorax fulvous or fulvous brown; abdomen pale fulvous and with or without a narrow, broken, dark central line. Antennae black above, fulvous beneath, the apical part of the club black, the apiculus red.

♀. Upper side. Primaries blackish brown, a discal band of four bright fulvous spots, two in interspace 1, the lower one the larger, the upper one very small and extending further toward the outer margin than the lower one; an oblong spot in interspace 2 beyond the base of the interspace, convex on the inner side and concave on the outer side; a somewhat wedge-shaped spot in interspace 3; two small, elongate subapical spots of the same color. Fringes sordid brownish.

Secondaries. Blackish brown with or without a small fulvous discal area cut by the veins into three rather hazy, elongate spots. Fringes sordid brownish or dirty whitish.

Beneath. Primaries blackish brown in the basal half below the cell and along inner border except at the extreme outer margin. The discal band and lower subapical spot repeated, paler, the two spots in interspace 1 fused into one large spot and extended to nearly the outer margin and sordid whitish. Secondaries as in the male but a little darker in tone.

Body above with brownish or fulvous brown hairs. Top of head and palpi with brownish and fulvous hairs. Beneath as in the male.

Expanse: male, 36 mm. to 38 mm.; female, 38 mm. to 42 mm.

Type material.—Holotype male; Monticello, FLORIDA, March 31 (Engelhardt); *allotype* female; Merritts Island, Brevard County, Florida, September 30, (Berry), in collection of the American Museum of Natural History. *Paratypes;* two males, Orlando, Florida, October 8, one female, same locality, October 17 (Berry), in collection of Mr. Cyril F. dos Passos; one female, Miami, Florida, (Hebard) in collection of the Academy of Natural Sciences of Philadelphia.

It is a pleasure to name this species for Mr. Dean F. Berry of Orlando, Florida, who collected most of the specimens.

On the upper side the appearance of the male is similar to that of *Atrytone conspicua* Edwards but the outer margin of the wings is not quite so rounded and the stigma is slightly thinner than in that species. On the under side the appearance is more similar to that of *Atrytone bimacula* Grote and Robinson, especially in the pale veins of the secondaries but these are pale fulvous in *berryi* and more nearly whitish in *bimacula* and besides *berryi* entirely lacks the white inner margin of these wings, which is so conspicuous in *bimacula*.

The females resemble that sex of *Atrytone arpa* Boisduval and LeConte on the upper side but they are readily distinguished by the entirely different appearance of the under side, and besides they are of a smaller size than the usual female *arpa*.

The male genitalia differ materially from any of the other closely related species in the genus.

The Leng Types of Cicindelidae (Coleoptera).

By Richard G. Dahl, Oakland, California.

The following is presented in order to designate lectotypes of the species of Cicindelidae described by C. W. Leng in cotype series and to give in detail data concerning these, as well as the other species described by him. The discussion is intended to clarify their present status, and to add further information concerning them.

Lectotypes herewith designated are now located in the collection of M. A. Cazier, unless otherwise stated. Several other Leng types are located in other collections as are noted herein. Thanks are due M. A. Cazier for the generous use of his collection and for his helpful suggestions and assistance. I wish to express my appreciation also to L. L. Buchanan, E. A. Chapin, P. J. Darlington, C. W. Leng, and A. S. Nicolay for their assistance.

1. Omus intermedius Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 104.

Discussion: In the description of this species, C. W. Leng does not mention a type, and I have been unable to locate any specimens with the data as given in his discussion. However, there is a specimen in the E. D. Harris collection, at the Museum of Comparative Zoology, which now stands under *procerus* Casey and is labeled "0/248"; "cotype *intermedius* Leng"; "Colony Mill Rd. n. Kaweah, California, May 1, R. Hopping" and "from C. W. Leng Nov. 1906, this label is his identification of the specimen" and "Nov. 1910 determined by C. W. L. as v. *procerus* Cas." I do not believe this specimen should be known as the type of *intermedius*. It would be wise to have a lectotype designated, should anyone encounter the material as mentioned by Leng (1902).

2. TETRACHA CAROLINA var. FLORIDANA Leng and Mutchler. Leng, C. W., and Mutchler, A. J., 1916, Desc. Cat. W. Ind. Cic.; Amer. Mus. Nat. Hist., Vol. XXXV, p. 688.

Type Locality: Everglade, Florida. *Date:* June, 1912. *Collectors:* sons of Mr. Geo. W. Storter. *Type Now Located:* American Museum of Natural History.

Discussion: Evidence shown by C. W. Leng in his description tends to indicate the confinement of this form to one locality, therefore it should be known as *Tetracha carolina* subspecies *floridana*. In collections examined none were found to occur outside the type locality. In this subspecies, the cupreous is completely lost from the head, pronotum, and elytra. Otherwise this form agrees with *carolina*.

3. CICINDELA FORMOSA var. MANITOBA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 137.

Lectotype Locality: Aweme, Hudson Bay, Manitoba. *Collector:* Norman Criddle.

Discussion: Lectotype male designated from a cotype series of six, all from Aweme, Hudson Bay, Manitoba (C. W. Leng collection). This has always been considered a variety, but because of its restricted occurance in the north, it should be known as *Cicindela formosa* subspecies *manitoba*. In this subspecies the widened pattern on the elytra, as well as its restricted distribution, may easily distinguish it from its most closely related form *Cicindela formosa generosa* Dej.

4. C. PURPUREA var. NIGERRIMA *Leng.* Leng, C. W., 1918, New Race of Cicindela, Journ. N. Y. Ent. Soc., Vol. XXVI, p. 139.

Lectotype Locality: Oslar; Chimney Gulch, Golden, Colorado.

Discussion: Lectotype male designated from a specimen of the series in the C. W. Leng collection. In the assignment of the name to this varital form of *purpurea,* Mr. Leng did not designate a type. The specimen above designated is from the series that was before him at that time. *Cicindela* *purpurea* var. *nigerrima* is the black form of *Cicindela purpurea* Oliv. and occurs regularly throughout its range.

5. C. PURPUREA var. TRANSVERSA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 131.

Lectotype Locality: North Illinois.

Discussion: Lectotype male designated from a cotype series of eight specimens. Additional cotype specimens from Eureka, Missouri, April 30, 1905 (Smyth); South Orange, New Jersey, September 1, 1888; Colorado; Louisiana, Missouri, September, 1919, (G. M. Dodge); North Illinois, all in the C. W. Leng collection. In the designated lectotype there is a slight indication of the oblique middle lunule present, however in the cotype series, the middle transverse band is shortened and in one specimen almost lacking. At the present this is considered as a variety of *Cicindela purpurea* Oliv.

6. C. PURPUREA var. LUDOVICIANA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 132.

Lectotype Locality: Vowell's Mill, Louisiana. *Collector:* George Coverdale.

Discussion: Lectotype male designated from a cotype series of five all from Vowell's Mill, Louisiana (C. W. Leng collection). In this variety of *purpurea* the blue head and pronotum are contrasted to the purplish margined green elytra. This variety is very distinct, and can hardly be confused with any of its closely related subspecies and varieties.

7. C. TRANQUEBARICA var. MINOR Leng. Leng, C. W., 1910, Journ. N. Y. Ent. Soc. XVIII, p. 80.

Discussion: In this variety C. W. Leng did not designate a type or cotypes, but merely described it as "smaller than the northern forms and never metallic or brilliant colored", he also states: "The few specimens found in Georgia were of this small dark form, which has been called *minor* by Mr. Edw. D. Harris."

There is no specimen in the C. W. Leng collection that agrees well enough to be designated as a lectotype of this form. It is considered at present to be a faint variety of *Cicindela tranquebarica* Hbst.

8. C. TRANQUEBARICA var. HORICONENSIS Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 145.

Lectotype Locality: Lake George, New York. *Date:* August.

Discussion: Lectotype male designated from a cotype series of seventeen specimens. Additional cotype specimens are from the following localities; De Bruce, New York, June 11, 1911, (Harris); Bartlett, New Hampshire, June 4, 1915 (Harris); North Illinois; Keene Valley, Essex County, New York, August 17, 24, and 27, 1919 (H. Nortman); Marquette, Michigan; Mount Desert, Maine, August: and Boisdale, C. B., all in the C. W. Leng collection. In the cotype series before me the markings vary considerably. In the designated lectotype the markings are reduced, and in the middle transverse band there is a break just before the point of intersection at the margin. The elytra and pronotum are cupreous, and the impressions of the head are green. The cupreous and the green-bronze color are the only characters to separate this variety from *Cicindela tranquebarica* Hbst. The pubescence of the thorax and abdomen varies as in that of *Cicindela tranquebarica* Hbst.

9. C. TRANQUEBARICA var. SIERRA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 146.

Lectotype Locality: Sierra County, California. *Collector:* From the collection of Charles Fuchs.

Discussion: Lectotype female designated from a series of three specimens. Additional cotype specimens are from Big Trees, Calaveras County, California, and Placer County, California, all in the C. W. Leng collection. In the designated lectotype the color is brilliant green above, with purplish-green reflections beneath; the markings are reduced, with the humeral lunule almost lacking. In the other two cotypes, one is an opaque dark green and the other a sericeous green; the markings on each are represented by a middle transverse band only. This form thus far has been collected only in the Sierra Nevada Range in California, which indicates it deserves the status of *Cicindela tranquebarica* subspecies *sierra* Leng.

(To be continued.)

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.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bolletino 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.
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.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
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.
55. Pan-Pacific Entomologist. San Francisco, Cal.
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.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
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.
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.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
87. Archiv für Entwicklungsmechanik 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.
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.
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.
117. Microentomology, Stanford University.
118. Ward's Ent. & Nat. Sci. Bull., Rochester, N. Y.
119. American Midland Naturalist, Notre Dame, Ind.
120. The Great Basin Naturalist, Provo, Utah.
121. Ciencia, Mexico City.
122. Revista Museo de la Plata, Buenos Aires.
123. Indian Journal of Entomology, New Delhi.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.

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.—Davis, W. T.—Charles W. Leng and the New York Entomological Society. [6] 49: 189-192, ill. **Kreibohm de la Vega G. A.**—Contribucion al conocimiento de algunos enemigos naturales de la oruga de la hoja del algodonero (Alabama argillacea) Lucha biologica. [Rev. Ind. Y Agric. Tucuman] 30: 163-171, ill. **Leng, C. W.**—Obituary by J. D. Sherman, Jr. [6] 49: 185-187. **McCoy & Carver.**—A method for obtaining spores of the fungus Beauveria bassiana in quantity. [6] 49: 205-210, ill. **de Seabra, A. F.**—A Entomologia do Trigo. [Arq. da Secc. Biolog. e Parasit.] 3: 699 pp. 1939. **Szekessy, W.**—Disputatio physica de insectis von Andreas Horvath. Die erste, von einem ungarn verfasste entomologische abhandlung. [Ann. Mus. Nat. Hung.] 33: 1-13. **Weiss, Soraci & McCoy.**—Additional notes on the behavior of certain insects to different wave-lengths of light. [6] 49: 149-159, ill.

ANATOMY, PHYSIOLOGY, ETC.—Bucherl, W.—Sobre a musculatura da Scolopendra viridicornis. [Mem. Inst. Butantan] 14: 65-92. **Cambournac, F. J. C.**—Como os mosquitos transmitem as sezões em condições naturais. [Naturalia, Lisboa] II: 151-159, ill. **Hanstrom, B.**—Inkretorische organe, sinnesorgane und nervensystem des kopfes einiger niederer insektenordnungen. [Kungl. Sv. Vet. Akad. Handlingar] 18: 265 pp., ill. Die chromatophoraktivierende substanz des insektenkopfes. [Lunds Univ. Arssk.] 36: No. 12: 20 pp., ill. **Kuhn & von Engelhardt.**—Ein das flügelmuster beeinflussender letalfaktor bei Ptychopoda seriata. [97] 60: 561-566, ill. **Perez, Z.**—Les cellules secretrices du cerveau de quelques Lepidopteres. [An. Fac. Cien Porto] 25: 92-94. **Toth, L.**—The protein metabolism of the aphids. [Ann. Mus. Nat. Hung.] 33: 167-170. **Wagner, E.**—Ueber eine die gonaden beeinflussende mutation von Ptychopoda seriata. [97] 60: 567-589, ill. **Woke, P. A.**—Structure and development of the alimentary canal of the southern armyworm larva. [U. S. Dept. Agric.] Tech. Bull. 762: 29 pp., ill.

ARACHNIDA AND MYRIOPODA.—Chamberlin, R. V.—New American millipeds. [Bull. Univ. Utah] 31: 3-39, ill. **da Fonseca, F.**—Notas de Acareologia. Familias genero e especie novos de acarianos parasitas do pulmao de serpentes (Pneumophionyssid. n. fam. e Entonyssid. n. fam.). [Mem. Inst. Butantan] 14: 53-58, ill. Bolivilaelaps tricholabiatus, gen. n., sp. n. (Laelaptid.). [Mem. Inst. Butantan] 14: 59-64, ill. **de Mello-Leitão, C.**—Spiders of the Guiana forest collected by O. W. Richards. [Arq. Zool. Est. de Sao Paulo] II: 175-197, ill. (*). Aranhas do Espírito Santo Coligidas por Mario Rosa, em 1936 e 1937. [Arq. Zool. Est. de Sao Paulo] II: 199-214. (*).

THE SMALLER ORDERS OF INSECTS.—Geotsch, W.—Staatengrundung und kastenbildung bei Termiten. [88] 29: 1-13, ill. **Guimarães, L. R.**—Notas sôbre Siphonaptera e redescrição de Polygenis occidentalis. [Arq. Zool. Est. de Sao Paulo] II: 215-250, ill. **Kohls, G. M.**—Siphonaptera. A study of the species infesting wild hares and rabbits of North America north of Mexico. [Nat. Inst. Health] Bull. 175: 34 pp., ill. **Sanderson, M. W.**—A bat flea new to Arkansas. [103] 14: 60. The order Embioptera new to Arkansas. [103] 14: 60. **Setty, L. R.**—Description of the larva of Bittacus apicalis and a key to bittacid larvae. [103] 14: 64-65. **Truxal & Jenkins.**—An Ascalaphid larva note. [103] 14: 71. **Viets, D.**—A biological note on the Mantispidae [103] 14: 70-71.

ORTHOPTERA.—Hebard, M.—A new species of Pterophylla from eastern Mexico (Tettigoniid.). [Notulae Nat.] No. 81: 4 pp., ill. **Matthey, R.**—Etude biologique et cytologique de Saga pedo (Tettigoniid.). [Rev. Suisse Zool.

48: 91-142, ill. **Smith, C. W.**—Successful hibernation of the earwig |parasite Bigonicheta setipennis in Ontario. [75th Ann. Rep. Ent. Soc. Ontario] 1940: 29-32. **Tinkham, E. R.**—Biological and faunistic notes on the Cicadidae of the Big Bend Region of Trans-Pecos, Texas. [6] 49: 165-182, ill.

HEMIPTERA.—Beard, R. L.—The biology of Anasa tristis, with particular reference to the tachinid parasite, Trichopoda pennipes. [Conn. Agric. Exp. Sta.] Bull. 440: 597-679, ill. **Drake, C. J.**—New American Tingitidae. [91] 31: 141-145. **Gomez-Menor Ortega, J.**—Cóccidos de la República Dominicana (Cocc.) [EOS] 16: 125-143, ill. **Hungerford, H. B.**—New distributional note on Notonecta borealis. [103] 14: 53. **Kuitert, L.**—An interesting abnormality in Ranatra quadrilentata. [103] 14: 71. **Monte, O.**—Catálogo dos Tingitídeos do Brasil [Arq. Zool. Est. de Sao Paulo] II: 65-174.

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The Francis Walker Types of Trichoptera in the British Museum, by Cornelius Betten and Martin E. Mosely. British Museum, London. June 8, 1940, Price 15 shillings. ix and 248 pp., 122 figs.—In 1852 Walker described 101 species of Trichoptera, 71 from North America, the remainder from other scattered parts of the world. The species from North America have been a source of dispute and confusion since the time of their description and one of the gravest stumbling-blocks to students of the Trichoptera. The book of Betten and Mosely dealing with these is a fine piece of work which redescribes Walker's types to bring out every valuable taxonomic character used in present day studies. The aim of the book was to settle the many problems which have arisen in regard to the identity of these species and the two authors have succeeded brilliantly. It is now one of the basic papers which is indispensable to the study of North American caddis flies. Every specimen recorded by Walker is studied and an interpretation given on opinions published in the past by various authors. Definite types are designated for Walker's species and from the remainder of the material six new species and one new variety are described. Two new genera are erected, *Trentonius* and *Frenesia*. The drawings by D. E. Kimmins are ample, clear, and in fine scale. There is no doubt but that this book lays a foundation for a much more stable group of names in caddis fly literature. Both the authors and the Trustees of the British Museum deserve a vote of thanks for the planning, execution, and publication of this book.—HERBERT H. ROSS.

OBITUARY

Dr. LEVI W. MENGEL, founder and director emeritus of the Reading, Pennsylvania, Public Museum and Art Gallery and internationally known entomologist, died in Reading Hospital on the afternoon of February 3, 1941.

He would have been 73 years old on September 27. He was stricken by a heart attack while working in the Reading Museum on the previous afternoon. Alone, save for one or two members of the janitorial staff, he telephoned his physician, telling him he had an attack of indigestion. The doctor found Mengel sitting in his accustomed chair in the Museum office, suffering from a coronary occlusion, treated him and drove him to the Reading Hospital where, on the following afternoon, Dr. Mengel fell asleep and never awoke.

Dr. Levi Walter Scott Mengel, a son of the late Mathias and Amelia M. (Soder) Mengel, was born in Reading on September 27, 1858. After his graduation from Reading High School he entered the Philadelphia College of Pharmacy, taking his degree in 1891. In 1930, he received an honorary doctor of science degree from Bucknell University. Albright College, Reading, gave him an honorary doctor of laws degree in 1934. In 1891, he, with other members of the Academy of Natural Sciences of Philadelphia joined Lieutenant (later Rear Admiral) Peary's expedition to West Greenland, he as the expedition's entomologist. Returning to Reading, he was employed by the Reading School District as a teacher, was a vice principal from 1902 to 1915, director of the Reading Museum and Art Gallery from 1915 to 1939 and director emeritus until his death.

In 1932 he spent some time in Czechoslovakia with the late Dr. Adelbert Seitz, the well-known lepidopterist, and on a number of occasions exchanged butterflies with the Grand Duke Nicholas Michaelovitch Romanoff. He was a collector of birds, minerals, stamps, postcards and butterflies; the last named collection, valued at $250,000, he gave to the Reading Museum. It includes one of the best collections of Erycinidae in the world, that of the British Museum being perhaps more extensive; it is also rich in Nymphalidae and Papilionidae.

In 1892 he published, jointly with the late Dr. Henry Skinner, a paper on Greenland Lepidoptera (Proc. Acad. Nat. Sci. Phila. 1892, pp. 156-159). It is based on the specimens captured by himself and Dr. Wm. E. Hughes, ornithologist of the Peary Expedition. Twelve species are represented: 2 Pierids, 1 Lycaenid, 1 Nymphalid, 1 Bombycid, 4 Noctuids and 3 Geometrids. Two of them were described as new. *Glaucopteryx immaculata,* a geometer, and a Pierid butterfly, *Colias hecla,* new variety *pallida.* The latter and some of the others were figured in ENTOMOLOGICAL NEWS (vol. III, p. 49, pl. ii, March, 1892).

In 1905 appeared *A Catalogue of the Erycinidae, A Family of Butterflies* with the synonomy [sic] brought down to July 1, 1904. By Levi W. Mengel, Prof, Natural History, Boys' High School, Reading, Pa., May, 1905. The above is the printed title, but in the copy which the author presented to Dr. Henry Skinner, under date of June 10.05, "July" has been crossed out and "Oct." written in its place. The preface begins as follows: "To Whom it may concern: This catalogue is the result of some years of study of the family of which the author makes a specialty. It was made as a working catalogue for the author's guidance. That it is not without fault is known even to the writer; while he expects criticism, it is to be remembered that the sequence of genera, etc., is as the author thinks it ought to be with our present knowledge of the family. The writer uses 'Erycinidae' as the family name; for while the name is preoccupied, yet working naturalists over the world are less familiar with 'Lemoniidae' of Kirby, or with the still newer 'Riodinidae' of Grote."

The Catalogue comprises 161 pages, with, in most pages, two columns to the page. A brief notice of it was published by Dr. Skinner (unsigned) in the NEWS for June, 1905, page 200, in which it is stated that Prof Mengel published it at his own expense. Mr. R. C. Williams, Jr., tells us that Mengel told him that the sales were sufficient to take care of the cost of publication and comments: "a rare thing for a privately printed paper in Entomology." A notice of the *Catalogue* appeared also in the *Canadian Entomologist* for July, 1905, page 267, but it was not entered in the *Zoological Record* until 1907.

Dr. Mengel was a member of the American Association for the Advancement of Science, a member and a Research Associate of the Academy of Natural Sciences of Philadelphia and a corresponding member of The American Entomological Society. He was one of the most widely known and universally respected men in Berks County and one of the first advocates in America of visual education. This he made one of the functions of the Reading Museum, of which museum he said that it was no rich man's luxury but an important adjunct to Berks County's educational institutions. His interest in the Museum has been more fully touched on by Lawrence S. Dillon in *Science* for March 14, 1941, and by the local newspapers, such as the *Reading Times* for February 4, 1941.

FRIENDS OF L. W. M.

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.—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, Correo 1043, Buenos Aires, Rep. Argentina.

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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

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JULY, 1941

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1941, 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 Hibernation in Missouri of Zerene caesonia (Stoll) and Euptoieta claudia (Cram.) (Lepid.: Pieridae and Nymphalidae).

By Harold I. O'Byrne, 663 W. Lockwood Ave., Webster Groves, Missouri.

Our knowledge of the winter status of many of our familiar butterflies is far from complete. This is especially true of a number of species of southern distribution which are known to remain on the wing during the winter months in the South, but whose winter habits in the northern parts of their ranges are shrouded in mystery. Missouri is a border state with respect to these species, and for that reason, data on their hibernation in Missouri should have special significance. The Missouri species that deserve study in this connection are *Phoebis sennae eubule* (Linn.), *Zerene caesonia* (Stoll), *Eurema nicippe* (Cram.), *E. lisa* (Bdv. & Lec.), *Danaus plexippus* (Linn.), *Euptoieta claudia* (Cram.), *Precis coenia* (Hbn.), and *Anaea andria* Scud. Of these, only *Anaea andria* has heretofore been definitely known to hibernate in the imagine stage. The following records refer to *Zerene caesonia* and *Euptoieta claudia*.

Autumn individuals of *Zerene caesonia* are of the form *rosa* McNeill, characterized by the more or less extensive pink suffusion on the lower surface of the wings, especially in the females. In contrast, butterflies of the summer brood are plain yellow below, with no suggestion of pink. Butterflies captured in the spring, therefore, show by this character whether they belong to the brood that ordinarily emerges in the fall or the one that emerges in early summer. The forms and dates of the specimens in my collection are:

Form *rosa*: Mar. 6*; Apr. (no date)*; May 1.

Form *caesonia*: May 22, 25; June 11, 12, 16.

Form *rosa*: Sept. 11*, 15, 22; Oct. 23.

Specimens starred (*) represent the form of *rosa* known as *rosea* Roeber and belong to the autumn brood.

The earliest three spring specimens show the coloration of the brood which emerges in the fall; however, this is only circumstantial evidence that they actually emerged in the autumn preceding their capture. But the one caught on March 6 (1932) was found actually hibernating, under a small log on the east slope of a narrow valley. The butterfly was lying on its side, dormant, and was clinging with its legs to debris on the ground. This observation was made shortly before 11 a. m., when the temperature was 27° F., at Ranken (4 miles east of Eureka, St. Louis County), Missouri.

Less conclusive is the evidence for hibernation in *Euptoieta claudia*. This species is supposedly triple-brooded, but I find no break in its flying period during the summer, though the autumn brood is well set off. I have specimens taken on the following dates:

Summer brood: June 23.

Autumn brood: Sept. 21; Oct. 26; Nov. 1, 9.

Representative additional dates of its occurrence, taken from my records, are:

Summer broods: May 25; June 3, 14, 27; July 5, 12, 26; Aug. 10.

Autumn brood: Sept. 20, 22; Oct. 2, 11, 29.

Possible hibernators: May 13.

At Ranken, May 13, 1932, I saw a badly worn and faded female, and later on the same day a male just as worn, flying about on a sheltered, sunny hillside. The early date (for this species) and the evident worn condition of the butterflies, suggested strongly that they had hibernated. In view of the complete absence of records of possible hibernators in other years, it may be that 1932 was an exceptionally favorable year and that hibernation in Missouri takes place only under such favorable conditions. Scudder (Everyday Butterflies, 1899, p. 358) says, "It seems probable that the butterfly often hibernates, and that some of the autumn chrysalids do not disclose their inmates until very early the following spring"; but

Scudder worked in a locality considerably farther north than Missouri. My experience has been that all that have pupated emerge in the fall, but there are insufficient data to indicate whether the usual overwintering stage is the larva or the adult. French (Butterflies of the Eastern U. S., 4th ed., 1914, p. 167) says that the last brood probably hibernates in the larval state. A need for further observation is apparent.

On Lerodea telata Herrich-Schaeffer and tyrtaeus Ploetz (Lepidoptera: Hesperiidae).

By E. L. Bell, Flushing, New York.

There seems to have been more or less confusion in the application of the names *telata* and *tyrtaeus,* the latter usually having been considered as a form of or a synonym of the former. An examination of the male genitalia shows that the insects to which these names should be applied are really specifically distinct.

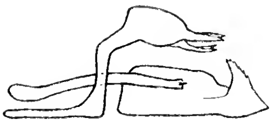
Lerodea telata Herrich-Schaeffer (Fig. 1).

1869. *Cobalus telata* Herrich-Schaeffer, Correspondenzblatt des Zoologisch-Mineralogischen Vereines zu Regensburg, xxiii, p. 201.

1883. *Hesperia telata* Ploetz, Stettiner Entomologische Zeitung, xliv, p. 51; *apellus* Kaden, i. 1. Laguayra.

Herrich-Schaeffer did not mention the locality whence came his type material. The original description distinctly says that the spots of the forewings are yellow and Ploetz also says that they are of that color. Specimens before the writer from localities in Venezuela, Trinidad, British West Indies and Brasil have yellow spots on the primaries and these are considered to be the true *telata of* Herrich-Schaeffer.

Examination of the male genitalia of four specimens from the countries above mentioned shows the same form in all of them. In the figure here given of a specimen from Venezuela it will be seen that the claspers terminate in a short triangular apex, immediately back of which rises a stout dorsal tooth extending obliquely backward.



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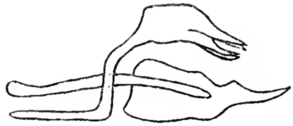

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Male genitalia of 1. *Lerodea telata* Herrich-Schaffer, 2. *L. tyrtaeus* Ploetz.

LERODEA TYRTAEUS Ploetz (Fig. 2).

1883. *Hesperia tyrtaeus* Ploetz, Stettiner Entomologische Zeitung, xliv, p. 51. Laguayra.

1900. *Megistias telata* Godman, (not Herrich-Schaeffer), Biologia Centrali-Americana, Rhopalocera, ii, p. 574; pl. 101, figs. 13, 14, 15 male genitalia. Mexico; Honduras; Venezuela; Guiana.

1907. *Hesperia tyrtaeus* Godman, Annals and Magazine of Natural History, (7) xx, p. 143, "*Megistias telata* H.-S.-var."

1909. *Callimormus elides* Weeks, Entomological News, xx, p. 263, Suapure, Venezuela.

1911. *Callimormus elides* Weeks, Illustrations of Diurnal Lepidoptera, ii, p. 29; pl. xxi, fig. 1.

1924. *Megistias telata* Draudt, (not Herrich-Schaeffer), in Seitz Macrolepidoptera of the World, v, p. 974; pl. 187i.

In his paper on the genus *Hesperia* Ploetz describes *tyrtaeus* immediately following his diagnosis of *telata* Herrich-Schaeffer, and states that the spots on the primaries of *tyrtaeus* are white, thus distinguishing that insect from *telata* with yellow spots. Godman (1900) states that the insect he determined as *telata* had white spots, which he shows in his figure. He also figures the male genitalia of a Mexican specimen, this figure differing in the termination of the claspers from the form found in *telata*.

A female specimen from Ruatan Island, Honduras, in the collection of the American Museum of Natural History and a series of male specimens in the collection of the National Museum from Mexico; Guatemala; Costa Rica and Taboga Island, Panama, have small, dirty white spots on the primaries and these are believed to be *tyrtaeus*.

These specimens superficially agree with the Godman figures and the form of the genitalia from four specimens, kindly dissected by Mr. W. D. Field, agrees in detail with the Godman figure.

In the accompanying figure of the genitalia of *tyrtacus* it will be seen that the claspers terminate in a long, narrow, sharply pointed apex, far back of which rises a short triangular tooth.

Tyrtacus usually has the spots of the discal band of the primaries much smaller than those found in *telata* and often some of them are very indistinct or entirely lacking, but other than this and the whitish color of the spots there is considerable resemblance between the two species, especially on the under side of the secondaries where the color and pattern is very much the same, although variable in both species.

The Ploetz type of *tyrtacus* was said to have come from Laguayra and in this region may possibly fly with *telata* but in Mexico and the Central American region it appears to be the prevailing species.

The Genus Colias in North America (Lepidoptera: Pieridae).

By Austin H. Clark, U. S. National Museum, Washington, D. C.

In the study of butterflies too much attention has been concentrated on the description and study of type or typical specimens and too little on the description of species as a whole. Yet it is quite as important to understand a species as a unit as it is to view it as an aggregation of subspecies, forms, and aberrations.

The following description of the common local *Colias* is based upon a very large number of specimens, all from the District of Columbia. They were collected by Mr. Warren Herbert Wagner, Jr., who has been so kind as to permit me to study them in detail. He later presented them to the U. S. National Museum.

Regarding this description the objection may be raised that the specimens represent the local *philodice,* the recent immigrant *eurytheme,* and hybrids between them. But since *philodice* is only the northeastern form of *eurytheme* and hybridization occurs at all points where the ranges of these two forms overlap the picture presented by these specimens is a perfectly natural one so far as this species is concerned.

The fore wings in the males vary from 18 to 32 mm. in length, and in the females from 18 to 33 mm. Dwarfs are most common in early spring, though they occur at all seasons. Giants are found only in the last half of the summer, in low and more or less damp meadows.

The shape of the fore wings is very varied. They may be short and broad with the outer edge at right angles to the lower edge and the outer edge rather strongly convex, or longer with the angle between the outer and lower borders obtuse, the outer border straight, and the apex pointed. In early spring or winter individuals they may be markedly elongated and narrow. The extreme type of short wing and the extreme type of long wing occur most frequently in very small individuals and are rare in individuals above medium size. The pointed wing with the straight outer border is characteristic of all very large individuals, but occurs typically developed also among the smallest. The lower border of the fore wings is straight in the females, in the males either straight or bowed outward forming a very broadly rounded obtuse angle approximately in the center. There is no difference in wing shape between yellow and orange individuals, but the majority of the yellow individuals have the outer border of the fore wings more or less convex and the lower border straight, while most of the orange ones, particularly the larger, have the outer border straight and the lower bowed outward. However, many yellow individuals, especially the larger ones, have the same wing shape as orange individuals of the same size. There is little difference between males and females in the shape of the fore wings, though in the females they are never so pointed as in the more extreme males, and the lower border is always straight.

The hind wings vary from evenly rounded with scarcely any trace of an anal angle to subangulate with a sharply rounded anal angle, almost a right angle, and another sharply rounded angle at the end of vein 6. They are usually broad, the maximum width in the females and in many males being 88 percent of the length. In the larger males with strongly angulated wings the width is 80 percent of the length. In long-winged early spring or winter individuals the maximum width is only 70 percent of the length.

The color varies from a light clear citron yellow, sometimes more or less greenish, to a uniform brilliant orange, the males with more or less intense violet reflections, usually with the costal margin yellow, and in the females with the spots included in the dark borders yellow. But the costal margin in both sexes and the included spots in the dark borders of the females are occasionally orange like the rest of the wing. Rarely the males are chrome yellow or uniform light dull orange.

In the transition from the yellow to the deep orange forms the orange first appears as a faint flush on the under side of the fore wings in the inner portion. The next stage is an orange flush between the lower edge and vein 1 of the fore wing. From this the orange flush spreads upward to the cell. Individuals are common that have the fore wings suffused with orange in a roughly triangular patch extending from the wing base outward to a line from the end of the cell to the lower end of the dark margin, the upper and outer sides of this orange triangle gradually shading into the yellow of the rest of the wing. More rarely this orange patch has sharply defined borders, or the veins anterior to the orange patch are broadly bordered with orange, the borders being broadest at the base and tapering outwardly. Next the orange suffusion appears on the hind wings, but here it becomes evident uniformly over the entire wing except anterior to vein 7 and below vein 1, these areas always remaining yellow. As the orange spreads over the wings it usually deepens in color, though this is not always true. Uniform pale orange, chrome yellow, or dull orange individuals occur, flying with the much more numerous bright orange and clear yellow ones.

(To be continued.)

OBITUARY

Science for June 13, 1941, announced the death of Dr. Lee Abram Strong, chief of the Bureau of Entomology and Plant Quarantine, on June 2. He was born at Russell, Iowa, June 17, 1886, was engaged in horticultural inspection and plant quarantine in California 1910-18, 1919-29, and in the Federal service from 1929 on, becoming chief of the Bureau above mentioned in July, 1934.

The Leng Types of Cicindelidae (Coleoptera).

By RICHARD G. DAHL, Oakland, California.

(Continued from page 172.)

10. C. BELLISSIMA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 142.

Lectotype Locality: Yaquina Bay, Oregon. *Collector:* Wickham.

Discussion: Lectotype male designated from a series of ten specimens all from Oregon (C. W. Leng collection). In the designated lectotype the color is coppery green above and dark green below; the impressions of the thorax and elytra are metallic green; the markings are uniformly widened. In the cotype series there is little variation, except in color, which varies from cupreous to greenish-bronze.

11. C. LONGILABRIS var. NOVATERRAE Leng. Leng, C. W., 1918, Journ. N. Y. Ent. Soc. Vol. XXVI, Nos. 3-4, p. 140.

Type Locality: Bay St. George, Newfoundland. *Date:* July. *Collector:* W. S. Genung.

Discussion: Type designated by C. W. Leng in 1918 from four specimens, represented by a type (female) and three paratypes. In the type the markings are narrow, and the subapical spot does not extend to the margin. The color is brilliant green with bronze reflections. This form is a synonym of *Cicindela longilabris* subsp. *laurenti* Schp.

12. C. LONGILABRIS var. VESTALIA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 121.

Lectotype Locality: Maiden, Montana. *Date:* June 17, 1890. *Collector:* From the collection of Fred C. Bowditch.

Discussion: Lectotype female designated from a cotype series of three. Additional cotype specimens are from Fort McLeod, British America, 1882, and Telegraph Creek, British America, all from the C. W. Leng collection. In the designated lectotype, the color is bright coppery bronze above and dark metallic green below. In the cotype series there is little variation except in color, which varies from coppery-bronze to dark green. This form is a synonym of *Cicindela longilabris* Say.

13. C. LONGILABRIS var. OSLARI Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 121.

Lectotype Locality: Southwest slope of Mount Wilson, 12,000 feet, San Miguel Range, Colorado. *Date*: July 18 to 27. *Collector:* Ernest J. Oslar.

Discussion: Lectotype female designated from a cotype series of nine. Additional cotype specimens are from Colorado and Savoy, South Dakota, 5,000 feet, June 11, all from the C. W. Leng collection. In the designated lectotype the color is brilliant green throughout, with no humeral marking, but with a post-humeral spot, otherwise narrow markings. In the cotype series before me, six have humeral spots, one is without post-humeral spots; otherwise the markings vary only in their widths, and in that very little. The color in the cotype series varies from coppery-bronze to bright green. This form is a synonym of *Cicindela longilabris laurenti* Schp.

14. C. OREGONA var. MARICOPA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 150.

Lectotype Locality: Phoenix, Arizona.

Discussion: Lectotype male designated from a cotype series of six. Additional cotype specimens are labeled "Prescott, Arizona, May 13", and "Arizona", all from the C. W. Leng collection. In the designated lectotype the head and the pronotum are a shining metallic green; the elytra are a dull dark violet, and the underparts are a shining dark violet. In the cotype series there is little variation, except in size, which varies the same as in *oregona Lec.* The markings are generally heavier than *oregona* Lec.

There is sufficient evidence to prove that this form should be known as *Cicindela oregona* subspecies *maricopa*. It is restricted to the southern arid regions of the Great Basin. In the M. A. Cazier collection there is a specimen from Zion Cañon, Utah, of which the elytra are a dull dark green and the pronotum a dull green. A specimen from Barstow, California, July, 1914, (R. T. Garnett collection) is typical of *maricopa*. In a series of *maricopa* from Prescott, Arizona, June, 1909 (H. Kushner), three stand out as different, varying in being entirely black above, and the thorax beneath dark violet and the abdomen dark green. Another specimen from White Mountains, Arizona, June, (D. K. Duncan collector) has heavy markings, a dark green elytra and a cupreous pronotum. It is intermediate between *maricopa* and *guttifera* Lec.

15. C. SEXGUTTATA var. HARRISI Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 128.

Lectotype Locality: Lake Memphremagog, Canada.

Discussion: Lectotype male designated from a series of four cotypes. Other cotype specimens are from De Bruce, New York; Stamford, New York, August and North Carolina, all from the C. W. Leng collection. This variety can be distinguished from typical *sexguttata* Fab., by the absence of the strong bluish or greenish reflections. It is a mountain form, being taken at high elevations throughout north-eastern United States.

16. C. ROBUSTA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 124.

Lectotype Locality: Alpine, Texas. *Date:* July 20-22. *Elevation:* 4,400-6,000 feet. *Collector:* Wickham.

Discussion: Lectotype female designated from two cotype specimens, both from the C. W. Leng collection. The other cotype is from Marfa, Texas, June 15. In the designated lectotype the anterior parts of the elytra are more coarsely punctate than in that of *nigrocoerulea* Lec., and is a dark green in color. Neither of the cotypes have markings, as illustrated by W. Horn[1].

17. C. BOWDITCHI Leng. Leng, C. W., 1902, Cic. of Bor. Amer. Trans. Amer. Ent. Soc. XXVIII, p. 124.

Lectotype Locality: Vicinity of Durango, La Plata County, Colorado. *Date:* July 23-August 8, 1885. *Collector:* Fred

[1] Horn, Walther, 2,000 Zeichnungen von Cicindelinae, Band 5, März 28, 1938, p. 76.

C. Bowditch. *Lectotype Now Located:* Museum of Comparative Zoology, Harvard College, Cambridge, Massachusetts.

Discussion: Two specimens were mentioned by Leng[2], both as occurring in the vicinity of Durango, Colorado.

Mr. M. A. Cazier, who has seen this specimen at Cambridge, has assured me that it agrees in every way with the description. This designated lectotype is entered as a cotype in the Museum of Comparative Zoology type catalog under number 16,272. This form is at present considered to be the maculated variety of *nigrocoerulea* Lec.

18. C. CARTHAGENA HENTZIANA Leng. Leng, C. W., 1918, Journ. N. Y. Ent. Soc., Vol. XXVI, Nos. 3-4, p. 139.

Discussion: This name was proposed by C. W. Leng in place of *Cicindela carthagena hentzi* Geo. H. Horn which was previously occupied by *Cicindela carthagena hentzi* Dej. The type of this is in the George H. Horn collection at the Philadelphia Academy of Natural Sciences.

19. C. PUSILLA var. TUOLUMNAE Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc., XXVIII, p. 157.

Lectotype Locality: Hetch Hetchy Valley, Tuolumne County, California. *Collector:* Dr. Edwin C. Van Dyke.

Discussion: Lectotype female designated from the unique specimen in the C. W. Leng collection. This is at present considered to be an aberrant form of *Cicindela pusilla lunalonga* Schp.

20. C. KNAUSII Leng. Leng, C. W., Cic. of Bor. Amer.; Trans. Amer. Ent. Soc., XXVIII, p. 166.

Discussion: There are no specimens of this in the C. W. Leng collection that agree with his descriptions well enough to be designated as a lectotype. This is at present recognized as a variety of *nevadica* Lec.

I have been unable to locate either types or cotype material of *Omus intermedius* Leng, *Cicindela tranquebarica minor* Leng, and *Cicindela knausii* Leng. There is no material in the C. W. Leng collection that agrees with his descriptions of these. It is unfortunate that this type material became separated from the C. W. Leng collection of Cicindelidae.

[2] Leng, C. W., 1902, Cic. of Bor. Amer; Trans. Amer. Ent. Soc. XXVIII, p. 124.

Undescribed Species of Crane-flies from the Eastern United States and Canada (Dipt.: Tipulidae). Part VII.

By Charles P. Alexander, Massachusetts State College, Amherst, Massachusetts.

The Tipulidae discussed herewith have been received from various sources that are indicated in connection with each species. The preceding part under this general title was published in Entomological News, vol. 51: 83-85, 99-103; 1940.

Dolichopeza (Oropeza) pratti n. sp.

Belongs to the *obscura* group; general coloration of mesonotum opaque brown, without clearly defined stripes; legs dark; wings with a brownish tinge, the oval stigma a little darker brown; vein Sc_1 preserved; abdominal segments bicolored; male hypopygium with median area of tergite narrowly produced into a tridentate lobe; lateral tergal arms appearing as narrow spatulate blades; outer dististyle a little dilated on basal portion, the apex a short spinous point; inner dististyle deep, its rostral prolongation long; aedeagus simple, unarmed.

♂. Length about 8-9 mm.; wing 10-10.5 mm.; antenna about 2.8 mm.

Frontal prolongation of head brownish black; palpi dark brown. Antennae with scape brownish yellow; pedicel light yellow; flagellum black; verticils of flagellar segments coarse. Head dark gray.

Mesonotum brown, the surface of praescutum opaque, the posterior sclerites more nitidous; in some cases, praescutum with faint indications of lighter stripes. Pleura paler brown. Halteres dusky.

Legs with the coxae pale brown; trochanters obscure yellow; remainder of legs brown, including the tarsi.

Wings with a brownish tinge, the oval stigma a little darker brown; prearcular field a very little brightened; veins brown. Venation: Sc_1 preserved, Sc_2 ending opposite or just beyond the origin of Rs; petiole of cell M_1 exceeding m.

Abdominal tergites obscure brownish yellow to testaceous yellow, the lateral margins and incisures darkened, on the outer segments and hypopygium the dark color including all of the segments; basal sternites yellow, the incisures narrowly darkened, the outer segments more generally suffused. Male hypopygium with the median area of tergite produced into a narrow lobe, the apex of which is further toothed, usually tridentate, with the central point longest; lateral tergal arms with outer blades expanded into weak spatulae, in some cases these only a little wider than the arms. Outer dististyle a little dilated on basal portion, the apex a short spinous point. Inner dististyle with the blade deep, the rostrum long-produced, its apex weakly bidentate. Aedeagus simple, unarmed.

Habitat.—MINNESOTA. *Holotype*: ♂, St. Paul, September 14, 1940 (H. D. Pratt). *Paratopotypes*, 5 ♂♂. Types in author's collection.

I take great pleasure in naming this interesting crane-fly in honor of the collector, my former student, Dr. Harry Davis Pratt. From the other described species of the *obscura* group, the present fly is closest to *obscura* (Johnson), *tridenticulata* Alexander, and *polita* (Johnson), especially the last. The shape of the median tergal lobe is much the same in the two flies but the other details of structure of the hypopygium of *polita* are quite distinct, especially the more expanded lateral tergal arms, the bulbous basal enlargement of the long blackened outer dististyle, the tuft of longer setae on outer face of the inner dististyle, and the differently constructed gonapophyses with more abundant armature. All of these species differ further in the length and structure of the antennae.

Limonia (Dicranomyia) broweriana n. sp.

Allied to *magnicauda;* general coloration of thorax brownish yellow, the praescutum with a very conspicuous blackened median stripe; antennae black throughout; wings with a faint yellow tinge, the stigma only slightly indicated; male hypopygium very large and complicated in structure; ninth tergite subcordate in outline, the caudal margin truncate; both the basistyle and ventral dististyle greatly complicated by lobes and outgrowths.

♂. Length about 8 mm.; wing 7.4 mm. ♀. Length about 8 mm.; wing 7.5 mm.

Rostrum brownish black; palpi black. Antennae black throughout; flagellar segments oval, the outer segments a little more elongate; terminal segment (male) a trifle longer than the penultimate; verticils short. Head dark brown.

Pronotum brownish black medially, paler on sides. Mesonotal praescutum brownish yellow pollinose, with a very conspicuous blackened median stripe and inconspicuous brownish lateral areas, all of these in some cases more or less confluent on the posterior portion of sclerite; posterior sclerites of notum chiefly pale, the scutellum and median area of scutum faintly pruinose; scutal lobes weakly darkened. Pleura brownish yellow pollinose, the ventral sternopleurite a trifle darkened. Halteres relatively short, stem yellow, knob dark brown.

Legs with the coxae and trochanters yellow; remainder of legs dark brown, the femoral bases yellow.

Wings with a faint yellow tinge, the stigma only slightly differentiated; prearcular field clearer yellow; veins brown, flavous in the basal area. Venation: *Sc* variable in length, Sc_1 ending shortly before to just beyond the origin of *Rs*, Sc_2 slightly removed from its tip, Sc_1 alone subequal to *m-cu;* vein *2nd A* gently sinuous.

Abdominal tergites dark brown, the extreme caudal margins pale; sternites obscure brownish yellow to pale brown, with the pale caudal borders somewhat wider and more conspicuous. Male hypopygium very large and conspicuous, the most so of any of the described Nearctic species of the subgenus. Ninth tergite very large, subcordate in outline, narrowed behind, the length and greatest width subequal; caudal margin of tergite truncate, with numerous setae. Basistyle of moderate size, the ventromesal lobe large and very complicated by lobules and outgrowths, including one arm that is conspicuously but unequally bifid, the lower branch being only about one-half as long as the more clavate upper branch; besides this arm, the lobe is produced into an even larger and longer blade that gradually narrows to the pale obtuse apex. Dorsal dististyle a small, sickle-shaped rod. Ventral dististyle with the main body small and pale, the base and rostral prolongation more sclerotized and very complex; from base of style extends a long, gently curved blackened arm, the tip expanded and further produced at apex into a small digitiform lobule; rostral prolongation very complex, beyond the two subequal spines widened and bilobed, the upper lobe longer and terminating in a recurved spinous point; lower lobe broader and more obtuse. Gonapophyses with mesal-apical lobe small but slender, gently curved.

Habitat.—MAINE. *Holotype:* ♂, Richardson Lake, near Oquassoc, Oxford County, August 24, 1940 (A. E. Brower). *Allotopotype:* ♀.

This striking crane-fly is named in honor of Dr. A. E.

Brower, to whom I am very greatly indebted for many interesting Tipulidae from Maine and from interior Gaspé. The nearest ally is *Limonia (Dicranomyia) magnicauda* (Lundström) of northern Europe. While both species agree in the great size of the male hypopygium and in the general structures of the same, yet all details of the tergite and the various lobes of the basistyle and ventral dististyle are distinct in the two flies.

Dicranoptycha tennessa n. sp.

General coloration brownish gray, the praescutum with a slightly darker median stripe; antennae with scape brownish black; pleura light gray, the anepisternum and ventral sternopleurite darkened; legs obscure yellow, the femora with the tips rather narrowly infuscated; wings with costal fringe (male) unusually long and conspicuous; abdominal tergites brown, sternites yellow, a black subterminal ring; hypopygium yellow; male hypopygium with the outer dististyle unusually broad and flattened, terminating in a short blackened point; surface of style before apex weakly roughened; aedeagus unusually broad and flattened.

♂. Length about 9 mm.; wing 8.5 mm. ♀. Length about 10 mm.; wing 9.5 mm.

Rostrum black, sparsely pruinose; palpi black. Antennae with scape brownish black, pedicel brownish yellow, flagellum brownish black. Head gray, provided with long conspicuous black setae.

Pronotum brownish gray. Mesonotal praescutum brownish gray, with a more or less distinct, darker brown, median stripe, the lateral stripes less evident; posterior sclerites of notum grayish pruinose. Pleura light gray, more darkened on the anepisternum and ventral sternopleurite. Halteres relatively elongate, yellow.

Legs with the coxae testaceous yellow; trochanters yellow; femora obscure yellow, the tips rather narrowly but evidently infuscated, the amount subequal on all legs; tibiae and basitarsi obscure yellow; outer tarsal segments blackened.

Wings with a yellowish tinge; veins brown. Costal fringe of male unusually long and conspicuous. Venation: *Rs* relatively short, only about one-fifth longer than the basal section of R_{4+5} and much shorter than cell *1st* M_2, the latter relatively small; *m-cu* nearly its own length beyond the fork of *M*.

Abdominal tergites brown; sternites yellow, the subterminal segments black; hypopygium yellow. Male hypopygium with the tergal arms relatively short, expanded into broad blades, their apices obtuse. Outer dististyle unusually broad and flattened, terminating in a short blackened point; surface of style before apex weakly roughened; base of style with abundant short pale setulae. Inner dististyle relatively short, not or scarcely constricted before apex. Aedeagus unusually broad and flattened, more so than in *megaphallus* or *sobrina*.

Habitat.—TENNESSEE. *Holotype*: ♂, Knoxville, June 10, 1939 (Arthur C. Cole). *Allotopotype*, ♀, pinned with type.

This interesting fly was included in extensive series of Tipulidae from the Great Smoky Mountains, received from my friend, Dr. Arthur C. Cole, to whom I am greatly indebted for many favors. The species is allied to *Dicranoptycha sobrina* Osten Sacken and probably has been confused with this in collections. Both species have the costal fringe of the male long and very conspicuous. The present fly has the darkened apices of all femora subequal in amount and has a very different male hypopygium, with both the outer dististyle and aedeagus unusually broad and flattened.

District of Columbia Butterfly Notes (Lepidoptera : Rhopalocera).

By WARREN HERBERT WAGNER, JR., Washington, D. C.

In "The Butterflies of the District of Columbia and Vicinity" (U. S. Nat. Mus. Bulletin 157), Mr. Austin H. Clark listed 92 species and subspecies from the area covered. Forty-five additional species were listed in an appendix as possibly occurring as very local residents or casuals.

Since the publication of this list 10 species have been added to the District fauna. Of these, 7 were given in the appendix, 2 were not mentioned in the appendix, and one (*Thorybes confusis*) had been earlier recorded from the District by Mr. E. L. Bell but the record had been overlooked by Mr. Clark. These ten species are: *Lycaena thoë* (Guerin), *Strymon liparops strigosa* Harris, *Eurema jucunda* Boisduval and LeConte, *Papilio palamedes* Drury, *Erynnis zarucco* Lucas, *Thorybes confusis* Bell, *Hesperia metea* (Scudder), *Atrytone bimacula* Grote and Robinson, *Poanes aaroni* Skinner, *Lerodea eufala* (Edwards).

Of these 10 species Mr. Clark secured *Atrytone bimacula; Poanes aaroni* was recorded from a specimen taken many years ago by Mr. Eugene M. Aaron; *Thorybes confusis* was earlier recorded by Mr. Bell and has been taken both by Mr. Clark and myself; and I had the good fortune to secure the other seven.

In addition to these Mr. Clark has taken *Papilio philenor* f. *acauda* in nearby Maryland and *Lycaena phlaeas hypophlaeas* ab. *fulliolus* in nearby Virginia: Mr. Gilbert Yobst has taken *Vanessa virginiensis* ab. *ahwashtee* in the latter place and I have taken several specimens of *Phyciodes tharos* ab. *dyari* in Washington.

These additions to the District list, with the exception of the last two have been briefly noted by Mr. Clark. I have, however, some supplementary notes on these and other species in the District of Columbia area which seem to be worthy of publication. For helping me I should like to acknowledge the Washington naturalists for their assistance and Dr. R. G. Schmieder of the University of Pennsylvania for his suggestions. Most of all I am indebted to Mr. Clark for his patient assistance in every way and for contributing introductory material. The nomenclature used is that of McDunnough's 1938 Check List of the Lepidoptera of Canada and the United States with two exceptions.

SATYRODES EURYDICE (Johannsen). There is a partial second brood in the Washington area. Mr. Shoemaker found it here in September and I have seen it a few times at Hyattsville, Maryland, in late September and I have one taken September 19, 1936, along Difficult Run near Tyson's Corner, Fairfax County, Virginia.

MINOIS ALOPE (Fabricius). In Washington, those specimens without the lower eye-spot on the fore wings above, which are like the large southern subspecies *pegala*, are merely variants of f. *maritima*. However, those specimens that are found along the Chesapeake Bay salt marshes in Maryland east of Washington are larger and much closer to typical *pegala*.

Polygonia interrogationis (Fabricius). The winter form (*fabricii*) and the summer form (*umbrosa*) are occasionally found out of season. It is interesting to note that in 1935, Wayne K. Hill and I found a number of the summer form in early May and I took a badly worn one in Rock Creek Park, May 28. At the last place I took the winter form on July 21, 1935.

Precis coenia (Hübner). The wet form appeared in 1933-34-35, late in the season in great numbers at MacMillan Park in Washington. The reddish underside varies from bluish to almost entirely dark brown in some individuals.

Asterocampa clyton (Boisduval and LeConte). Although they are sometimes found together, when alone *clyton* occurs in dry open places around hackberries and *celtis* flies usually in deep woods. In the Soldiers Home Grounds in Washington *clyton* occurs alone. The first brood lasts from the end of the second week in June until the first week in July. July 10, 1934, was an unusually late capture. The second brood starts the middle of August and flies until late September. Two chrysalids in my series are dated September 20, 1934. The color ranges from very light to very dark. On August 28, 1938, I watched an old male court a fresh female. It took him about thirty minutes to rout three other males. The female repulsed him by quick darts for fifteen minutes and then they suddenly mated. The female carries the male in flight. The ceremony took place around the bottom branches of a cherry tree about ten feet above the ground. *Clyton* is found also at Camp Letts, Fair Haven, and Fort Washington in Maryland.

Phyciodes tharos (Drury). Because of its great abundance aberrations are frequently found. Specimens with slightly fused markings are found in both broods and the markings come together in many different combinations. Melanism is frequent and the melanistic aberration *dyari* Gunder has been found several times in and near Washington. Males seem attracted to the females of this coloration as much as the females of normal markings.

ARGYNNIS APHRODITE Fabricius. Two males; a fresh one lacking the usual reddish tinge taken in Washington, June 8, 1938, and an old broken one from Beltsville, Maryland, on July 2, 1938; indicate that at least some males appear before the middle of June instead of the first of July.

VANESSA VIRGINIENSIS (Drury). A specimen of the aberration *ahwashtee* Fox was taken by Mr. Gilbert Yobst along Scotts Run, Fairfax County, Virginia, in May, 1936. The ground color of the hind wings underneath is snow white and all of the markings are slightly blurred.

LIBYTHEA BACHMANII Kirtland. The Snout Butterfly is more common in the region along Chesapeake Bay in Maryland to the east of Washington, but it varies tremendously in numbers. In 1932, it was exceedingly abundant at Camp Letts, near Beverley Beach, Maryland, but only of infrequent occurrence since. During 1933-34-35, chrysalid skins were found on hackberries in the Soldiers Home Grounds around the bottom branches near the trunks.

STRYMON FALACER (Godart). In certain very restricted localities this hairstreak is abundant for a limited period. Sunny glades in dry oak woods (often with much pine) form the playgrounds for the males. Beside chasing one another I have seen them pursue *Achalarus lyciades, Epargyreus tityrus* and *Thorybes* species. Males appear the first week in June and remain in their woods until after the middle of June when they start wandering out into the open fields. It was found at Widewater, Beltsville and Muikirk, in Maryland, and in the Soldiers Home, Catholic University Grounds and in woods east of 16th Street, N. W., near the District line. Some specimens found showed a decided breaking up of the band on the underside approaching *S. edwardsi*.

S. LIPAROPS STRIGOSA Harris. Only one has been found: this was a female taken June 10, 1935, on Aster flowers near the bog at Hyattsville, Maryland.

S. TITUS MOPSUS Hübner. This hairstreak is also more common than previously supposed. The Catholic University Grounds and the bog at Hyattsville, Maryland, are the localities where it is most common. The males select brushy knolls of dry grassy hills for their playgrounds and they are very pugnacious. Orange and Red Milkweeds are its favorite flowers. My earliest date is June 13, 1936, at Camp Letts, Maryland and it becomes rare after the middle of July. It is never found in the woods but rather in open country. Dwarfs are occasional in both sexes.

INCISALIA HENRICI (Grote and Robinson). This is one of our earliest appearing butterflies. I have a male taken March 30, 1935, at Cabin John, Maryland. It also occurs at Hyattsville, and near the Powdermill Bogs along Paint Branch, in Maryland and in woods west of 16th Street, N. W., near the District line.

FENISECA TARQUINIUS (Fabricius). On June 11, 1939, this butterfly was common on elms along Morningside Drive, N. W., in Washington. The elms were infested with aphids and I suspect that these were the food. Its usual haunt is along streams.

LYCAENA THOË (Guerin). In 1934, I took an old female in a dry field in the Soldiers Home Grounds on June 15 and a perfectly fresh male in the Beltsville, Maryland Bog on July 22. This extends the known range on the Eastern Seaboard considerably southward.

PHOEBIS SENNAE EUBELE (Linnaeus). Spring records are a female taken by Mr. Wayne K. Hill, May 11, 1935, at Cabin John, Maryland, and a male that I took in April, 1933, at Terra Cotta in the District. Both are somewhat old specimens. A female taken in August, 1939, at Camp Letts, Maryland, (where *eubele* is much more common) is very pale yellow showing an approach to f. *pallida*.

EUREMA NICIPPE (Cramer). A male taken March 21, 1938, in downtown Washington and a female taken April 27, 1935, at Cabin John, Maryland, are the only spring records for this area.

(To be continued.)

Notes on Some Cuculliinae (Phalaenidae, Lepidoptera) I.

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

MNIOTYPE nom. nov.

Genotype: *Hadena ducta* Grote=*Mniotype ducta* (Grote).

This name is proposed to replace ‡*Crino* Hampson, Cat. Lep. Phal. B. M., vi, 321, 1906, nec ||*Crino* Hübner Samml. exot. Schmett., ii, plate (197), 1821 [nec *Crino* Lamarck *in* Virey, Journ. de Phys., iv, 429, 1798]. Hampson erred in that he credited the type of *Crino*, *sommeri*, to Lefebure. *Sommeri* Lef., a noctuid, was described in 1836, fifteen years after Hübner described his genus *Crino*, which included one species *sommeri* Hübner, a notodontid! Nevertheless Hübner's generic name *Crino* is preoccupied by *Crino* Lamarck, so *Tarsolepis* Butler will be, as it has been, used for *sommeri* Hbn. and its allies.

Mniotype will include all the species listed under *Crino* in McDunnough's Checklist, page 84, 1938, and the Eurasian species, *adusta* Esp., *satura* Schiff. and related forms.

SERICAGLAEA gen. nov.

Genotype: *Orthosia signata* French=*Sericaglaea signata* (French).

Proboscis well developed; palpi short, porrect, clothed with scales and long hair, the third segment drooping, inconspicuous, hidden in the hair of the second; eyes moderate and rounded; antennal scape without lashes, antennae of male simple, minutely ciliate; thorax clothed with hair, no anterior or posterior crests; forelegs with the first tarsal segment bearing 6 to 7 moderately long slender spines, distinctly longer than those on succeeding segments of the same leg, the femora and tibiae of all legs fringed with long hair; abdomen very much flattened, fringed with very evident lateral and anal tufts, no dorsal tufts, clothed on the dorsum with scales and hair; fore wing with the costa evenly curved, the apex blunt and rounded.

Male genitalia symmetrical; uncus simple, long and curved; tegumen broad with two expanded basal lobes; vinculum moderate, long; harpes with a distinct pollex and long curved clasper; corona slight; aedoeagus moderate, vesica with a long spine, which possesses a bulbous base, and with a large group of micro-chaetae.

This genus differs from *Epiglaea*, *Harpaglaea* and *Psectraglaea* by the absence of the conspicuous, sharp frontal tuft and from the latter two genera also by the lighter spination of the first fore tarsal segment. It differs from *Metaxaglaea*, in which I placed the sole species when describing that genus, first, by the palpi, which have the third segment drooping and hidden in the hair of the second, while *Metaxaglaea* has the third segment of the palpi visible and porrect; second, by the cut of the fore wings, those of *Metaxaglaea* having the apex distinctly more acute; third, in that the species of *Sericaglaea* hibernates as an adult, while the two species of *Metaxaglaea* oviposit in the fall, shortly after emerging. Since the author feels that a genus should, besides being structurally a unit, be fundamentally also a biological unit, he believes that this last difference is as valid as a difference of structure. The genitalia approach those of *Psectraglaea*, differing mainly in that the aforementioned genus entirely lacks a corona; from *Metaxaglaea*, they differ in the well developed clasper, the slight corona and the shorter and stockier harpes (valves).

Included species: *Sericaglaea signata* (French.)

PYREFERRA HESPERIDAGO (Guenée).

Hoporina hesperidago Guenée, Spec. Gen. Lep., vii (Noct. iii), 393, 1852.

Xanthia indirecta Walker, Cat. Lep. Het. B. M., x, 468, 1856 (New synonymy!)

Scopelosoma graefiana Grote, Bull. Buff. Soc. Nat. Sc., ii, 69, 1874.

Scopelosoma moffatiana Grote, Bull. U. S. Geol. & Geog. Surv., vi, 583, 1882.

Guenée described *Hoporina hesperidago* from an unpublished Abbot drawing, which is without a doubt the species that has been called *Pyreferra indirecta* Wlk. by McDunnough in his 1938 Checklist and *Conistra indirecta* by other workers following Hampson. Guenée's description is repeated here to make it available to those persons to whom the above work is inacessible, and it amply bears out my contention as to the identity of the species in question.

"38 mm. Ailes supér. coupées carrément, comme chez *croceago,* d'un fauve-orangé, nuancé de jaune-safrané et de rouge, avec quatre lignes d'un rouge-brique, presque parallèles et presque égalemant écartées: l'extrabasilaire et la subterminal un peu ondées; le coudee et l'ombre médiane presque droites: la première ne formant un coude que près de la côte; la seconde linéaire et séparant les deux taches ordinaires: l'orbiculaire annulaire et rouge; la réniforme indiquée seulement par le point noir du base. Ailes infér. d'un blanc-jaunâtre, avec deux lignes fine, parallèles et non ondées et un liseré terminal rougeâtres."

The types of *indirecta* and *graefiana* are in the British Museum, and Mr. W. H. T. Tams assures me that they are one species; as such they are referrable to *hesperidago.* The type of *moffatiana* is in the United States National Museum and is likewise referrable here.

The last mention of *hesperidago* in American entomological literature appears to have been by Grote in his 1875 Checklist of the Noctuidae of America, North of Mexico, page 14, footnote 16; following this the name has been ignored by all workers in the Noctuidae.

Pyreferra citrombra n. sp.

Head russet ochre intermingled with dark hairs; thorax ochre brown, collar darker, patagia with a dark russet brown line across the tip. Abdomen pale creamy yellow, the lateral and anal tufts concolorous.

Forewings ochreous, very heavily irrorate with varying degrees of russet fuscous, with an evident silken sheen; the basal half-line straight, dark russet fuscous with a pale shade on the outer side; antemedial line absolutely straight, orange russet in color with a pale shade on the inner side; the median shade straight, of the same color as the antemedial line, with a pale shade on the inner side, not as noticeable as that of the antemedial line; the postmedial line angled sharply outward from below costa, then oblique and straight to inner margin, of the same color as the antemedial line and the median shade, with a distinct pale shade on the inner side; the four aforementioned lines almost parallel; subterminal line vague, irregular, with a pale shade on the inner side; terminal line lunulate, dark blackish brown; the fringe concolorous with the general tone of the wing; orbicular rather inconspicuous, small and round; reniform constricted at middle on outer side, the inner side resting on the median shade; both ordinary spots ringed by orange russet scales; reniform with a few dark scales in base.

Hindwings pale creamy yellow, with a very evident silken sheen; postmedial line pale reddish russet, parallel to the outer margin: terminal line lunulate of the same color as the postmedial line; fringe concolorous with the general tone of the wings. Below, the fore and hind wings creamy white with a silken sheen; a common postmedial line of reddish russet, crossing both wings, following the same course as that on the upper side; terminal line of both wings lunulate, dark reddish russet; hind wings with faint discal spots. Expanse: 28-35 mm.

♂ genitalia somewhat asymetrical; the uncus short and broad; the tegumen broad; the vinculum long and moderate; valves assymetrical, especially at the apex, the left valve stouter than the right, corona absent, represented by a few hairs, claspers moderately long and irregularly bent; aedoeagus moderately long and stout, the vesica armed only with very minute spinules.

Holotype: ♂, Ithaca, New York, Sept. 22, 1940 (J. G. Franclemont), [in Coll. Franclemont]. *Allotype*: ♀, Ithaca, New York, Oct. 2, 1940 (J. G. Franclemont), [in Coll. Franclemont]. *Paratypes* all from New York: 23 ♂ ♂, 33 ♀ ♀, Ithaca, Sept.-April (J. G. Franclemont), 4 ♂ ♂ 3 ♀ ♀, McLean Bogs Reserve, Tompkins County, Oct.-Apr. (J. G. Franclemont), [in Coll. Franclemont]; 16 ♂ ♂, 26 ♀ ♀, Horseheads, Oct.-Apr. (L. R. Rupert), [29 in coll. Rupert, 13 in Coll. Franclemont]; 1 ♂, Sardinia, Oct., (L. R. Rupert), [in Coll. Rupert]; 9 ♂ ♂, 3 ♀ ♀, Ithaca, Oct.-Apr. (Various Collectors), [in Cornell Univ. Coll.].

This species differs from *ceromatica* and *pettiti* by the dark ordinary lines contrasting with the ground color and by the lack of evident dark points on the veins on the outside of the postmedial line, and further from *ceromatica* by its very light color, that of *ceromatica* being deep vinous red, it is also considerably yellower than *pettiti*, which is rather bright orange. From *hesperidago* Gn. (*indirecta* Wlk.), the closest species superficially, it differs, first, in its paler color, *hesperidago* being bright fiery orange; second, the ordinary lines (except the basal) are straighter and preceded on their inner sides by pale shades; third, the hindwings are also much paler, lacking the orange tint of *hesperidago*.

The male genitalia differ from *hesperidago* and *ceromatica* in that they lack a pollex on the left valve, and from *pettiti*, which they most nearly resemble, in that they have a narrower uncus, broader claspers, broader apices to the valves and a generally larger size.

This is the species that has erroneously been identified as *graefiana* Grt. and is figured as such by Barnes and McDunnough, Contrib. Nat. Hist. Nat. Lep. N. Am., iv (2), pl. xv, fig. 16, 1918, but it cannot conceivably be that species, as the type of *graefiana* is in the British Museum, and is equal to *hesperidago* Gn. (*indirecta* Wlk.). I cannot agree with the two aforementioned authors that this type is spurious. Since no other type has turned up, as they suggested might[1], when they discussed the matter in the Contributions, iv (2), pp. 102-103, 1918, I feel that the type in the British Museum is unquestionably the real one. I am inclined to believe, moreover, that they have misinterpreted the original description: Grote definitely says, "Yellowish, powdered with deep orange," and the species under discussion is never that color, whether it be from the fall or the spring; then too, he says that the hind wings have a distinct orange cast, leaving the costal region free; this species has no such orange cast, the costal region being of the same pale yellow color as the disk of the wing. As one carefully considers the original description of *graefiana* point by point with specimens of both species before him, only one conclusion can be reached, that *graefiana* is a synonym of *hesperidago* (*indirecta*).

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[1] In a letter of October 20, 1938, Mr. J. F. Gates Clarke of the United States National Museum has assured me that no type or specimen that might possibly be the type of *graefiana* Grt. was obtained with the Brooklyn Museum collection, which contained the Graef Collection. It was in this latter collection that Barnes and McDunnough thought another type might be found.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.

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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INSECTS AND THEIR STORIES. By HARRY HOOGSTRAAL with camera studies by MELVIN MARTINSON and drawings by Dr. CARL O. MOHR. Thomas Y. Crowell Company, New York, 1941, 7¾ inches high x 9¾ inches wide. 144 pages, including 46 full-page half-tone reproductions of photographs of entire insects and 38 drawings of whole insects or of parts. $2.00—A non-technical account of the form, habits and life-history of 46 different insects under their common names, grouped in five sections: Introduction, Insects of the house, garden, trees and woods, in or near the water. The most striking feature of the book is the photographic reproductions, but while some of these, such as the stink bug, buckeye, cabbage and tiger swallow tail butterflies, lacewing, dobson fly and water strider are, as the jacket says, "clear," others, such as most (but not all) of the beetles, the honeybee, hornet and thread-waisted wasp, are cloudy or indistinct, owing to the lack of contrast with the background or to faulty focussing. Prof C. L. Metcalf, of the Department of Entomology, University of Illinois (where Mr. Hoogstraal is a graduate student) writes the foreword. At the end is an "Index and guide to recognition of insects . . . arranged according to orders" and an alphabetical index.—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.

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, Correio 1043, Buenos Aires, Rep. Argentina.

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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus Nomada, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

Arctic Lepidoptera especially **Noctuidae**—Wanted to hear from collectors who desire the Arctic Species. Have large collection. R. J. Fitch. Lloydminster Saskatchewan, Canada.

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A Stenogamic Autogenous Strain of Culex pipiens L. in North America (Diptera: Culicidae).

By A. Glenn Richards, Jr., Zoological Laboratory, University of Pennsylvania.

This preliminary note is to call attention to the fact that the *Culex pipiens* complex in the eastern United States shows a differentiation similar to that shown by this complex in Europe. There it is the only known genetically diverse species or species group of the subfamily Culicinae. However, the problem of anopheline races has recently received attention in this hemisphere (Hoffman, 1936; King, 1939; Hinman, 1940; de Leon, 1940; Vargas, 1941) following the extensive work on the European *Anopheles maculipennis* complex (see Hackett, 1937; Bates, 1940).

During the past two years I have used for histological and other purposes a strain of *Culex pipiens* that apparently established itself in the vivarium of our laboratory years ago. This strain breeds there unattended and maintains itself by breeding continuously during all seasons of the year (Philadelphia, Pennsylvania). Using Roubaud's terminology, this strain is autogenous, *i. e.,* can breed without taking a blood meal, stenogamic, *i. e.,* mates readily in a confined space, and homodynamic, *i. e.,* does not have a true winter diapause although it may hibernate under adverse conditions. In contrast to this strain, there is another strain, also present in the eastern United States, which usually requires a blood meal (non-autogenous or anautogenous), and does not mate in a small space (eurygamic). No data are available on the question of whether or not this anautogenous eurygamic strain has an obligatory diapause (*i. e.* is heterodynamic).

In my laboratory, specimens emerged in small covered aquaria on six different occasions; and left undisturbed they laid viable egg rafts. In one case three successive generations were obtained without any special feeding for adults or larvae and without renewal of the water. In the other cases only one generation was produced, but it is to be noted that the rearing was in clear vivarium water without the added nourishment usually given larvae to speed their development and increase egg-laying. The number of eggs per raft was rather low (30-115, average about 65), and egg-laying did not take place until 5-8 days after emergence.

Observations in our vivarium where the adults fly around the room indicate that the same occurs there. The hundreds of egg rafts that have been seen in the vivarium tanks during these two years have all been relatively small, whereas engorged autogenous and engorged anautogenous females both are recorded as laying considerably larger rafts (150-300 or more eggs). Hundreds of adult females have been observed loose in the laboratory and in the vivarium; no specimen obviously engorged with blood has been seen and 25 randomly captured females on being dissected showed no visible evidence of blood. Finally, although various persons are around the vivarium during the evening, as well as during the day, I have heard only one report of the mosquitoes attempting to bite during the winter and early spring (during summer months there is an influx from out-of-doors).

The preceding observations established the autogenous character of this line. I must add that not all females lay eggs although some did in every batch tested. In the three aquaria that were set-up specifically to observe this (at different times), there were never as many egg rafts as there were females. Also, in one of the six cases treated some of the egg rafts were non-viable, presumably having been laid by virgin females (it is well known that eggs from virgin female mosquitoes are not viable). This agrees with European data which shows 40-86% of the females of autogenous lines capable of laying eggs (only 46-94% lay eggs if allowed to engorge with blood) (Tate & Vincent, 1936).

The data cited for the autogenous characteristic also indicate ability to mate in confinement (stenogamy). In addition to this presumptive evidence, pairs have been seen copulating on the sides of the aquaria during the daytime on a number of occasions. In the observed cases the male was resting on the side of the container and the female seemed to be the aggressor since she flew around the male and eventually came to rest on top of him. Copulation ensued, the male appearing passive throughout the entire performance. Mating has been observed in a round jar with an air-space of approximately 6¼ x 6 inches (200 cu. in.), and judging from viable egg rafts must have occurred in a round jar of approximately 5 x 5 inches (115 cu. in.).

For the third character (homodynamic development), there is obviously no seasonal interruption in our moderately heated vivarium. In our unheated frog room adults continue activity until ice is present out-of-doors and larvae continue to develop in spite of some ice in the aquaria each night. On warmer days pupation occurs. The winter temperature of this room is too low for adult activity, and only the one brood of larvae occurs after the appearance of ice during the night.

I accidentally discovered another interesting feature of this strain, namely its lack of phototropism. Adults are not attracted to lights in the laboratory, and while they usually rest in the darker *damp* places, they commonly fly around during the day. In January, 1941, I gave some hundreds of larvae and pupae to Mr. H. B. Weiss for use in his studies on light reactions. Mr. Weiss writes that he tested 64 adults in three different trials several days after emergence and that they failed to react either positively or negatively to different wave lengths of light (for his technique see Weiss, Soraci & McCoy, 1941). This contrasts with definite reactions obtained by him for the yellow-fever mosquito, *Aedes aegypti*, but agrees with the indifference to light reported by Tate & Vincent (1936) for European autogenous strains.

The idea of two strains of *Culex pipiens* is also supported by field observations made on Long Island, New York. These observations taken alone have little or no validity, but are most amenable to the idea of two strains existing there. On Long Island, larvae of *C. pipiens* are occasionally found in small numbers in water containing some ice. Occasional reports come in of winter activity—in one case in February, 1941, Mr. D. E. Longworth sent me series including as many males as females; yet only females are known to hibernate, so this could hardly represent emergence of a diapausing group. Aquaria placed on exhibit there during the summers of 1936 and 1937 sometimes gave adults showing stenogamic autogenous characteristics, but in most cases no egg rafts were produced (exhibits at different times and larvae from various sources). Light traps used to sample mosquito populations usually produced satisfactory samples (positive phototropism), but in certain areas produced no *C. pipiens,* although adults were fairly common within the immediate vicinity of the trap. This may have been due to the inconsistency of trap-light efficiency, but it is also possible that it reflects the absence of phototropism found for my autogenous strain by Mr. Weiss and recorded for the European strain by Tate & Vincent.

The presence of autogenous individuals in the United States has already been recorded by Mitchell (1907) and Huff (1929) but these authors did not recognize the inherited nature of this characteristic. In Europe Roubaud (1929-1933), Weyer (1935), Tate & Vincent (1936), Marshall & Staley (1935-1937), Mathis (1940) and others have shown that the biological characteristics are definitely inherited. Claims have been made by Roubaud and Weyer that stenogamy versus eurygamy and autogeny versus anautogeny are simple Mendelian characters, but this is disclaimed by Tate & Vincent, who cite extensive experiments showing that within pure strains the characteristics were maintained for the duration of the 49 generations bred but that cross-breeding results were peculiar and certainly not genetically clear. Tate & Vincent also point out that stenogamy is the best of the biological characteristics because of the great variability (40-86%) in the expression of the autogenous characteristic.

Marshall & Staley consider the autogenous and anautogenous forms in Europe to represent separate species. They retain the name *C. pipiens* L. for the anautogenous form and resurrect the name *C. molestus* Forskal for the autogenous form. The situation in this country certainly differs from that in England. In structural characters my autogenous strain does not agree with the description of *C. molestus* as given by Marshall & Staley. The males, while usually having the first four palpal joints somewhat shorter than the proboscis, commonly have longer palpi; the number of setae on the lobes of the ninth abdominal tergite is less (averaging even less than in the British anautogenous form), and the number of branches in each tuft of the respiratory siphon averages less. From the biological point of view, I have seen no indication that our anautogenous strain shuns human blood—in fact the contrary is true. The autogenous strain of this laboratory seldom seeks human blood, although autogenous lines at times certainly are pests of humans in this country; in Europe the autogenous form is reported as always an avid feeder on humans. It seems probable, therefore, that although stenogamic autogenous and eurygamic anautogenous lines occur in the eastern United States, we do not have an exact duplicate of the European situation.

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A List of Butterflies Which May be Found Within 50 Miles of Philadelphia. (Lepid.: Rhopalocera).

By R. C. WILLIAMS, Jr., Research Associate, Acad. Nat. Sciences, Philadelphia.

The nomenclature follows that of Macy & Shepard's recently published "Butterflies".

The rare or doubtful species are indicated by an asterisk. Authentic data on the occurrence of any of these or of any species omitted from the list will be appreciated by the American Entomological Society or the writer.

PAPILIO

1 PHILENOR L.
2 AJAX L.
3 CRESPHONTES Cr.
4 GLAUCUS L.
♀ f. TURNUS L.
5 TROILUS L.
6 MARCELLUS Cr.

ANTHOCHARIS

7 MIDEA Hüb.

COLIAS

8 EURYTHEME Bd.
f. KEEWAYDIN Edw.
f. ERIPHYLE Edw.
f. AMPHIDUSA Bd.
9 PHILODICE Godt.

ZERENE

10 CESONIA Stoll.

PHOEBIS

* 11 SENNAE L.
r. EUBELE L.

EUREMA

12 LISA Bd. LeC.
13 NICIPPE Cr.

PIERIS

14 PROTODICE Bd. LeC.
15 NAPI L.
f. OLERACEA Har.
16 RAPAE L.

DANAUS

17 PLEXIPPUS L.

ENODIA

18 PORTLANDIA F.

MEGISTO

19 MITCHELLII French
20 EURYTUS F.

SATYRODES

21 EURYDICE Johan.

MINIOS

22 ALOPE F.
r. MARITIMA Edw
* r. NEPHELE Kir.

DIONE

* 23 VANILLAE L.

EUPTOIETA

24 CLAUDIA Cr.

ARGYNNIS

25 IDALIA Dru.
26 CYBELE F.
27 APHRODITE F.
* 28 ATLANTIS Edw.

BRENTHIS

29 MYRINA Cr.
30 BELLONA F.

EUPHYDRYAS

31 PHAETON Dru.

PHYCIODES
32 nycteis West.
33 tharos Dru.
f. marcia Edw.
f. morpheus Edw.
* 34 batesii Reak.

POLYGONIA
35 interrogationis F.
36 comma Har.
f. dryas Edw.
* 37 satyrus Edw.
38 faunus Edw.
* 39 progne Cr.

NYMPHALIS
40 j-album Bd. LeC.
* 41 milberti Godt.
42 antiopa L.

VANESSA
43 atalanta L.
44 virginiensis Dru.
45 cardui L.

JUNONIA
46 coenia Hub.

BASILARCHIA
47 arthemis Dru.
hy. f. proserpina Edw.
48 astyanax F.
49 archippus Cr.

ASTEROCAMPTA
50 celtis Bd. LeC.
51 clyton Bd. LeC.

LIBYTHEA
52 bachmanii Kirt.

NYMPHIDIA
* 53 borealis Gr. Rob.

ATLIDES
* 54 halesus Cr.

STRYMON
* 55 cecrops F.
* 56 m-album Bd. LeC.
57 melinus Hüb.
* 58 favonius Ab. Sm.
* 59 titus F.
60 acadica Edw.
61 edwardsii Saund.
62 falacer Godt.
63 liparops Bd. LeC.

MITOURA
64 damon Cr.

INCISALIA
65 augustus Kir.
* 66 irus Godt.
67 henrici Gr. Rob.
68 polios Cook Wats.
69 niphon Hub.

FENISECA
70 tarquinius F.

LYCAENA
71 thoe Gray.
* 72 epixanthe Bd. LeC.
73 hypophleas Bd.

EVERES
74 comyntas Godt.

GLAUCOPSYCHE
75 lygdamus Doub.

LYCAENOPSIS
76 pseudargiolus Bd. LeC.
r. lucia Kir.
f. marginata Edw.
f. neglecta Edw.

URBANUS
77 proteus L.

PROTEIDES
78 clarus Cr.

ACHALARUS
79 lyciades Gey.

AUTOCHTON
* 80 cellus Bd. LeC.

THORYBES

81 BATHYLLUS Ab. Sm.
82 PYLADES Scud.
f. IMMACULATA Skin.

PYRGUS

83 COMMUNIS Grote.
* 84 CENTAUREAE Ramb.

PHOLISORA

85 CATULLUS F.
* 86 HAYHURSTII Edw.

ERYNNIS

87 ICELUS Scud. Burg.
88 BRIZO Bd. LeC.
89 MARTIALIS Scud.
* 90 LUCILIUS Scud. Burg.
* 91 BAPTISAE Forbes.
92 PERSIUS Scud.
93 JUVENALIS F.
94 HORATIUS Scud. Burg.
* 95 ZARUCCO Luc.

CARTEROCEPHALUS

* 96 PALAEMON Pall.

ANCYLOXYPHA

97 NUMITOR F.

HESPERIA

98 SASSACUS Har.
* 99 UNCAS Edw.
100 LEONARDUS Har.
*101 METEA Scud.
*102 ATTALUS Edw.

HYLEPHILA

103 PHYLEUS Dru.

ATALOPEDES

104 CAMPESTRIS Bd.

POLITES

105 THEMISTOCLES Lat.
106 MANATAAQUA Scud.
107 VERNA Edw.
108 PECKIUS Kir.
109 MYSTIC Scud.
110 BRETTUS Bd. LeC.

WALLENGRENIA

*111 OTHO Abb.-Sm.
r. EGEREMET Scud.

POANES

112 HOBOMOK Har.
♀ f. POCAHONTAS Scud.
113 ZABULON Bd. LeC.
114 MASSASOIT Scud.
f. SUFFUSA Laurent.
* r. HUGHI Clark.
*115 AARONI Skin.
116 VIATOR Edw.

ATRYTONE

117 RURICOLA Bd.
118 BIMACULA Gr. Rob.
*119 AROGOS Bd. LeC.
120 LOGAN Edw.
121 CONSPICUA Edw.
122 DION Edw.

ATRITONOPSIS

123 HIANNA Scud.

LEREMA

124 ACCIUS Ab. Sm.

AMBLYSCIRTES

125 VIALIS Edw.
126 HEGON, Scud.

LERODEA

127 L'HERMINIER Lat.

CALPODES

128 ETHLIUS Cr.

PANOQUINA

129 OCOLA Edw.
130 PANOQUIN Scud.

The Genus Colias in North America (Lepidoptera: Pieridae).

By Austin H. Clark, U. S. National Museum, Washington, D. C.

(Continued from page 187.)

The dark border of the wings in the males is exceedingly variable, ranging from vestigial to very dark and broad, 7 mm. wide at the narrowest point in a specimen with the fore wings 30 mm. long. In a long-winged spring male with the fore wings 22 mm. long, taken on April 12, 1938, the border of the fore wings below vein 4 is represented by a fine diffuse dusting of dark scales forming a series of narrow crescents, with the convexity inward, one in each interspace. Anterior to vein 4 the dark dusting in the interspaces extends further and further inward so that the whole apex is dusted with dark scales; the infuscated apical area is crossed by broadly yellow veins and there is a marginal more or less semicircular yellow spot at the outer end of each interspace. On the hind wings there is a dusting of dark scales at the ends of the interspaces between veins 4 and 5, 5 and 6, and 6 and 7, that between veins 5 and 6 the most extensive, that between veins 6 and 7 smaller, and that between veins 4 and 5 very slight. The margin of the wing beyond these small patches of dark scales is narrowly yellow.

The reduction of the dark border in the males to a rather faint and very narrow submarginal dusting of dark scales is rare; usually the border is continuous and dark, and the dark scales extend outward to the base of the fringe. On the fore wings the dark border varies in width in its lower half from scarcely more than one-third of an interspace to more than twice the width of an interspace. Most commonly it is approximately the width of an interspace, often slightly more or slightly less.

When the border of the fore wings is narrow its inner edge is frequently deeply indented by long narrow angles running inward along the veins, and the veins may cross it as narrow yellow lines. Most commonly, however, only the veins at the apex are yellow, and these do not quite reach the outer edge. When the dark border is broad the inner edge may be more or less deeply scalloped, the black of the border extending outward as long narrow angles along the veins. In most cases the inner edge of the dark border is simply irregular.

In the males the dark border of the hind wings is developed proportionately to that of the fore wings. It may reach downward to vein 1, but usually ends at about vein 2. When the border is narrow it may not pass vein 3, and in extreme cases it is developed only between veins 6 and 4.

In the females the inner edge of the dark border of the fore wings is abruptly bent inward in the interspace between veins 3 and 4. Rarely it is broadly curved inward in its anterior half as is the case in *C. werdandi*. The inner edge of the border is usually very irregular, though occasionally smooth. The spots in the dark border vary greatly in size, being largest in the small light orange individuals. They are usually of different sizes, that in the interspace between veins 3 and 4 being much smaller than the others or absent. Rarely they are large and subequal and more or less confluent, forming a partially interrupted broad yellow band separated from the orange or yellow of the inner portion of the wing by a narrow dark band of uniform width broadly and evenly curved in its anterior half. Not infrequently the spots are entirely absent, the black border then closely resembling that of the male. In spring individuals the dark border is narrower than it is in summer individuals, and below vein 4 the inner portion may be narrow, vestigial, or even entirely absent, the dark border of the female then resembling approximately that of the male except for the inclusion of a curved row of four spots in the apical portion. Similar borders are found in the south Russian forms *chryseis* and *diana* of *C. erate*.

On the hind wings in the females the dark border may be narrow, resembling that of the male though with the inner edge vaguely defined. Sometimes it is as broad and continuous as it is on the fore wings with the inner edge well defined and parallel to the edge of the wings, and completely enclosing a row of subequal yellow spots, largest anteriorly, one in each interspace, much as in the females of *C. eogene* from Kashmir. Usually it is broad anteriorly where it completely encloses from one to three spots, the inner border then becoming obsolescent or represented by a slight dusting of dark scales in the interspaces. Occasionally the border is represented merely by long narrow dark triangles with their bases outward that extend inward along the veins. Rarely it is wholly absent, there being merely a few dark scales at the outer ends of the anterior veins.

The spot at the end of the cell of the fore wings is usually well developed, black, and conspicuous, sometimes with an orange, yellow, or white center. Rarely it is much enlarged, taking the form of a black circular ring surrounding a white center. It may be reduced to a narrow line, or even vestigial, represented simply by a few dusky scales. Not infrequently it is produced into a more or less extended angle on the side toward the apex. It may be bright orange instead of black. In pale orange early spring individuals it is commonly more or less broadly bordered with orange or mixed with orange scales, sometimes entirely orange.

The spot at the end of the cell of the hind wings varies from pale straw yellow to orange red. In light orange spring individuals it is sometimes very large, its greatest diameter, parallel to the cell, being as great as the maximum width of the cell. Usually it is somewhat less in diameter than the width of the interspace between veins 4 and 5. Rarely it is very small, only about one-third the width of this interspace. There is usually a small supplementary spot on its outer side just across vein 5, but this may be absent, especially if the spot be small.

The wing bases above are usually marked with blackish scales. In the males these may be very dark, and the blackish patch is sometimes extended as a sooty infuscation along the lower border of the fore wings half way to the outer margin, and also on the hind wings in the interspace between veins 1 and 2 and the lower half of the cell downward almost to the anal angle. In the females the infuscation is less dense than in the males, but more extensive. On the fore wings it may be confined to the costal border, though it commonly affects about the basal third of the fore wings and the area below the cell in the hind wings, becoming diffuse toward the outer edge. Occasionally the entire hind wing is infuscated except for a light marginal band or row of more or less indistinct spots.

In the females the veins of the fore wings for their whole length and the outer half of the veins of the hind wings may be narrowly blackish. Rarely in the males all the veins may be marked by narrow back lines. I have not seen an example of this last variety from Washington but Mr. Wagner has taken it in Nebraska.

The hind wings on the under side may be clear yellow, usually darker than on the upper side, yellowish white, yellowish orange, dull white, or grayish blue. They are usually more or less heavily dusted with dark scales, when the dusting is heavy becoming dusky olive yellow and in extreme cases in winter dull green with a broad indefinite lighter border.

The antemarginal spots on the under side of the fore wings are usually well developed with the three lowest the largest. In the forms with very narrow dark borders above they may be as much as four times as far from the edge of the wings as the inner edge of the dark border; in the forms with broad borders they may be somewhat nearer the edge of the wing than the inner edge of the dark border. Usually they are approximately under the inner edge of the dark border, in most of the yellow males slightly further from the edge of the wings. This line of spots is usually straight and parallel with the outer edge of the wings, but it may be somewhat curved inward, especially in yellow males. In males in which the dark border is narrow, the outer edge of the fore wing markedly convex, and the spot at the end of the cell of the hind wings small and that at the end of the cell of the fore wings vestigial the spots are greatly reduced and not infrequently wholly absent.

The fringes of the wings vary from light dull olive with or without a pink edging to entirely bright pink. They are usually more or less dull rosy or pinkish.

This composite description covers all forms between the most extreme *eurytheme* (form *amphidusa*) and the most extreme *philodice*, including the yellow phase or variety of *eurytheme* and *eriphyle*. Two of the spring males if their origin were unknown would almost certainly be referred to *pelidne*.

To the insects included in the description 46 different names, covering species, subspecies, forms, and aberrations, have been applied. These names are usually divided between two accepted species, *eurytheme* and *philodice*. There is, however, no character or group of characters by which *eurytheme* and *philodice* may be distinguished. Originally in the east *philodice* ranged from the highlands of Georgia and the lowlands of northern North Carolina northward, becoming more and more distinctive toward the northeast. *Philodice* therefore is (or was) the northeastern representative of *eurytheme*.

Toward the west *philodice* intergrades insensibly with *eriphyle*, which is only an extreme form (with the subcentral spot on the upper surface of the secondaries reduced) of the yellow phase of *eurytheme*. Toward the northwest *eriphyle* passes into the more distinctive *kootenai*, and in the extreme south into *guatemalana*.

Comparison between *eurytheme* and the European and Asiatic *chrysotheme* fails to show any features by which the two may be differentiated; *eurytheme* and the forms associated with it should therefore be regarded as forms of *Colias chrysotheme* (Esper). The significant forms having a more or less definite significance are:

COLIAS CHRYSOTHEME (Esper)

Colias chrysotheme eurytheme Boisduval

Colias chrysotheme eriphyle W. H. Edwards

Colias chrysotheme kootenai Cockle

Colias chrysotheme philodice Godart

Colias chrysothema guatemalana Staudinger

The four yellow forms (*eriphyle, kootenai, philodice,* and *guatemalana*) occupy mainly, or largely, distinctive areas. The orange *eurytheme,* which has a yellow phase running directly into *eriphyle,* covers most of the range of *eriphyle* and part of the ranges of *kootenai* and *philodice.*

The relation of *Colias chrysotheme* to the other species of *Colias* in North America may be made clear by a brief analysis of the genus as a whole. The species of *Colias* fall naturally into five groups, as follows: 1. The *Crocea* group; a mealy patch at the base of the secondaries above; chiefly orange; Asia, Europe, Africa, and South America, with one species (*meadii*) in western North America. This passes into: 2 The *Hecla* group; no mealy patch; under side of secondaries green; chiefly orange; Alpine and Arctic in Asia, elsewhere Arctic, with one species (*hecla*) in northern North America. 3. The *Werdandi* group; an extreme development of the preceding; upper side also green or greenish and sexes similar; Alpine and Arctic in Asia and Europe, in North America Arctic (various forms of *werdandi*) and Alpine (*behrii* in California). The two following groups are distinct from the three preceding. 4. The *Hyale* group; no mealy spot; beneath usually yellow, sometimes orange, gray, or bluish; often infuscated; an antemarginal row of spots on the under side of the fore wings; sexes similar or different; chiefly yellow, sometimes orange, white or gray-blue; Asia, Europe, and Africa, with one species (*chrysotheme*) over almost the whole of North America. 5. The *Palaeno* group; essentially as in the northern yellow forms of *chrysotheme* but without the antemarginal spots on the primaries below and with the dark margins in the females usually obsolescent; yellow, rarely white, the males of some species with an orange form; chiefly in the Rocky Mountain region and in boreal and subarctic North America; two species in Alpine and Arctic Asia and Europe; in North America represented by *occidentalis, harfordii, interior, christina, alexandra, gigantea, scudderii, pelidne,* and *palaeno.*

Some Unusual Dragonfly Records from New Jersey (Odonata).

By John Gillespie, Glenolden, Pennsylvania.

During the past summer, while collecting dragonflies in New Jersey, I obtained five males and one female of *Celithemis verna* Pritchard. They were taken on July 12 and July 20, at Bennett, which is located in Cape May County, on the peninsula at the southern extremity of the state. This species was originally described in 1934 by Pritchard from specimens taken in Oklahoma and Georgia. Its occurrence in a region so far to the northeast as New Jersey seems particularly noteworthy. The identification has been confirmed by Dr. P. P. Calvert.

The environment in which *verna* was found consisted of an extensive boggy swamp and an adjoining sphagnum bog. The greater number were observed at the swamp, which was boggy around the edges, but with a large amount of open water in the middle. Several individuals in addition to those captured were seen.

Other species of *Celithemis* occurring here were *elisa, martha* and *eponina.* Some of the more noteworthy of the twenty-five species of dragonflies observed at Bennett, besides *verna*, were *Anax longipes, Pantala hymenaea, Enallagma pictum*, and *Nehallenia gracilis*.

Other interesting captures were:

DOROCORDULIA LEPIDA (Hagen). Lake near Kirkwood, June 22.

CELITHEMIS MONOMELAENA Williamson. Keswick Grove, August 6; Atco, August 16.

ENALLAGMA CARUNCULATUM Morse. Lenape Lake, near Newton, August 31.

E. WEEWA Byers. Cedar stream at Chatsworth, August 3; two different localities on cedar streams between Whiting and Bamber, August 6.

E. DIVAGANS Selys. Cedar stream between Whiting and Bamber, August 6.

TELEALLAGMA DAECKII (Calvert). Reedy edge of lake near Newtonville, July 12.

NEHALLENIA INTEGRICOLLIS Calvert. Same as above.

ARGIA BIPUNCTULATA Hagen. Chatsworth and Keswick Grove, August 3.

A "Zippered" Sweeping Net.

A very convenient sweeping net for micro-diptera was made of heavy unbleached muslin. The net tapered below to an open bottom of about five inches in diameter. To this bottom rim one side of a coat zipper (the type in which the two sides of the zipper may be completely separated) was sewn. Two or more cup-shaped bags were made whose rims were the same diameter as the open bottom of the net. To the rim of each cup-bag the opposite side of a coat zipper was sewn. Thus when zippered together a complete net was formed with quickly interchangeable bottoms. The cup part when swept full of insects and debris was tied with tapes near its mouth, un-zippered and inserted into a large cyanide bottle. Another cup-bag was zippered onto the net and the sweeping continued while the first lot of insects was being killed.—ELIZABETH G. FISHER, The Academy of Natural Sciences of Philadelphia.

Notes on some Rare Scarabaeidae with the Description of One New Species. (Coleoptera).

By MARK ROBINSON, Sharon Hill, Pennsylvania.

For a long time it was apparent to me that some of our species of *Trox*, which were never found in the usual places where I had looked for them but where I found many other species, must be specialized, just like some of our *Aphodiini* and other *Scarabaeidae*. With this in mind I set out this spring to prove or disprove this theory. I had several clues on which to work viz: material collected by Sim and Frost, plus several specimens from unidentified sources.

The method used was to scour the woods for birds building their nests in the early spring and, after the birds had raised their young, collect the nests and examine them bit by bit. The nests ranged from ten to seventy feet in the air and were in a great variety of trees including Beech, White Oak, Chestnut, Sycamore, Red Maple, Tulip Poplar, Norway Spruce and White Pine.

In the case of such birds as crows, titmice and other Passerines, the *Trox* are feeding on the feathers used to line the nest or the hairs which crows will intertwine through their nests; hawks' and owls' nests will always have scattered through them hair and feathers from the mammals and birds with which the Raptores had fed their young. In order for the *Trox* to be able to subsist in these nests, the nests must be very thick, or be in the cavity of a tree, in order to preserve the moisture which the larvae must have in order to mature.

The nest which proved to be the most productive was that of a barn owl at Broomall, Pennsylvania. This abode was located about twenty feet above the ground in the hollow of a dead Chestnut tree. I have collected *Trox* in these woods for the past eight years without ever taking any of the species that were collected in this nest. These consisted of over five hundred specimens of *striatus*, *aequalis*, *affinis* and the new species described in the following pages.

Thanks are due to the following men for their assistance in locating nests or otherwise helping in the studies undertaken in this paper: Nelson D. Hoy, Robert M. Stabler, R. C. Casselberry, M. W. Sanderson, R. J. Sim, C. A. Frost and R. Swett.

Trox (Omorgus) tytus new species.

It is remarkable that an insect as large as this could have remained out of the hands of taxonomists and collectors as long as has been the case. Until I examined the material taken in the Broomall Owl nest I had never seen this species and yet I have seen most of the large collections of *Trox* in this country.

The nearest known species to this one is *suberosus Fab.,* but *tytus* is smoother through-out, and the side margins of the pronotum are straight and not incised as they are in *suberosus.* In addition to the external characters, the male aedeagus has a very different shape. All the specimens in the type series were taken in barn owl (*Tyto alba pratincola* Bonap.) nests.

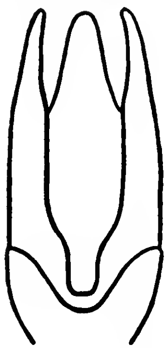

Fig. 1. Dorsal view of aedeagus of *Trox tytus.*

Oblong; completely covered with a yellowish-brown granule-pollinose, opaque coating. Interspersed over the body are yellowish-brown scale like hairs, which are a little more concentrated on the elytral tubercules. The underparts of the head and anterior tips of the tibiae are reddish and shining.

Clypeus triangular, rather strongly reflexed laterally. On either side of the median line and just to the rear of the genae is an elongate, deeply excavated pit. Head rounded without trace of tubercules.

Pronotal sides arcuate, converging to the rounded hind angles in the posterior one-sixth, sinuation within the hind angle well pronounced. Hind margin rounded medially, sinuate on each side. On the disk of the pronotum is an ill-defined median groove which runs posteriorly into a deeply, transversely excavated pit;. the sides of this pit are sloping. The usual tubercules of this subgenus are but vaguely indicated on the pronotum.

The elytral tubercules are low, barely rising above the plane of the intervals. The tubercules on the first and sutural rows are elongate and 'sometimes longitudinally confluent, the tubercules on the lateral rows are oval to rounded. The intervals are biseriately punctured. Humeral umbone moderately prominent while the apical umbone is indefinite.

Scape of antennae reddish, bristling with long ochraceous-orange hairs; funicle fulvous, glabrous; club testaceous. Apical process of anterior tibiae bifid, side margin of tibiae with a sharp denticle just back of the anterior process.

Wings: Length, 18 mm.; Breadth, 6.25 mm. Length, 12 to 13 mm.; Breadth, 7 to 8 mm.

Type.—♂ Broomall, Delaware County, PENNSYLVANIA, June 14, 1941 (Mark Robinson). *Allotype.*—♀, With same data as type.

Paratypes.—190 of both sexes; 162 Broomall, Pennsylvania, from May 29, 1941 to June 20, 1941 (Mark Robinson); 4 Broomall, Pennsylvania, June 1, 1941 (R. Stabler); 24 Lyndell, Pennsylvania, June 18, 1941 (Mark Robinson). Paratypes will be deposited in the collections of: Academy of Natural Sciences of Philadelphia; American Museum of Natural History; Museum of Comparative Zoology; United States National Museum; University of Kansas; O. L. Cartwright; M. A. Cazier; R. C. Casselberry and the writer.

TROX SIMI Robinson. 1940. Trans. Amer. Ent. Soc. LXVI, p. 157.

The type series of this species consisted of fifteen specimens found in New Jersey, Pennsylvania and Virginia. The food records I had at the time of description were: Hen feathers, mouse hair, dead crow, dead mole, old carpet and owl pellets. This year I have found ninety-two specimens in Broomall, Darby and Sharon Hill, Delaware County, Pennsylvania, from

April 28 to June 19. All specimens were found feeding on Barn Owl (*Tyto alba pratinicola* Bonap.) pellets which were disgorged on the ground beneath the trees in which the owls roosted.

TROX AEQUALIS Say. 1832. Say, New Harmony, p. 5.

This species seems to be found in a great variety of mammal and bird nests, as prior to 1941 I had only collected one specimen; this was on an old felt hat on the ground at Broomall, Pennsylvania, June 12, 1934. This year I collected between two and three hundred specimens in the nests of crows (*Corvus brachyrchynchos Brehm*), screech owl (*Otus asio naevius* Gmelin), great horned owl (*Bubo virginianus* Gmelin), barn owl (*Tyto alba pratinicola* Bonaparte), tufted titmouse (*Baeolophus bicolor* Linnaeus), hawk (*Buteo* sp.) and gray squirrel (*Sciurus carolinensis* Gmelin). All specimens were collected in Chester or Delaware Counties, Pennsylvania, between May 11 and June 15, 1941. In addition I have seen specimens collected in the nests of turkey vulture (*Cathartes aura septentrionalis* Wied) and the starling (*Sturnus vulgaris* Linnaeus).

TROX AFFINIS Robinson. 1940. Trans. Amer. Ent. Soc. LXVI, p. 158.

At the time I wrote the original description of this form I thought it was a subspecies of *Trox aequalis* Lec. Since then I have examined specimens from New York, Pennsylvania, Maryland, Virginia, Iowa, Kansas and California. While I haven't found any more characters to separate the two species I think the larger size, different male genitalia and lack of intermediate specimens are sufficient to rank it as a separate species.

In addition to the type series of fifty-nine specimens collected in various localities in New Jersey, which were all collected in crows' nests, I have collected twenty-four specimens in four different crows' nests this spring and Dr. Robert M. Stabler collected two specimens in Chester County on May 18, 1941, in a crow's nest. In the great horned owl nest which I examined on June 18, 1941, I collected fifty-two specimens of this species. I believe the reason for the large number of specimens being found in this Owl's nest is that the owl had used a last years crow's nest as the basis for its own nest and the *Trox,* when they matured this year, started to feed on the hair of rabbits and feathers of pheasants and grouse, which remains were found in the nest.

Trox striatus Melsheimer. 1846. Proc. Acad. Nat. Sci. Phila. II, p. 137.

This species has always been rare in collections and was one of the species I endeavored to trace to a definite host. In the barn owl's nest at Broomall, I took several hundred specimens of *striatus* along with the other *Trox* and *Hister* collected there. In addition I collected it in the nest of a barn owl at Lyndell, Pennsylvania, on June 18, 1941, a great horned owl's nest at Cupola, Pennsylvania, on the same date, and screech owl's nest at Chester Heights, Pennsylvania, also yielded several specimens on June 15, 1941.

Conjointly with the above biological data is the record of Sim's that he collected several specimens in May and June, 1930 at Moorestown, New Jersey, in the nest of a barn owl. All of these records add up to but one conclusion, that *Trox striatus* is found in the nests or nesting cavities of our species. of owls.

Trox laticollis Leconte. 1854. Proc. Acad. Nat. Sci. Phila. VII, p. 213.

This species was always very rare in collections until Mr. C. A. Frost collected over twenty-five specimens in May, 1939, in a fox den at Natick, Massachusetts. Since then Dr. Milton W. Sanderson sent me four specimens which he found feeding on a dead fox in a cave in Washington County, Arkansas, on November 12, 1938. On July 1, 1941, I took one specimen in the den of a gray fox (*Urocyon cinereoargenteus* Schreber) at the Springton Dam in Delaware County, Pennsylvania.

Aphodius manitobensis Brown. 1928. Can. Ent. LX, p. 302.

Mr. Robert Swett presented to me a male specimen of this species which he collected at Canadensis, Pennsylvania, in March, 1939, in the ground under a pile of white-tailed deer (*Odocoileus virginianus* Boddaert) excrement. At the time that the specimen was collected there was frost in the ground and patches of snow here and there on the surface.

Mr. W. J. Brown, who described the species and compared this specimen with the type stated that this was only the second specimen he had seen.

APHODIUS OBLONGUS Say. 1823. Journ. Acad. Nat. Sci. Phila. III, p. 215.

Four specimens of this rare species were taken by myself at Broomall, Pennsylvania, in two gray squirrel (*Sciurus carolinensis* Gmelin) nests on June 14, 1941. Both nests were in cavities of dead chestnut trees about thirty feet above the ground. They were composed of piles of leaves which were chewed into small pieces. Whether the *Aphodius* were feeding on the decomposing leaves or the squirrel excrement scattered through the nest I was unable to determine.

PHYLLOPHAGA POSTREMA Horn. 1887. Horn, Tran. Amer. Ent. Soc. XIV, p. 233.

This rather rare Melolonthid was taken by myself for the first time in New Jersey at White's Bogs on June 24, 1939. Six specimens were found feeding at night on tupelo (*Nyssa sylvatica* Marsh.), sweet fern (*Myrica asplenifolia* L.) and blueberry (*Vaccinium virgatum* Ait.).

Tabanidae of Panama (Diptera).

The annual report of the Gorgas Memorial Laboratory, located in Panama City and in three field stations, for 1940, states that Mr. G. B. Fairchild, Junior Entomologist continued work on the Tabanidae of Panama. "A considerable number of species were added to the collections and three papers on the group were prepared. Two additional species were reared from larvae. In February, the services of a reliable native were secured which enabled collections to be made at one spot every two weeks. When a year's collection has been gathered, it will enable us to gain a very fair idea of the seasonal abundance of the various species."

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.

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.—Dr. Lee Strong dies in Arizona. [4] 73: 114-115. **A. W. B.**—Professor Lawson Caesar retires. [4] 73: 97-98, ill. **Crabb, E. D.**—Abbreviation of names of biological publications. [Univ. Colo. Studies] 1 (D): 177-191. **Davis, J. J.**—Willis Stanley Blatchley. [7] 34: 279-283, ill. **Fossa-Mancini, E.**—Noticias sobre hallazgos de insectos fosiles en la America del sur. [Notas Mus. de la Plata] 6: 101-140. **Riley, et. al**—Catalogue of the books, manuscripts, maps and drawings in the British Museum (Nat. Hist.). Vol. 8: 969-1480. **Smart, J.**—Instructions for collectors. No. 4A. Insects. [Brit. Mus. Nat. Hist.] 1940: 164 pp., ill. **Torre-Bueno, J. R.**—A useful catalogue. [19] 36: 128. Compendium of entomological methods-Pt. 2. Orthoptera. [19] 36: 136. **Turner, H. J.**—Notes on nomenclature. 1. [21] 53: 63-67. **Williams, E. C.**—An ecological study of the floor fauna of the Panama Rain Forest. [Bull. Chicago Acad. Sci.] 6: 63-124, ill. **Wood, S. F.**—A method of collecting and transporting cone-nosed bugs. [19] 36: 137-139, ill.

ANATOMY, PHYSIOLOGY, ETC.—**Crowell, H. H.**—The utilization of certain nitrogenous and carbohydrate substances by the southern armyworm, Prodenia eridania. [7] 34: 503-512, ill. **Day, M. F.**—Pigment migration in the eyes of the moth, Ephestia kuehniella. [Biol. Bull.] 80: 275-291, ill. **Dethier, V. G.**—The function of the antennal receptors in lepidopterous larvae. [Biol. Bull.] 80: 403-414, ill. **Evans, J. W.**—Morphology of Tettigareta tomentosa (Cicadid.). [Pro. R. S. Tasmania] 1940: 35-49, ill. **Hardman & Craig.**—A physiological basis for the differential resistance of the two races of red scale to HCN. [68] 94: 187. **Henke & Mertz.**—Ueber die kerngrossenunterschiede im flugelepithel der mehlmotte und ihre beziehungen zur grossendifferenzierung der schuppen. [97] 61: 40-64, ill. **Hungate, R. E.**—Experiments on the nitrogen economy of termites. [7] 34: 467-489. **Kuhn, A.**—Zur entwicklungsphysiologie der schmetterlingsschuppen. [97] 61: 109-147, ill. **Lotmar, R.**—Das mitteldarmepithel der raupe von Tineola biseiliella, insbesondere sein verhalten während der Häutungen. [41] 18: 233-248, ill. **Timofeeff-Ressovsky, H. A.**—Temperaturmodifikabilitat des zeichnungsmusters bei verschiedenen populationen von Epilachna chrysomelina. [97] 61: 68-84, ill. **Vargas, L.**—Detalles morfologicos de los Anopheles americanos del grupo maculipennis y especies proximas. [121] 2: 23-25, ill. Detalles morfologicos poco o nada conocidos de Anopheles mexicanos [121] 2: 66-69, ill. **Vogt, M.**—Anatomie der pupalen Drosophila-ringdruse und ihre mutmassliche bedeutung als imaginales metamorphosezentrum. [97] 61: 148-158, ill. See also under Diptera, various authors.

ARACHNIDA AND MYRIOPODA.—Archer, A. F.—The Argiopidae or orb-weaving spiders of Alabama. [Geol. Surv. Alabama] Mus. Pap. 14: 77 pp., ill. (*). **Chamberlin, R. V.**—New genera and species of American Lithobiid centipeds. [Bull. Univ. Utah] Biol. Ser. 6: 23 pp. New western Millipeds. [Bull. Univ. Utah] Biol. Ser. 6: 23 pp., ill. **Malkin, B.**—New spider records for New York State. [19] 36: 122. **Marshall, R.**—Preliminary list of the Hydracarina of Wisconsin VI. [Trans. Wisc. Acad. Sci. Arts & Letters] 32: 135-165, ill. (*). **de Mello-Leitao, C.**—Anchocoema ogloblini, nova especie de Proscopiida. [15] 13: 99-102, ill. Notas sobre a sistematica das Aranhas, com descricao de algumas novas especies sul Americanas. [15] 13: 103-127, ill. Aranhas do Parana. [14] 11: 235-257, ill. (*).

THE SMALLER ORDERS OF INSECTS.—Buxton, P. A.—Studies on populations of head-lice (Pediculus humanus capitis). [116] 33: 224-242. **Crawford, J. C.**—A new Taeniothrips from Michigan. [10] 43: 142-143. **Leeson, H. S.**—The effect of temperature upon the hatching of the eggs of Pediculus humanus corporis. [116] 33: 243-249.

Ross, H. H.—Descriptions and records of North American Trichoptera. [1] 67: 35-126, ill. **Silvestri, F.**—Tre nuove sp. di Machilellus del Brasile. [14] 11: 545-550 ill.

ORTHOPTERA.—Alexander, G.—Keys for the identification of Colorado Orthoptera. [Univ. Colo. Studies] 1 (D): 129-164, ill. **Chagnon, G.**—The cockroach Supella supellectilium in Quebec (Blattidae). [4] 73: 104. **Deoras, P. J.**—Structure of Hemimerus deceptus var. ovatus; an external parasite of Cricetomys gambiense. [116] 33: 172-185, ill. **Rehn, J. A. G.**—A new Californian species of Gammarotettix (Gryllacrididae). [Notulae Nat.] No. 85: 4 pp., ill. **Shotwell, R. L.**—Life histories and habits of some grasshoppers of economic importance on the Great Plains. [U. S. Dept. Agric.] Tech. Bull. No. 774: 47 pp., ill.

HEMIPTERA.—Barber, H. G.—Descr. of a new bat bug (Cimicid.). [91] 31: 315-317. **de Carlo, J. A.**—Descripcion de tres especies nuevas del genero Cryphocricus. Una nueva especie del genero Heleocoris (Naucoridae). [104] 10: 426-433, ill. **Drake & Harris.**—Concerning some Halobalinids from western Hemisphere (Gerridae). [Iowa Sta. Jour. Sci.] 15: 237-240. (s*). **da Fonseca, J. F.**—Contribuicao para o conhecimento dos membracideos neotropicos III. [14] 11: 133-138 (*). **Harrington, C. D.**—Influence of aphid resistance in peas upon aphid development, reproduction and longevity. [47] 62: 461-466, ill. **Harris & Drake.**—Notes on the family Mesoveliidae with descr. 2 n. sps. [Iowa State Jour. Sci.] 15: 275-277. (s*). **Harris, H. M.**—Concerning Neididae, with new species and new records for North America. [19] 36: 105-109. **Hausman, S. A.**—Leaf-mining insects. [Sci. Monthly] 53: 73-75. ill. **Knight, H. H.**—N. sps. of Lygus from West. U. S. (Miridae). [Iowa State J. Sci.] 15: 269-273. (*). **Knowlton, G. F.**—Studies of western aphids. [Pro. Utah Acad. Sci. Arts & Letters] 18: 41-44. **deLong, D. M.**—The gen. Arundanus in N. Am. (Cicadellid.). [119] 25: 632-643. (*). **Monte, O.**—Tingitideos novos pouco conhecidos da fauna Americana. Notas sobre Gargaphia subpilosa. [14] 11: 283-300, ill.; 301-308, ill., (s*). **Morrison, H.**—A new Steatococcus from Mexico. [10] 43: 140-141. **de Toledo, A. A.**—Notas sobre a biologia do Chrysomphalus aonidum no Estado de S. Paulo, Brasil. [14] 11: 559-78, ill. **de la Torre-Bueno, J. R.**—Remarks on the genus Corizus of authors, not of Fallen. [7] 34: 284-288. (k). **Usinger, R. L.**—The present status and synonymy of some Orsilline species

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Atlas of the Scale Insects of North America, by Gordon Floyd Ferris, Professor of Zoology, Stanford University. Series III, 269-384. Stanford University Press. Published March 27, 1941. Price bound $7.75, unbound $6.75. —In the News for May, 1937, page 150, and for October, 1939, pages 238-239, we have noticed respectively the appearance of Series I and II of this Atlas. The present series continues in the style of its predecessors and is devoted to the Tribes Diaspidini (23 genera, 11 of them new, with 5 previously described and 40 new species) and Aspidiotini (13 genera, 3 of them new, with 26 previously described and 24 new species). Many of the new species are based on material collected by the author in his expedition of 1938 from California to Panama. Members of both the tribes here represented also appeared in the earlier series.—P. P. Calvert.

BUTTERFLIES. A handbook of the butterflies of the United States, complete for the region North of the Potomac and Ohio Rivers and East of the Dakotas, by RALPH W. MACY and HAROLD H. SHEPARD. Published by the University of Minnesota Press, Minneapolis. 8 vo. Cloth, 247 pp., 4 colored plates and many text illustrations. Price, $3.50.—Dr. Macy is the author of many technical papers on biological subjects, as is Dr. Shepard, as well as the Hesperidae section of the Catalogus Lepidopterorum; the completion of which is unfortunately interrupted by the war.

In the first section the authors give new information about ancient beliefs about butterflies, and curious facts about their life histories and habits. The second section describes the 162 species to be found in N. E. United States and adjoining Canada, with special reference to their occurrence in Minnesota.

The keys, adequate descriptions, and plates and text illustrations will enable the collector to identify the butterflies that may come to his net. There is included a sufficient amount of references to other more expensive or obscure publications, but this book is indispensible to the amateur as well as the advanced student of these most charming members of the insect world.—R. C. WILLIAMS, Jr.

INSECT PESTS OF STORED GRAIN AND GRAIN PRODUCTS, IDENTIFICATION, HABITS AND METHODS OF CONTROL, by RICHARD T. COTTON, Senior Entomologist, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. 8 vo., photo offset, flexible binding, 242 pp., illus., Minneapolis, Minn., Burgess Publishing Company, 1941, $3.00. —This is a compact, practical handbook prepared for ready reference use of farmers, elevator operators, shippers, millers and all others who are engaged in the storage, shipping and processing of grain, as well as manufacturers and users of pest control supplies. It has been estimated that as a result of their feeding activities, their presence in grain and cereal products and the cost of methods employed to destroy them, this group of insects exacts a toll yearly of at least $300,000,-000 in the United States alone. In order intelligently to combat these insects it is essential to possess a knowledge of their life histories, habits and environmental needs. In order to acquaint the reader with these pests and the most effective methods of controlling them, the subject matter of the book has been arranged in the following subdivisions: The insect pests of stored grain and milled cereals; Controlling stored grain insects on the farm; Control of insects in grain stored in elevators and warehouses; The insect problem in flour mills; Practical control methods in the mill; Protecting flour after manufacture; Fumigants and fumigation; The common fumigants; Flour mill and warehouse fumigation; Fumigation in atmospheric vaults and vacuum chambers; and Heat sterilization in flour mills. Lists of selected references following each of these subdivisions will aid those who desire to pursue study of any of the various phases of its subject matter beyond the scope of this book. The illustrations likewise have been chosen with particular care adequately to supplement or to make clearer the text discussion. In view of the highly practical importance of the whole subject, particularly at this time when a nationwide public defense program is being stressed, it is believed that this book will fill a definite need and will speediy attain a wide usefulness.—J. S.W.

OBITUARY

The death, on July 17, 1941, of Professor Myron Harmon Swenk, chairman of the department of entomology of the University of Nebraska since 1919, was announced in *Science* for August 8. He was born at Polo, Illinois, August 8, 1883, and received the A.B. (1907) and A.M. (1908) degrees from the University of Nebraska, with which his professional life was continuously spent. His entomological interests were on the pollination of plants by insects and the taxonomy of bees. He contributed descriptions of a new *Colletes* to volume 15 of the News (1904) and of other species of the same genus to the volume for 1906, and of species of the genus *Anthophora* to that for 1909.—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.

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, Correio 1043, Buenos Aires, Rep. Argentina.

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., Birmngham, 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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

Arctic Lepidoptera especially **Noctuidae**—Wanted to hear from collectors who desire the Arctic Species. Have large collection. R. J. Fitch. Lloydminster Saskatchewan, Canada.

ENTOMOLOGICAL NEWS

NOVEMBER, 1941

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CONTENTS

PHILADELPHIA, PA.

THE ACADEMY OF NATURAL SCIENCES,

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1941, 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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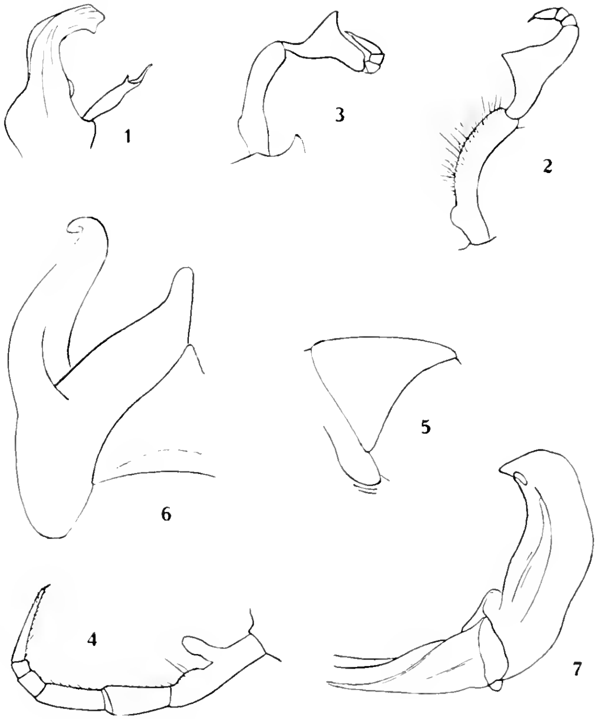

Fig. 1. *Cleidogona nueva*, new species. Right gonopod of male, ectal view.
Fig. 2. The same. Left leg of 9th pair of male, caudal aspect.
Fig. 3. *Cleidogona nueva michoacana*, new variety. Right leg of 9th pair of male, anterior view.
Fig. 4. The same. Left leg of 10th pair of male, caudal view.
Fig. 5. *Eurelus tancitarus*, new species. Collum as seen from the right side.
Fig. 6. The same. Anterior gonopod of left side, anterior view.
Fig. 7. The same. Posterior gonopod of left side, caudal view.

NEW MEXICAN MILLIPEDS.— CHAMBERLIN.

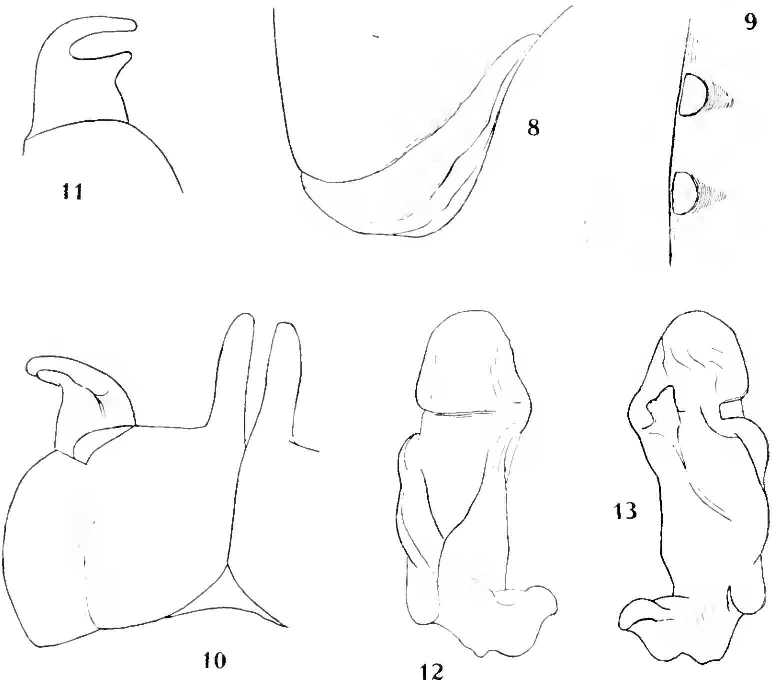

Fig. 8. *Orthoporus leonicus*, new species. Collum as seen from right side.
Fig. 9. *Rhinocricus potosianus*, new species. Scobina of segment in middle section of body.
Fig. 10. *Messicobolus hoogstralli*, new species. Anterior gonopods of male, anterior view.
Fig. 11. The same. Distal end of telopodite of anterior gonopod, caudodorsal view.
Fig. 12. The same. Right gonopod of posterior pair, caudal side.
Fig. 13. The same. Right posterior gonopod, anterior side.

NEW MEXICAN MILLIPEDS—Chamberlin.

ENTOMOLOGICAL NEWS

VOL. LII NOVEMBER 1941 No 9.

Samuel Henshaw, 1852-1941. An Appreciation.

Announcement of the death of Samuel Henshaw, on February 5, 1941, was made in the NEWS for March last. Since then two biographical notices of him have appeared: one by his associate in the Museum of Comparative Zoology at Cambridge, the paleontologist, Robert T. Jackson (Science for April 11), the other by two entomologists of the United States Bureau of Entomology and Plant Quaratine, Joseph S. Wade and J. A. Hyslop (Proceedings, Entomological Society of Washington 43: 108-110). To those accounts we can add nothing. Henshaw's reticence concerning himself is illustrated by the brevity of his autobiographical data in *American Men of Science* and in *Who's Who in America.*

His positions at the Museum from 1891 to 1927, first as assistant to Dr. H. A. Hagen, then as assistant in entomology, curator and director, gave him the opportunity to influence greatly the careers of students of insects. As one of these, I wish to put on record some evidences of appreciation. I made his acquaintance on July 25, 1890, when at the Museum to meet Dr. Hagen. I must have made a favorable impression on him for repeated visits to the M. C. Z., enabled me to acquire a knowledge of American Odonata from what was at that time one of the largest collections in the world, certainly in the western hemisphere. In 1899, he allowed me to borrow and bring from Cambridge to Philadelphia, an extensive series of neotropical specimens which were utilized in the preparation of the *Biologia Centrali-Americana* and in a contribution to the Neotropical Odonate fauna other than that of Mexico and Central America. It is idle to speculate whether my—and others'—opportunities would have been greater or less had someone else occupied Henshaw's positions. Suffice it to say that I appreciated them then and now, and just as I told him on that cold snowy evening of December 29, 1933, when I last saw him, in his Fayerweather Street house, so now I repeat: I am grateful and I thank him.

PHILIP P. CALVERT.

Prothetely in Scolytus multistriatus Marsham (Coleop.: Scolytidae).

By RAIMON L. BEARD and PHILIP P. WALLACE.
Connecticut Agricultural Experiment Station,
New Haven, Conn.

Prothetely, or the presence of pupal characteristics in the larval stage, has been reported in several families of Lepidoptera and Coleoptera. Earlier literature covering these reports has been summarized by Thomas (1933).

Since 1933, prothetely has been reported in *Epilachna varivestris* (*E. corrupta*) by Landis and Davidson (1934), in *Tribolium confusum* by Oosthuizen and Shepard (1936), and in *Melanotus longulus* by Stone (1938).

Observation of several cases of this developmental abnormality among larvae of the elm bark beetle, *Scolytus multistriatus* Marsham, adds a representative of the family Scolytidae to the list of Coleoptera exhibiting this phenomenon.

The larvae of this beetle are typically scolytoid in form and do not normally possess legs. The pupal stage of the insect is preceded by a short prepupal period which is characterized by an enlargement of the thoracic region, with the presence of bulbous structures indicative of the future legs. The prothetely observed is chiefly marked by the presence of legs which are readily distinguished from these prepupal protuberances.

The specimen showing the greatest development of "pupal" characteristics possessed both legs and wing pads. The legs were conspicuous, having the shape illustrated in Figure 1, B.

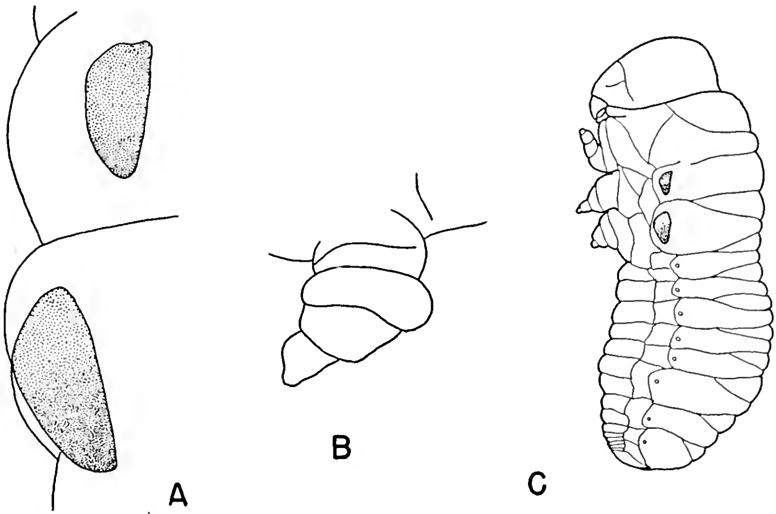

Fig. 1. Prothetely in *S. multistriatus*. A. Dorsal aspect of lateral region of mesonotum, showing position and relative size of wing pads. B. Outline of leg. C. Outline, drawn to scale, of prothetelous larva.

Although the legs had a jointed appearance, there was no evidence of their having any functional significance. The two pairs of wing pads were sclerotized, the posterior pair being somewhat better developed. The wing pads (Fig. 1, A) were flattened sacs, appearing to evaginate from the lateral region of the mesonotum and metanotum. It is presumed that this larva, when found, was in the penultimate stadium, as it molted once and later succumbed (probably from desiccation), when it showed evidence of approaching the prepupal condition.

Another specimen, found in the last larval instar, had legs developed almost as well as the one just described, but only the posterior pair of wing pads was evident. This individual pupated and reached the imaginal stage with no apparent difficulties. The adult form did not appear abnormal in any way, indicating that the presence of premature legs and rudimentary wings had no obvious effect upon the viability of the insect.

Approximately twelve other larvae were observed to bear the abnormality in degrees varying from the above two to larvae possessing slight conical protuberances suggestive of leg structures. No confusion, however, arose between these and the protuberances which characterize the prepupal stage.

In only three cases were wing pads present.

An estimated one fourth of one percent of the beetle larvae showed the abnormality, as the number of larvae examined carefully enough to detect the legs approximated 5,000.

Pruthi (1927) believed that in certain Tenebrionids a combination of larval and pupal characteristics indicated a condition of inhibited metamorphosis to which he applied the term neoteny. There is no doubt that the cases here reported for *S. multistriatus* are conditions of prothetely, as the possession of legs and wing pads was noted in the larval instar preceding the definitive prepupal and pupal stages.

In most cases on record (vide Thomas 1933) prothetely has not been observed on material taken in nature, but on experimental material subjected to unusual environmental conditions. Moreover, such a morphological abnormality has generally prevented normal development. It is of particular interest to note, then, that these prothetelous larvae of *S. multistriatus* were taken from infested elm bark exposed to natural conditions and that of the two most extreme cases, one molted as a larva without difficulty, and the other pupated and developed into an apparently normal adult beetle.

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District of Columbia Butterfly Notes (Lepidoptera : Rhopalocera).

By Warren Herbert Wagner, Jr., Washington, D. C.

(Continued from page 200.)

Eurema jucunda Boisduval and Leconte. I took an old but unbroken male on alfalfa flowers in the Soldiers Home Grounds on July 24, 1935. Mr. Carroll Wood told me that every year specimens are found at Salem, Virginia, so perhaps this butterfly can be expected to reach Washington regularly and therefore should be regarded as a rare visitor.

Pieris protodice Boisduval and LeConte. A distinctive autumn form occurred in the District region in 1934-35-36. Similar specimens are found in other localities according to Dr. George W. Rawson. The shape is nearest that of the summer form, but the chalky white color of the wings and dark markings underneath are closer to the spring form.

Papilio ajax Linnaeus. In the spring a small, light form occurs just as in all of the other swallowtails. It is found in the last half of April and early May and is characterized by the greater amount of yellow relative to the black ground color. The row of spots nearest the outer edge is larger and the females have more yellow in the inner row than in the summer form. There is more hair on the bodies of both sexes.

P. palamedes Drury. On July 31, 1937, I saw an unmistakable *palamedes* near Chillum Heights in Washington from a distance of about 200 feet. Even at this distance the lumbering flight and checkered appearance make it easily recognizable. I caught up with it but unfortunately "muffed" it. It was a fresh specimen. A previous storm may account for its presence so far from its native swamps.

P. marcellus Boisduval. Intermediates between the late-spring and the summer forms are found occasionally in late May. A fresh one at hand taken by Mr. Wayne K. Hill is a female and intermediate in every respect.

Rhabdoides cellus (Boisduval and LeConte.) This butterfly is a permanent resident here, reappearing every year in the locality near Great Falls, Maryland, discovered by Mr. and

Mrs. Clark.

Erynnis zarucco Lucas. This species was taken for the first time when a mated pair was captured July 12, 1935, in the Soldiers Home Grounds. They were identified by Foster H. Benjamin as *zarucco* (*terentious*). It is probably more common along the Chesapeake Bay Region of Maryland east of Washington.

Staphylus hayhurstii (Edwards). Although it does not occur in the original Washington area, this skipper is quite common at Camp Letts, Maryland, just twenty-nine miles away. It is found along paths in woods and the edges of woods bordering on old fields and salt marshes.

Hesperia metea (Scudder). Mr. and Mrs. Clark have this skipper from nearby in Virginia. It is not uncommon in the Catholic University Grounds in Washington wherever there are dry grassy fields interspersed with pines. My earliest date is April 25, 1938, when three fresh specimens of both sexes were taken. My latest capture was May 29. It is extremely inconspicuous and hard to catch.

Polites manataaqua (Scudder). Before 1932, this skipper was apparently rare but since that time it has been abundant. May 25, 1936, is my earliest date and it disappears around the end of June appearing again toward the end of July. I took a gynandromorph in field east of 16th Street, N. W., near the District line. A common tendency among the males is to lose the orange-yellow markings above the stigma, making the specimens almost completely melanic. Some of these have been confused with *Atrytone vestris,* but the stigma shape and the presence of light tan scaling on the underside of the hind wings in *manataaqua,* which is absent from *A. vestris,* enable easy identification usually.

Atrytonopsis hianna (Scudder). The same localities that yield *H. metea* also yield *hianna* in much greater quantities. *Hianna* emerges later than *metea*—my earliest date is May 5, 1938—and it can be found until the first week in June. It rarely visits flowers but when it does this skipper is usually found on blackberry blossoms. The height of the season is the middle of May when fifty or so can be taken in a morning: mated pairs are most common at this time. *Hianna* is occasional in several other places in and around Washington.

The specimen captured August 26, 1939, by Mr. Clark and listed as this species has since been found to be *Lerema accius*. *Hianna* has but one brood.

LERODEA EUFALA (Edwards). A single male was taken September 7, 1935, in a flower bed in MacMillan Park. It should be regarded as a very rare visitor here late in the summer.

POANES ZABULON (Boisduval and LeConte). This common skipper has two broods here instead of one. My records show that it disappears toward the end of June and reappears the last week in July and flies until September.

P. MASSASOIT HUGHI Clark. Another bog where this butterfly is abundant was located at Hyattsville, Maryland. Both the Beltsville, Maryland Bog and that at Hyattsville are being destroyed in their natural flora and fauna by "improvements." In 1936, this butterfly appeared as early as June 25. The form of this subspecies, corresponding to *suffusa* of typical *massasoit*, is frequent in both sexes and has the yellow-orange patch on the underside of the hind wings evenly covered over with dark rusty brown. *Poanes massasoit hughi* may conceivably disappear from our area as did *P. aaroni* and *viator*.

P. VIATOR (Edwards). This is a common skipper in and near salt marshes around Camp Letts and along the Patuxent River at Benedict, in Maryland, but I doubt if it now occurs normally much nearer to Washington. My earliest and latest dates are June 20 and September 7. There are at least two broods.

P. AARONI Skinner. The above named localities for *viator* also yield this skipper, but in smaller numbers. *Aaroni* wanders quite far away from its supposed home at Camp Letts, Maryland. In fact all but one taken there were found in an old field a quarter-mile from the nearest salt marsh. On June 20, 1939, Dr. George W. Rawson and I took more than a dozen of both sexes in this field. There are two broods; the first is from the second week in June to the first week in July and the second from the third week in August to at least the second week in September. Many specimens, both Mr. Clark and Mr. Williams agree, approach in size and color the subspecies *howardi* from Florida. Although this interesting skipper has been often reported from the Eastern shore of Maryland, I believe these records are the first from the Western shore side of Maryland.

Panoquina ocola (Edwards). I have taken this butterfly in Washington from August 4 to September 23. It is rare here and the only female I have ever seen here was on the Chain Bridge Flats along the Potomac River. Held between two fingers, a male will slowly rotate its antennae after the curious fashion of *Ancyloxypha numitor* when at rest, as described by Mr. Scudder, and *Atrytone logan* held between the fingers, as described by Mr. Clark.

Papers including references to District of Columbia Butterflies Published since 1932.

Clark, Austin H. [*Chrysophanus thoë, Papilio philenor acauda,* and *Atrytone bimacula* recorded from the District of Columbia area.] Proc. Ent. Soc. Washington, vol. 36, Nos. 8, 9, November-December 1934, Feb. 18, 1935, p. 263.

Id. [*Cercyonis alope pegala, Strymon liparops* form *strigosa, Eurema jucunda, Thanaos terentius,* and *Lerodea eufala* recorded from the District of Columbia area, and *Hesperia metea* and *Thorybes confusis* recorded from Difficult Run, Virginia.] Proc. Ent. Soc. Washington, vol. 37, No. 8, November 1935, Jan. 17, 1936, p. 169.

Id. Life History of the Gold-banded Skipper (*Rhabdoides cellus*). Science, new series, vol. 80, No. 2068, Aug. 17, 1934, pp. 163-164.

Id. The Gold-banded Skipper (*Rhabdoides cellus*). Smithsonian Miscellaneous Collections, vol. 95, No. 7, May 6, 1936, pp. 1-50, pls. 1 [colored frontispiece]—8, text figures A-D, 26, E-H, p. 29.

Clark, Austin H., and Leila F. Clark. Butterflies from Virginia and the District of Columbia. Proc. Biol. Soc. Washington, vol. 51, pp. 1-6, Feb. 18, 1938. [*Lycaena phlaeas hypophlaeas,* ab. *fulliolus, Papilio palamedes, Polites manataaqua*

(gynandromorph), and *Calpodes ethlius* recorded from the District of Columbia area.]

Id. Butterflies from Virginia. Proc. Biol. Soc. Washington, vol. 52, pp. 177-184, Dec. 15, 1939. [*Poanes aaroni* recorded from Washington.]

A New Race of Vespula squamosa (Drury), from Michoacan, Mexico (Hymenoptera, Vespidae).

By J. BEQUAERT, Museum of Comparative Zoölogy, Cambridge, Massachusetts.

The small collection of Vespidae made in Mexico last summer by Mr. Harry Hoogstraal and Mr. Kenneth Knight was recently acquired by the Museum of Comparative Zoölogy. It contains an interesting local race of *Vespula* (*Vespula*) *squamosa* (Drury), the first to be known of that species.

Vespula squamosa var. (or subsp.) **michoacana**, new.

Worker.—Black, with the following yellow markings: clypeus, except for a median longitudinal spot in upper two-thirds; inner orbits, filling the ocular sinuses but not reaching the vertex; a large, lozange-shaped spot above insertion of antennae, very narrowly divided from the inner orbits; outer orbits covering the entire genae and extending over hind part of vertex, but narrowly interrupted behind the ocelli; most of mandibles; scape beneath; broad hind margin of pronotum, narrowed and widely interrupted medially; two narrow, slightly curved, median, longitudinal stripes on mesonotum; a basal transverse band, broadly interrupted on scutellum, very narrowly divided on postscutellum; a small spot on each side of propodeum; a large spot in upper corner of mesepisternum; a small spot in upper corner of metapleura; tegulae; most of legs (often somewhat orange and the femora extensively infuscate); hind margins of all tergites and sternites, continued along the sides, narrow and uniform on tergites 1 and 6, much wider and with wavy anterior margin on tergites 2 to 5, very extensive and with lateral black spots on sternites 2 to 5.

In addition tergite 1 bears on the edge of the slope a narrow transverse band which does not reach the sides and is interrupted medially; the disk of tergite 2 is either entirely black or bears a narrow cross-band (sometimes mere traces of it) which does not reach the sides and is interrupted medially. Under side of flagellum somewhat russet, particularly toward the tip. Wing as in typical *squamosa*. The yellow color is sulphur-yellow on head and thorax, slightly tinged with orange on abdomen.

Holotype, worker, and eight *paratypes* (workers), Tancitaro, 6600 ft., State of Michoacan, Mexico, July, 1940 (H. Hoogstraal and K. Knight). Mus. Comp. Zoöl., Cambridge, Mass. Paratypes also at Academy of Natural Sciences, Philadelphia, U. S. Nat. Museum and American Mus. of Natural History, New York.

It seems reasonable to assume that the curious reduction of the color markings of the abdomen is caused by the mountain climate. In the many workers of *V. squamosa* I have seen from the eastern United States and other parts of Mexico (Mexico City; Puebla; Hidalgo; Chihuahua), the discal transverse bands of tergites 1 and 2 are broad, connected with the yellow sides and not or very narrowly interrupted in the middle; the yellow markings of propodeum and mesopleura are also more extensive.

Seven New Millipeds from Mexico (Chilopoda).

By Ralph V. Chamberlin, University of Utah,
Salt Lake City.

(Plates III and IV.)

The seven species of diplopods described as new in the present paper are based upon material collected by Harry Hoogstraal and Kenneth Knight, chiefly in June and July, 1940, on the "Third Hoogstraal Mexican Biological Expedition." Some specimens, however, as hereafter noted, were taken in June, 1938. All types are at present deposited at the University of Utah.

Order Chordeumida.

Suborder Chordeumoidea.

Family Pseudocleididae.

Cleidogona nueva new species (Figs. 1, 2).

A blackish band across the dorsum of each metazonite enclosing four light spots in transverse series, from each of which arises a seta, the lateral spot on each side more elongate; prozonite also with cross band of black embracing at middle two contiguous or sub-contiguous light spots and large lateral light area on each side more extensive than the corresponding spot on metazonite. A longitudinal dark band along the upper part of each side just below line of keels while the lower part of side is pale, the line of junction between dark and light deeply remote. Legs somewhat dusky white, darker distally. Antennae dark.

Eyes large, triangular with apex ectad, ocelli numerous and distinct, arranged in 6 or 7 series much as in *michoacana*.

Antennae slender, with articles of usual proportions, the seventh more slender and scarcely longer than the sixth.

Distinguished from *michoacana* in the form of gonopods and adjacent legs as shown in figs. 1 and 2.

Length 12-13 mm.

Locality.—NUEVO LEON: Sabinas Hidalgo; Ojo de Agua. One male taken on June 14, 1940, in decaying wood outside of a cave at an elevation of 1300 feet by K. Knight.

A lighter colored form than *C. nueva michoacana* from which it differs superficially also in color pattern; e. g., in having the pair of submedian dorsal light spots on prozonites which are wholly lacking in *michoacana*.

Cleidogona nueva michoacana new variety (Figs. 3, 4).

A black band along dorsum and a similar one along each side with upper border at or just below level of pores; on each side between dorsal and lateral dark stripes a longitudinal yellow stripe with irregular margins and the sides also light colored below lateral dark bands; the two more median setae on each segment each inserted on a small circular yellow spot; anal tergite black. Legs dusky yellow.

Eyes large and black, composed of numerous ocelli arranged in series from above below as follows: 7, 7, 7, 5, 5, 3, 1. Antennae long and slender, with the articles of the typical relative proportions.

Carinae weak, and setigerous tubercles slight.

Gonopods close to those of *nueva*, but the dorsal tooth on the basal spur appears lower and less acute.

Ninth legs of male as shown in fig. 3. Tenth legs of male as shown in fig. 4. Process of eleventh legs nearly the same as those of the tenth.

Length, about 13 mm.

Locality.—MICHOACAN: Tancitaro. Elevation, 6,500 feet. Under logs in damp ground. A male and female taken by Hoogstraal, July 22, 1940.

Order JULIDA.

Suborder SPIROSTREPTOIDEA.

Family SPIROSTREPTIDAE.

Orthoporus leonicus new species (Fig. 8).

Brown, the segments with a lighter ferruginous annulus about the caudal border and lighter brown anteriorly adjacent to each preceding segment. Legs brown of a somewhat ferruginous cast.

Head and collum smooth. Collum with form and characteristic lateral sulci as shown in fig. 8. Segmental encircling sulcus on ordinary somites deeply impressed throughout, widely and moderately excurved opposite the pore which is separated from it by about twice its diameter; longitudinal striae deep and complete up to the level of pore, above which they are abbreviated and are not present across dorsum; the metazonites appearing smooth but under the lens revealing numerous very fine punctae and slight anastomosing ridges. Last tergite with caudal portion sharply set off by transverse depression from anterior part, exceeded by the valves. Anal valves smooth, their inner borders compressed and strongly elevated.

Number of segments in female holotype, 72. In female paratypes 69 and 73 respectively.

Length, near 160 mm.; width, 9.5 mm. The two younger female paratypes are respectively 5.5 and 7.5 mm. in diameter.

Locality.—NUEVO LEON: Ojo de Agua, Sabinas Hidalgo. Elevation 1500 feet. Under damp rock near a stream. Three females taken by Harry Hoogstraal, June 18, 1938.

This is a larger, more robust form than other species heretofore reported from Mexico, apparently also quite distinct in sculpturing of collum and other segments.

Suborder SPIROBOLOIDEA.

Family RHINOCRICIDAE.

Rhinocricus potosianus new species (Fig. 9).

Olive to olive brown, the caudal borders of segments deeper in color. Antennae and legs brown.

Head smooth and shining; median sulcus distinct below level of antennae, but obscure across vertex.

Collum with ends widely rounded; surface smooth and shining; a fine margining sulcus about the anterior corner on each side.

Second tergite extended well below level of the collum where its anterior border is thickened and elevated. On ordinary segments the median sulcus is distinct throughout, interrupted with impressed cross lines or punctae; slightly angled at level of pore with which it is in contact; surface above smooth and shining. Scobina beginning on ninth or tenth segment, where weak and small, and continuing to about the fiftieth where they again gradually fade out. In the segments of the middle region the scobina are deeply impressed with the striae very fine and close-set, the deep lunate areas separated by somewhat less than twice their width. See further fig. 9.

Number of segments in female holotype, 60.

Length, 108 mm.; diameter, 8.8 mm.

Locality.—San Luis Potosi: Valles, 7 miles south of El Banito. Elevation, 100 feet. Under bark of fallen tree. One female taken by Hoogstraal and Knight, June 26, 1940.

In general structure possibly near to *R. aurocinctus* of Durango, but strikingly different in coloration. The scobina in form and distance apart seem distinctive.

Family Spirobolidae.

Spirobolus nigrior new species.

Deep blackish brown, nearly uniform in color. Antennae and legs also blackish.

Eyes large, ocelli distinct, about 50-55 in number; arranged in 6 series. Clypeal foveolae 4 + 4.

Collum of usual general form; surface mostly smooth; a sharply defined anterior margining sulcus from level of eye to lower caudal corner; just above and subparallel with the margining sulcus a short stria running from caudal margin forward.

Second tergite extending well below level of the collum. On ordinary tergites the primary sulcus less sharply impressed across dorsum than the one in front of it. Posterior area of segments with numerous punctae; anterior ring marked with numerous fine short curved striae; striae on sides fine but distinct, present to level of pores. Caudal triangular portion of last tergite depressed below level of anterior portion, somewhat roughened, the anterior area smooth and shining. Anal valves with borders strongly compressed and elevated.

Number of segments, 53.

Length of female holotype, about 72 mm.; width, 7 mm. The largest paratype is 8.2 mm. in thickness.

Locality.—NUEVO LEON: Villa Santiago (Hacienda Vista Hermosa—Horsetail Falls). On arid plateau at elevation of 2500 ft. One female taken by Hoogstraal and Knight on June 18, 1938. Ojo de Agua, Sabinas Hidalgo; twelve females taken under damp rocks near stream, elevation 1500 ft., by Hoogstraal on June 12, 1938.

In large size of eyes apparently differing from other known Mexican species excepting *S. platyops* Pocock from Mescala. It is, however, conspicuously different from that form in lacking yellow posterior borders to the segments, etc.

Messicobolus hoogstralli new species (Figs. 10-13).

Brown, in part of chestnut cast, the somites darker on sides adjacent to preceding segment. Legs light brown. Antennae somewhat chestnut brown.

Antennae obviously compressed, lying in a wide groove down side of head in front of eye and forward in mandible at side of clypeal region. Clypeal foveolae 4+4.

Collum narrowly rounded at ends; with a submarginal sulcus extending from level of eye to lower end on each side; surface smooth and shining. Second tergite produced well below level of collum; four longitudinal sulci above lower margin. On typical segments the pore lies its diameter or more in front of the segmental suture; a supplementary sulcus branches off from the suture above the level of the pore and parallels the primary suture across dorsum. Metazonites appearing smooth and shining above but under the lens showing numerous but not dense fine punctae and short impressed lines; sides longitudinally striate below level of pore.

Gonopods of male as shown in figs. 10, 11, 12, and 13.

Number of segments 48-49.

Length of male holotype, about 100 mm.; diameter, 11 mm. Diameter of female allotype, 13 mm.

Locality.—NUEVO LEON: Sabinas Hidalgo, Ojo de Agua.

Five males and one female taken by Harry Hoogstraal, June 14, 1940, under damp rocks near a stream. "Arid semi-desert."

A larger form than *M. godmani* (Pocock) with 48-49 segments as against 42, distinct also in the form of the male gonopods.

Family ATOPETHOLIDAE.

Eurelus tancitarus new species (Figs. 5-7).

The male holotype is brown with the caudal borders of somites darker. Legs and antennae brown. Some of the associated females vary to chestnut, but the dark annuli about borders of segments are conspicuous in all.

Antennae slender as usual. Ocelli 28-30 in each patch, arranged in 6 series, the eyes widely separated.

Collum smooth and shining; at ends narrowly rounded as shown in fig. 5. Second tergite extending much below end of collum, its lower posterior corner widely rounded as shown in the figure. Segmental sulcus single, distinct throughout. Pore contiguous with segmental sulcus; a short deep longitudinal sulcus behind middle at level of pore. Longitudinal striae numerous and fine beneath but not reaching level of pore by a wide distance. Surface not punctate.

In the male the claws of the first two pairs of legs enlarged. The processes of coxae of third legs much smaller than in other known species and the coxae of immediately following legs scarcely compressed and with processes obsolete.

The gonopods of the male also distinctive among the known species. See figs. 6 and 7.

Number of segments in male holotype, 43. In females, 41-42.

Length of male holotype about 35 mm.; diameter, 4.5 mm. Females up to 60 mm. long and 8 mm. in diameter.

Locality.—MICHOACAN: Tancitaro. On soil under rocks in moist woods. One male (holotype) and ten females taken by Hoogstraal on July 20, 1940.

In the reduced size of coxal processes in the male *E. kerrensis* forms a transition to the present species. *E. tancitarus* is clearly distinct from other known species also in the characters of the male gonopods.

Cockroaches: The Forerunners of Termites (Orthoptera: Blattidae; Isoptera).

By PHIL RAU, Kirkwood, Missouri.

The termites show a very close structural relationship to cockroaches; they are, however, much more recent in geological time, having made their appearance during the age of Reptiles, whereas the cockroaches are known to be among the oldest of insects. There is little doubt, says Imms[1] that the Isoptera rose from cockroach-like forms and "subsequently developed a complex social organization." In observing cockroaches intimately for a number of years I am inclined to believe that termites did not subsequently develope a complex social organization, as Imms says, but that many of the features of social behavior which they possess were handed down to them from their ancestors, the cockroaches. Certain characteristics of termite behavior were already evident in cockroaches long before termites came upon the earth, and my attention was especially attracted to this problem when I found two species of domiciliary cockroaches mixing bits of wood, grains of sand, fecal pellets, or chunks of soil with the glutinous secretions of the mouth and applying the mixture to egg-cases, thereby completely disguising them.[2] Now termites have the habit of using similar mixtures for nest building and nest repairing and since this habit was evidently inherited from the cockroaches I thought perhaps that the gathering of additional data on how other species of cockroaches treat the egg-cases would throw some phylogenetic light on the subject.

I found that the two species alluded to, *Blatta orientalis* and *Periplaneta americana,* glue bits of surrounding material to the egg-case; *Periplaneta australasiae*[3] also covers the egg-case

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[1] Recent advances in Entomology; p. 85, 86, 1931.

[2] Ent. News 51: 186-187, 1940; also article soon to appear in Annals Ent. Soc. Amer.

[3] Rau, Jungle Bees and Wasps of Barro Colorado Island P. 196, 1933.

in the same way. Two species of wood-roaches in Missouri, *Parcoblatta virginica* (unrecorded observation) and *Parcoblatta pennsylvanica* (Ent. News 51: 6, 1940) do not cover the egg-cases but drop them as they are in galleries in rotten wood or under loose bark. The wood-eating roach, *Cryptocercus punctulatus*[4] cuts a groove in the wood, deposits the egg-case and seals it up so completely, that only one end is visible.

In the German cockroach, *Blattella germanica,* the period of incubation is much reduced, and also the egg-cases are carried for a longer time; the result is that often an egg-case gives forth its young while it is still being carried about by the mother[5]. The hatching of the eggs while the egg-purse is protruding from the mother's body is apparently a step toward the viviparous habit in cockroaches, and we have in the species *Panchlora viridis* an example of a cockroach that gives birth to its young alive; of *P. viridis* Sharp says (Insects, Pt. 1, 229, 1895) the egg-case is either wanting or present only in a very imperfect form.

We may note that the examples given thus far show the tendency of cockroaches to cover the egg-cases, to seal them up in a groove, to drop them loosely without cover, to carry them about until the eggs hatch from the protruding egg-case, and lastly to dispensing entirely with the egg-case in the viviparous species. Dispensing with the egg-case and dropping the eggs singly is the usual method of oviposition in termites; but even this method was anticipated by the cockroach for Gould and Deay[5] (p. 5) find that, during the latter part of their lives, the females of the American cockroach often "deposit eggs entirely unprotected by any trace of a capsule", and also there are indications that certain fossil Blattidae of Carboniferous did not make egg-capsules, but deposited the eggs singly in trees (Sharp, loc. cit., p. 239). While these two

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[4] Cleveland, Mem. Amer. Acad. Arts and Sci. 17: (2) 185-342, 1934.

[5] Gould and Deay, Bull. 451, Purdue Univ. Agri. Exp. Station pp. 15-16, 1940.

unusual examples are very similar to the habit of termites in depositing their eggs singly, we have on the other hand a habit of oviposition in certain primitive termites, *Mastotermes darwiniensis*, which resembles very much the egg-laying habits of cockroaches. Snyder[6] states that this species has an egg-mass similar to the egg-capsule of cockroaches, "the individual termite eggs are firmly cemented together by a light brown gelatinous secretion which fills the insterstices between the eggs." The fact that *M. darwiniensis* is a primitive species makes its egg-laying habits all the more interesting as a connecting link to the cockroach.

There are other patterns in cockroach behavior which parallel termite behaviour or anticipate it; for example, Snyder tells us that in the wings of certain primitive cockroaches, a break occurs similar to the humeral suture or line of weakness near the base of the termite wing, where the wing breaks off after the colonizing flight. He also tells us that the large wingless brown roach, *Cryptocerus punctulatus* leads a sub-social life in partly decayed logs, where the wood serves both as shelter and food. And finally, as if flying directly into the arms of termite behavior, we have a cockroach—an Australian species belonging to the genus *Panesthia*—[7] which "lives in burrows in the soil in strict family communities, each of which consists of an adult male, a viviparous female, and from ten to twenty of their larval progeny in various stages of growth, * * * * * and soon after reaching maturity the adults bite off their own tegmina and wings, for these organs are inconvenient for inhabiting the burrow"—and this, I may say in passing, is about as far as a cockroach may dare go—without actually becoming a termite.

To conclude then, this little review indicates that cockroach behavior in many of its aspects is the forerunner of termite

[6] Our Enemy the Termite, pp. 16-17, 1935.

[7] Tillyard, Insects of Australia and New Zealand, p. 92, 1926.

behavior and that the termites themselves are not responsible for the development of all of the complex traits of their social behavior—but much of it has been handed down to them from their Blattoid ancestors. This outline, however, is suggestive rather than exhaustive and future research will, I am sure, supply many of the connecting links and strengthen many of the weak places in the phylogenetic scheme.

I may mention in passing, Dr. Wheeler's contention[8] that the historical and comparative method "still has much to offer in the study of behavior, although it has fallen into undeserved disuse, and even disrepute among laboratory biologists."

INSECT PESTS OF FARM, GARDEN AND ORCHARD. By LEONARD M. PEAIRS. New York, John Wiley & Sons, Inc., 1941. $4.00.—In 1912, Dr. E. Dwight Sanderson published the first edition of this work, which met with such well deserved success that he, with the coauthorship of Dr. Peairs, had to revise it for two more editions. The present edition is the fourth and from which, as coauthor, Dr. Sanderson had to withdraw. Although the general format of the former editions has been retained in the present one the subject matter is presented in a much improved manner, making a more comprehensive work, better serving the purpose for which it is published, i. e., as a text book for agriculturists and students of economic entomology. The contents are divided into chapters on: 1, Structure and Development; 2, Classification; 3-5, Control: climatic, biological, mechanical, cultural and chemical; 6-19, Insects injurious to various crops and fruits; with the last two on insects injurious to stored products and on those injurious to man and domestic animals. It contains 523 pages including the index, and 648 illustrations. The illustrations, with few exceptions are good and satisfactorily delineate the subjects. On the whole, a work that should find a useful place on the desk of all economic entomologists and should be a valuable consulting work for the practical agriculturist.—E. T. CRESSON.

[8] Essays in Philosophical Biology, p. 52, 1939.

Current Entomological Literature

COMPILED BY L. S. MACKEY and R. G. SCHMIEDER.

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.—**Abbott, C. E.**—The sensory basis of courtship. [6] 49: 217-220. **Anon.** Arthur Paul Jacot. [39] 24: 43-47. **Balch, R. E.**—The climate of the Maritime Provinces. [4] 73: 139. **Bates, M.**—Laboratory observations on the sexual behavior of anopheline mosquitos. [42] 86: 153-174. **Bruch, C.**—Miscelaneas entomologicas. [Notas Mus. de la Plata] 6: 157-171, ill. **Buxton, P. A.**—A map projection of biological interest. [107] 16: 34, ill. **Chamberlin, W. J.**—Entomological Nomenclature and Literature. Michigan. 1941. 103 pp. **deLeon, D.**—Some observations on Forest Entomology in Puerto Rico. [Caribbean Forester] 2: 160-163. **Diakonoff, A.**—Het paramount-kaartsysteem ten dienste van de entomologie. [102] 7: 34-40. **Essig, E. O.**—Bibliography of entomological publications of Charles William Woodworth. [12] 34: 595-596. Itinerary of Lord Walsingham in California and Oregon, 1871-1872. [55] 17: 97-113, ill. **Fichter, E.**—Apparatus for the comparison of soil surface Arthropod populations. [84] 22: 338-339, ill. **Grier, M. C.**—Oceanography of the North Pacific Ocean, Bering Sea and Bering Strait: a contribution toward a bibliography. [Univ. Washington Publ.] 2: 169. **Hatch, M. H.**—The logical basis of the species concept. [90] 75: 193-212. **Hickin, N. E.**—Methods used in rearing small insects infesting stored food products. [107] 16: 35-38, ill. **Hovanitz, W.**—Parallel ecogenotypical color variation in butterflies. [84] 22: 259-284, ill. **Porter, L. C.**—

What kinds of light attract night flying insects most? Least? [General Electric Rev.] 44: 310-313, ill. **Snapp, O. I.**—History of the cotton states branch of the American Association of Economic Entomologists. [12] 34: 485-490. **Wade, J. S.**—Obituary Lee Abram Strong. [12] 34: 479-480, ill. **Whelan, D. B.**—The role of plastics in the field of entomology. [103] 14: 73-84. **Young, F. N.**—A correction. [39] 24: 31.

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GENERIC RELATIONSHIPS OF THE DOLICHOPODIDAE (Diptera), BASED ON A STUDY OF THE MOUTH PARTS, by Sister MARY BERTHA CREGAN, R. S. M., Illinois Biological Monographs, Vol. XVIII, No. 1. The University of Illinois Press, Urbana, Illinois, 1941. Pp. 37, 30 plates , 193 figs. $1.00—In her paper of the above title the author has proposed a generic arrangement of the American Dolichopodidae. Object of the study was, to quote, "To ascertain if the groupings of the American genera on the basis of mouthparts would conform to those of Langhoffer." Mouthpart structure was the basis upon which Langhoffer established a generic arrangement in the Old World Dolichopodidae. In addition to her own conclusions, the author gives a very "meaty" summarization of studies and observations made by earlier entomologists on the food habits, characteristics and habitats of this family. Four distinct types of mouthparts were found to occur among the thirty-two genera studied. They have been designated by Sister Cregan as: (1) the labralate type; (2) the epipharyngeal two-prong type; (3) the epipharyngeal four-prong type; and (4) the epipharyngeal plate type. The 193 freehand drawings illustrate both complete mouth units and individual structures in the various genera studied. Commonly used entomological terms are employed throughout. Mouthparts were prepared for study by being run through the potassium hydroxide, water, alcohol, xylol and glycerine series. The four main types are further divided, on the basis of structural characteristics in the epipharyngeal armature and pseudotrachea, into twelve groups of genera, which, as the author states, "may be considered as subfamilies although not so named here." The author has ascribed real importance to trophi structure as a means for generic classification, whereas, with the exception of Langhoffer, other systematists of the Dolichopodidae apparently gave little consideration to such structures. The phylogenetic arrangement of genera into subfamilies as proposed by Sister Cregan does not, in several instances, agree with the earlier system of Langhoffer, which likewise was based upon mouthpart structure, nor with those of Aldrich, Becker and Lundbeck, which were based upon external characters. In passing it should be noted, however, that in respect to many genera the earlier classifications do not agree among themselves. Regardless of the value which different investigators may attach to Sister Cregan's classification, her paper should prove to be a valuable reference for anyone contemplating a comprehensive study of Diptera mouthparts.—FRED C. HARMSTON.

OBITUARY

Postamtmann i: R. M. P. RIEDEL died on March 27, 1941, following a long illness, at Frankfurt am Oder, Germany. He was born on February 19, 1870, and was thus in his 72nd year. Riedel was a distinguished student of the Diptera, particularly of the Tipulidae, having published numerous papers on the Australian, Oriental, Ethiopian, Neotropical and western Palaearctic faunas. He is survived by his widow, Margarete Weidefeld Riedel, and a daughter, Gertrud Riedel Kloeckner. The words "Postamtmann i. R." preceding the name refer to his being a retired officer of the German Postal Service.—C. P. ALEXANDER.

Science for July 4, 1941, announced the death of ALEXANDRE ARSÉNE GIRAULT in the hospital at Brisbane, Queensland, Australia, on May 2. He was born at Annapolis, Maryland, January 9, 1884, received the B.S. degree from Virginia Polytechnic Institute in 1903, was a special field agent of the U. S. Department of Agriculture, 1904-07, and was connected with the office of the State Entomologist of Illinois, 1908-11. He contributed many articles to the NEWS from 1900 to 1918, especially in 1913-1918. Many of these dealt with the parasitic Hymenoptera, especially the Chalcioidea, but there were many observations on the life histories and biology of various insects. Two of his early papers were bibliographies of entomological glossaries (1905). A series of ten Standards of the number of eggs laid by insects, being averages obtained by actual count of the combined eggs from 20 depositions or masses, ran from 1901 to 1914; references to volume and page numbers will be found in volume 25, page 296. Another series of three dealt with the number of eggs laid by spiders (1911-1914, vols. 22, 24, 25).

A note in the NEWS for October, 1911 (page 373) announces his appointment as entomologist of the Department of Agriculture of Queensland, and his papers from October of that year to January, 1915, are from Brisbane or from Nelson (Cairns). That of February, 1915, was sent from Washington, but in 1916, he removed to Glenndale, Maryland, where he was when the last of his NEWS papers (1918) appeared. Subsequently he returned to Australia.—P. P. CALVERT.

Prof. CHARLES BRANCH WILSON died on August 18, 1941, according to *Science* for August 29. He was born at Exeter, Maine, October 20, 1861, and received the degrees of A.B. (1881) and A.M. (1883) from Colby College and Ph.D. (1910) from Johns Hopkins University. He was head of the department of Science at the Massachusetts State Teachers College at Westfield, 1897-1932, since which time he was emeritus lecturer there. *American Men of Science*, from which we have taken many of these data, gives a fairly long list of the groups of animals he studied, many of them in connection with the United States Bureau of Fisheries. The only insects mentioned are water beetles and dragonflies. His papers on the latter deal with those of the Mississippi Valley (the Mississippi River from St. Paul to Cairo, Illinois, the Ohio from Cairo to Paducah, Kentucky, and the Tennessee from Paducah to Riverton, Alabama: Proc. U. S. N. M. 36, 1909), the Cumberland Valley in Kentucky and Tennessee (Proc. U. S. N. M. 43, 1912) and Jamaica (Johns Hopkins Univ. Circ., Feb., 1911). A more extensive paper, abounding in ecological and developmental data. is that on dragonflies and damselflies in relation to pondfish culture with a list of those found near Fairport, Iowa (Bull. Bur. Fisheries 36, 1920). This was reviewed and criticised by Prof J. G. Needham in the NEWS for January, 1921 (pp. 30-31). A later paper on the macroplankton of Lake Erie (Bull. Buffalo Soc. Nat. Sci. 14, 1929) contains a very brief reference to insects.

No papers by Wilson are listed in the bibliographies in

Leng's Catalogue of the Coleoptera of America north of Mexico, or in the four supplements thereto.

My personal acquaintance with Prof. Wilson was limited to an impromptu dinner of odonatologists at the Harvard Club, Boston, December 28, 1922, arranged by the late Dr. R. Heber Howe, in connection with the American Association for the Advancement of Science meeting. I omitted to make a record of all those who were present.—P. P. CALVERT.

Prof. ELLISON ADGER SMYTH, Jr., died on August 19, according to a note in *Science* for August 29. From biographical notices in *Who's Who in America* and in *American Men of Science* (fuller in the former), we learn that he was born in Summerton, South Carolina, October 26, 1863, received the A. B. (1884) and the A. M. (1887) from Princeton and the honorary LL.D., from the University of Alabama in 1906. He was adjunct professor of biology at the University of South Carolina, 1889-91 and professor of biology at the Virginia Polytechnic Institute at, Blacksburg, 1891-1925, when he retired. A. A. Girault, whose death we also announce in this issue, must have come in contact with him there. We recall Prof. Smyth as a not infrequent visitor to the late Dr. Henry Skinner, at the Academy of Natural Sciences of Philadelphia, in the eighteen nineties and the early nineteen hundreds, drawn by a common interest in the Lepidoptera. He contributed eighteen papers and notes to the volumes of the NEWS for 1895, 1899-1904, 1907, 1908, 1912, and 1916. They are concerned with the butterflies, sphingids, Catocalae and *Dynastes tityus* of Montgomery County, Virginia, within which Blacksburg lies, butterflies and *Allorhina* of South Carolina, life histories of sphingids and descriptions of two new species from Mexico, a sphinx, *Philampelus elisa*, and a *Morpho* (*thoosa*). In the NEWS for May, 1908, he figured and briefly described "Two Freaks:—Papilio ajax and Eudamus tityrus." Nearly twenty years later, the latter was "christened" *Epargyreus tityrus* aberration *smythi* by R. C. Williams, Jr. (Transactions, American Entomological Society 53: 262. 1927).

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.

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, Correio 1043, Buenos Aires, Rep. Argentina.

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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus **Nomada,** any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

Arctic Lepidoptera especially **Noctuidae**—Wanted to hear from collectors who desire the Arctic Species. Have large collection. R. J. Fitch. Lloydminster Saskatchewan, Canada.

Subscriptions for 1942 are now due

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DECEMBER, 1941

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ENTOMOLOGICAL NEWS

VOL. LII DECEMBER 1941 No 10

Notes on the Bionomics of Ataxia hubbardi Fisher in Illinois (Coleop.: Cerambycidae).*

By R. W. WILLIAMS, University of Illinois.†

Ataxia hubbardi seems to have reached Illinois but recently. Through correspondence, the United States National Museum informs me this species had not previously been found as far north and east as Illinois. Moreover the Illinois Natural History Survey has no collection records of its occurrence in this State. Because Fisher (1924) lists its range as Arizona, Texas, Oklahoma, Nebraska, and Kansas, and I found it only in plants growing along an east-west railroad, it quite probably came here via railroad traffic from the west.

In the locality of Urbana, Illinois, the larvae and pupae develop in the petioles of the large basal leaves of Prairie Dock, *Silphium terebinthinaceum* Jacq. The first adult was found within the petiole of a leaf on June 4, 1940. Although fully developed in hardness and color it had not started to make an exit hole. Another section of petiole was found on the same day in which a circular hole had been gnawed, and through which the adult had apparently escaped. Later many more such stems were found.

Near the point where the leaf blade joins the petiole of *Silphium,* small circular holes about 1.5 mm. in diameter were found. These holes appeared to be too regular and too small to have been made by the adult beetle. It would seem, therefore, that the eggs were deposited upon, rather than in the host stalk, and the larvae upon hatching bored into the petiole. This is the procedure of the closely related species *Ataxia crypta (Say)* (Morgan 1907).

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* Contribution No. 217 from the Entomological Laboratories of the University of Illinois.

† Now at Cornell University.

Assuming the eggs are deposited on the stems, the larvae, upon hatching, bore into them just below the epidermis and turning towards the base eat downward for an inch or more. They then turn back and eat upwards about the same distance past their entrance holes. The larvae traverse back and forth several times over a period of several days or possibly several weeks. The epidermis of the petioles turns black in these regions. As they become larger the larvae leave the sub-epidermal region and burrow into the pith at the center of the stalk. Here they bore up the mid-rib of the leaf to a point near its tip, a distance of about twelve to fifteen inches. After turning around they come down the mid-rib to a point several inches below the base of the leaf blade. The passage in the mid-rib is filled with frass.

At various distances below the leaf blade the mature larvae girdle the petioles from within. The fallen leaves may be noted lying on the ground about the third week in September. Although all the leaves of this Rosin weed die in the fall and are strewn about over the ground, it is very easy to recognize those which are infested. The factor by which they can be recognized at a distance is the break in the mid-rib at about the middle of the leaf blade. Although all the leaves have a tendency to curl, only the infested stalks break at this point. This break does not appear until after the leaves have begun to dry out. The second recognition mark is the presence of the small circular hole near the base of the leaf blade through which the larva entered the stalk. The smooth girdled end of the stalk, plugged with frass, is a third recognition mark. Although the larvae are not always found in this section of the stalk above the girdle, which bears the blade, the basal portion of the petiole can usually be found within a radius of a few inches from the leaf blade. Rarely was more than one larva found within a stalk and never more than two. When two were present, one was in the section of petiole above the girdle while the other was in the lower section. The girdled end is plugged up with frass so that a closed chamber results in which the larvae overwinter.

Several pupae were found on May 28. These emerged as adults on June 8, indicating that the length of the pupal stage is at least twelve days, perhaps nearer to fourteen. The last pupa was found on June 19. This was the only individual found in the stem of Indian Hemp, *Apocynum cannabinum* L.

Summary.

1. There is one generation a year in the locality of Urbana, Illinois.

2. The newly transformed adults remain two or three days within the stalks of the basal leaves of *Silphium terebinthinaceum* before emerging, and began to appear during the first week in June.

3. The egg is apparently laid upon the outer surface of the petioles.

4. Upon hatching the larvae presumably bore into the pith, where they feed at first just under the epidermis, then in the pith the entire length of the stalk.

5. The mature larvae form the overwintering stage in this area of the insect's distribution.

6. Pupation begins during the last week in May and the pupal stage has a duration of about fourteen days.

Bibliography.

Fisher, W. S. 1924. A New Species of *Ataxia* from the United States. Canadian Ent., Vol. 56, No. 10, pp. 253-254.

Morgan, A. C. 1907. The Cotton Stalk Borer (*Ataxia crypta Say*). U. S. Dept. of Agr. Division of Ent. Bull., 63, Part 7, pp. 63-66.

The Insect Collection of Thaddeus W. Harris (1795-1856) Was transferred (as a deposit) from the New England Museum of Natural History to the Museum of Comparative Zoology in April, 1941, and placed in the Leconte-Fall Room, together with Harris's notebook and certain M. S. lists and data. This is probably the oldest existing general collection of North American insects. Many specimens are broken or damaged by old Dermestid work (some Orthoptera were completely destroyed long ago), but the bulk of the material is in fair condition considering its age. There was no damage during the transfer to the M. C. Z. The collection contains types of probably at least 200 insects, including numerous Coleoptera, described by Say, Harris, and others.—P. J. Darlington, Jr. in Annual Rept. of the Director of the M. C. Z. at Harvard College for 1940-41, pp. 16-17. 1941.

A Migratory Flight of Phoebis agarithe Bd. (Lepid.: Pieridae).

By Kenneth L. Knight, University of Illinois, Urbana.

Two extensive migratory flights of this species were observed* in June, 1940, in the state of Nuevo Leon, Mexico. Specimens captured from one of these flights were identified by Mr. W. D. Field of the Bureau of Entomology and Plant Quarantine as *Phoebis agarithe maxima* Neum. The white female specimens were further designated as the form *albarithe* Brown. Brown[1] reports this subspecies and form as occurring in the region bordering the Gulf of Mexico from Florida to Southern Mexico with possible extensions into the isthmus of Central America. There are no migration records in the literature for this species.

The flight from which the specimens were captured was observed on the morning of June 23rd in a lime orchard at Hacienda Vista Hermosa, two or three miles southwest of Villa Santiago near the slopes of the Sierra Madre Oriental range. The flight was first noticed at about 9:00 A. M. and was progressing from east to west. The sky was cloudless, and there was a slight breeze blowing from the east. The butterflies were traveling at various heights up to about one hundred feet above the ground. There was a wide belt of them flying through the grove and up over the ridge at the western end of the valley.

Twenty-two specimens were captured from this flight. Fourteen of this number were the white female form and the remaining eight were males of the orange subspecies, a sex ratio of 64 per cent females to 36 per cent males. There were a few cloudless yellows in the ranks, but none of them were captured.

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*Entomologist, The Third Hoogstraal Mexican Biological Expedition, June-September, 1940.

[1] Brown, F. Martin, 1929. A revision of the genus *Phoebis* (Lepid.) *Amer. Mus. Nov.* 368, 32 pp, 37 figs.

Since the path of the flight was so near the ground, many of the butterflies would turn aside a moment to the flowers, but then almost immediately return to the migrating stream. A few Pierids could be seen flying near the ground in directions other than that of the main flight. The flight lasted for about three hours. It stopped with the advent of noon and the dropping away of the breeze. All but two of the specimens captured were quite perfect.

The other flight was observed at 11:00 on the morning of June 22nd at Las Adjuntas, a tiny settlement about fifteen miles southwest of Villa Santiago in the mountains. No specimens were captured, but there were white, orange and yellow Pierids in the flight. They were in about the same ratio of abundance to one another as in the first flight described. This fact, coupled with the nearness of the locality and the similarity of conditions, would tend to indicate that the same species occurred here as in the other migration.

At 11:00 when the flight was first noticed, the butterflies were going along with a steady, swift flight in a northwesterly direction and were apparently riding the strong breeze blowing from the southeast, for when the breeze died away at noon, the flight stopped. In twelve minutes, six hundred butterflies were counted as they passed a point directly overhead, an average of fifty per minute. The lowest butterflies were just clearing the pine trees and were probably thirty feet high. From that elevation, there were butterflies traveling as high as one could see, which was at least a thousand feet, for the high sun illuminated their white or yellow wings in brilliant contrast to the cloudless blue sky. The butterflies were traveling at such different levels that counting was very difficul.t None of them ever faltered to come to earth, and there were no Pierids flying at ground level.

Prof. Funkhouser on a Collecting Trip.

The undersigned is leaving on a collecting trip in South America, Central America and Mexico and will not return until July 1, 1942. After that date the address will be as usual. W. D. Funkhouser, University of Kentucky, Lexington, Kentucky.

What is Pseudomechanitis? (Lepid: Nymphalidae).

By WM. T. M. FORBES, Cornell University,
Ithaca, New York.

In Fox's generic revision of the Ithomiinae[1], the only nominal genus not recognized is *Pseudomechanitis* Röber. The original figure is so vague, being apparently from a pencil sketch or wash drawing rather than from the butterfly itself, and the description is so incomplete in many important points, that any identification must be considered not quite certain until the type is examined.

But we have a male specimen, collected at R. Aguacatal, West Colombia, that comes from near enough to the type locality, and which in pattern fits as closely to the original figure as any real butterfly might be expected to. It is determined by Fassl as *Ceratinia dionaca limpida,* a form described from the Cauca Valley, and fits well enough also to that description. It is a true *Ceratinia,* both superficially and in genitalia, and so far as I can see differs only in minor pattern features from the well known *C. mergelana,* which the Fassl collection contains in series from Muzo, East Colombia. The true *C. dionaca* is quite distinct, and much more heavily scaled. I therefore propose the following disposal of *Pseudomechanitis paradoxa* Röber.

CERATINIA auct., Hübner in part (syn. *Pseudomechanitis* Röber).

MERGELANA Hew.[2]

[1] Trans. Am. Ent. Soc. lxvi, 205, 1940.

[2] Fox indicates that so far as it is based on Jones' figure, the name of *P. H. Lycaste* Fabr. belongs to this species, and is specifically based on a very dark female of the *megalopolis* race. Since the name of *lycaste* has been universally used for more than half a century for a member of the *iphianassa* group of *Ithomia,* and generally for *I. panamensis,* I prefer to keep to an unambiguous name. The leading references are: Fabricius, Ent. Syst. iii (1) 161, 1793; Holland, Moth Book (1931 Ed.) pl. 72, fig. 2, publishing Jones' figure from the ms. plate of his "Icones",—the "fig. pict." of Fabricius; Fox, Ent. News 1, 141, 1939, with discussion and fuller references. Fabricius' type from the Drury via the Milne collection is presumably in the British Museum, but has not been examined in modern times; Butler silently assumes it is identical with the Jones figure.

M. MERGELANA (East Colombia).
M. LIMPIDA Hsch. (Cauca Valley).
M. PARADOXA Röber (West Colombia).

While by strict interpretation of the code under the type fixation clause, *Ceratinia* would not be available in this place, it was in fact available when it came in use, under the then current elimination codes and practices, and should certainly be kept in the sense of more than fifty years unchallenged use, —as a conservandum even if we accept the validity of the *ex post facto* features of the present code.

Migrating Butterflies, Libythea bachmanii larvata Stkr., in Texas. (Lepid.: Nymphalidae).

On a Texas highway in the hot Rio Grande valley, as we drove south from Edinburg to McAllen on July 2, 1940, we encountered hundreds of thousands of snout butterflies (identified by Mr. H. I. O'Byrne as *Libythea bachmanii larvata*) as they crossed the road in migratory flight. They flew 3 to 6 feet above ground. They did not come in a continuous cloud, but in either droves or streams which we cut through intermittently. While most of the droves passed over the highway eastward, a few of them moved in the opposite direction. These swarms appeared every mile or two, with frequent stragglers between. All that were examined had frayed wings. Those in flight did not go around our car, but flew over the top or through the open windows. Likewise they persistently went over the roof of a garage toward the southwest, instead of going around it, for an hour while we watched them.

As a digression from their mass flight in a bee-line against the wind, occasionally two or three or half a dozen would whirl and flutter playfully around each other in a small circle, as if in courtship, and gently drift back with the wind, forgetting for the moment the serious business of going somewhere.

This is not the first record of the migration of the snout butterfly, for Mr. C. B. Williams states in the National Geographic Magazine (May 1937, p. 571) that *Libythea bachmanii* has been seen several times in enormous migrations in Texas, usually in August and September. One of these flights was said to extend over a front of 250 miles, and one and a quarter million butterflies passed per minute on the whole front.

"These flights are usually moving toward the east or southeast, but nothing is known of their origin or destination." Again he says (Ann. Ent. Soc. Amer. 31: 236, 1938), "Of the recorded flights in Texas, all except two were to the S. E. quarter, the two exceptions being toward the north."—Phil Rau, Kirkwood, Missouri.

Some New Species of Syrphidae from Florida, Cuba and Brazil (Diptera).

By Frank M. Hull, University of Mississippi.

In this paper I present the description of four new Syrphid flies. Types are in the author's collection.

Volucella florida n. sp.

Closely related to *picta* Wied., it is much larger, the prescutellar spot is double, the middle wing blotch is larger and longer, with a clear sinus; the pteropleural pile is yellow, the basi tarsi are orange-red instead of yellow. The pale spots of the venter are much smaller and do not reach the lateral margins. There is much black pile in the posterior corners of the third segment, almost none in *picta*.

♂. Length 9.5 mm. Head: vertex shining black with black pile, behind which on the occiput are a few silvery hairs. The ocular pile is dense, long and very dark brown. The front and face are light cream-yellow with pale yellow pile; the latter has a median, black, brown-bordered stripe running down to the epistoma where it connects with a similar and wider cheek stripe from eye to epistoma. The posterior part of the cheeks and lower occiput are dark brown. The antennae are elongate, the first two joints light brown, the third joint dark, greyish-brown but little less wide at apex than at base. The arista is pale yellow with fifteen black rays above.

Thorax: mesonotum shining black, the notapleurae, humeri, a pair of rounded spots just before the scutellum, a short sublateral vittae behind the transverse suture and the extreme lateral margin behind the suture as well as a large spot on the upper part of the mesopleurae and the propleurae are light yellow. The pile of the dorsum is light yellow in front and again just before the scutellum and narrowly along the sides and over the post calli, but is broadly black over the posterior part of the mesonotum; this pile is quite long and thick. There is a conspicuous tuft of long, light, shining yellow pile on the mesopleurae, some on the pteropleurae, upper part of sternopleurae and the propleurae. The scutellum is light translucent clayish-yellow; the long, erect pile of the basal half is light yellow; the equally long dense pile of the posterior half and margin is black.

Abdomen: broad and round, considerably wider than the thorax. The first segment is shining black with pale pile except on the narrow posterior margin in the middle where pile is black. The second segment has the entire posterior half forming a slight arcuate black fascia with short, erect black pile. In the middle on the basal part of the segment is a wide, diffuse, brownish-black area broadly connected with the posterior part. This leaves the lateral anterior corners extensively light yellow and pale yellowish pilose and due to the subtriangular arrangement of the middle basal blackish spot the yellow extends medially and more narrowly than at the sides. Third segment similar to the second in every respect; the posterior black fascia on either side of the median, black, triangular vittae bulges slightly forward and this anterior extension is low and broadly rounded. The pile on this segment, as in the preceding one, is black over the black areas but also over the median or postero-median extension of the yellow color but elsewhere is yellow. The fourth segment is entirely shining black with wholly erect, long, pale yellow pile; the posterior half of the segment is transversely concave from side to side, the hypopygial pile is entirely black.

Legs: all of the femora and tibiae except the narrow apices of the one and the apices of the other, dark, shining, mahogany-brown; the pile of the tibiae is wholly black or very dark brown and on the femora chiefly black, except that there is some yellow pile on the posterior surface basally of all the femora, and the entire dorsal surface and ventral surface basally of the hind femora has long yellow pile. The first two joints of all the tarsi are light orange, the middle tarsi is more yellowish and their pile golden; the apical tarsal joints black with dark colored pile.

Wings: hyaline, marked with brown as follows: a brown cloud at the base of the third longitudinal vein, another over the anterior cross vein, another at the end of the auxiliary vein, and just beyond it a small brown spot which widens out to occupy all of the distal portion of the marginal cell and widens still more posteriorly to occupy the posterior adjacent section of the submarginal cell and to border both sides of the third longitudinal vein to its termination and to border more narrowly all of the subapical cross vein. The small cross vein is also bordered on either side. The marginal cell is closed and slightly bulbous.

Holotype: one male, St. Augustine, FLORIDA, March.

Volucella pictoides n. sp.

Related to *picta* Wied. Characterized by the wholly black hind femora, black facial stripe and dark brown antennae.

♀. Length 7 mm. Head: the front and face are light yellow, each with a prominent median black stripe. The cheeks are shining black, the pile of face and front yellowish-white. The black frontal stripe is black, pilose. Antennae elongate and dark brown; the dorsal surface of the yellowish arista with fifteen rays. Eyes with dense, short, dark brown pile.

Thorax: mesonotum shining black, the notopleurae, most of the mesopleurae, the propleurae and a geminate spot before the scutellum pale cream-yellow. There is a short, yellowish, sublateral vitta above the base of each wing. Scutellum pale, yellow and translucent, with dense, black pile on all of the dorsum except the basal corners.

Abdomen: broad, globular and inflated. The first segment is brown upon a linear posterior fascia restricted to the middle of the segment and this brown area extends down upon the second segment to cover somewhat more than the basal half of the second segment. Elsewhere these segments are pale yellow. The posterior fourth of the second segment in the middle and in each posterior corner is shining black but this fascia is broadly extended to twice its thickness on either side of the middle. Third segment with a wide posterior fascia, a broad median vitta and the basal corners black, the remainder yellow. Fourth segment, except for a narrow, linear, basal, sublateral fascia, entirely shining black. The black fascia of the second segment and the black vitta of the third segment, except for a narrow median extension of white pile, are all black, pilose; otherwise all of the remaining black area has erect white pile and the yellow areas have whitish pile except for a small encroachment of black pile on either side of the median vitta of the third segment.

Legs: all of the femora and tibiae, including the whole of the hind femora, except their narrow apices and bases respectively, shining black. First two joints of all of the tarsi yellow, the remaining ones almost black. Pile of hind femora, except ventrally near the apex, long and white. Pile of remaining femora largely, and of all the tibiae, black.

Wings: patterned with brownish markings, somewhat similar to other members of the group, the apical third brown with a darker spot at the end of the marginal cell, a sinus before it and after it, another inside of the subapical cross vein and the apical portion of the stigma somewhat clearer. There is a brown spot at the origin of the third vein, another covering the small cross vein, another beginning at the costal and crossing the sub-costal cell at the end of the costal cell; it continues to cross the marginal cell to occupy a portion of this cell.

Holotype: one female, Havana, CUBA, F. M. Hull, August 1937, on herbage.

Planes grisea n. sp.

Related to *chrysopressa* Hull, but distinguished by the opaque black third abdominal segment with its widely separated basal spots, and by the absence of the thick, flat, yellow abdominal pile.

♂. Length 8.5 mm. Head: front shining coppery with considerable, almost white, pubescence along the eye margins. The lower portion of the face is obscurely yellowish-white in ground color. The face is everywhere yellowish-white pubescent. The frontal pile is white; that of vertex partly black. Antennae dark brown, the third joint a little over twice as long as wide, reddish-brown basally.

Thorax: ground color brassy-black on which are four, quite faint and obscure purplish vittae. There is a pair of well developed stripes of brassy-yellow pile; continuous with these is a transverse stripe of such pile along the suture, which stripe emits on either side a sublateral and posteromesonotal stripe of the same pile. There is considerable pale pile in front of the scutellum and on the pleurae, but elsewhere the pile is black. The scutellum is brassy-black, transversely striped with a coppery reflection and has a pair of scarcely differentiated short hairs on the margin.

Abdomen: black, feebly shining, strongly striated. Second segment dark brownish-black, nearly opaque with a pair of light, somewhat obscure, yellowish-brown hemicircles on either side, which do not reach the margin, widely separated in the middle. Third segment similar, with similar spots, that practically reach the margin. Fourth segment deep shining golden or brassy-black; pilose in the middle of basal half; with suberect brassy pile everywhere.

Legs: posterior femora shining black, the first two pairs blackish-brown on apical half, lighter brown basally and brownish-yellow narrowly at apex. All of the tibiae dark brownish-black, narrowly pale yellow at base, the middle pair perhaps lighter brown. Hind tarsi dark brown. First two joints of other tarsi pale yellow. Middle joint brown, the last joints black.

Wings: tinged with pale brown, the stigma sepia.

Holotype: one male, Sao Paulo, BRAZIL. Nov., 1938, (J. Lane, collector).

Planes valeria n. sp.

Related distantly to *vagans* Wied., this species is characterized by the subpetiolate abdomen, basally fused spots of third segment, pale anterior tarsi and tibia, yellowish scutellar margin etc.

♂. Length 9 mm. Head: front shining black, the narrow margin with pale yellow pubescence. The lower half of the face is broadly pale yellow. The whole of the face is covered with pale yellow pubescence. Frontal and vertical pile yellow. First two joints of antennae black, the third joint less than twice as long as wide, brownish-black in color, reddish ventrally near the base.

Thorax: mesonotum with four greenish vittae, the outer pair broader and interrupted at the suture, and broadly margined everywhere with a brassy color that tends to become coppery. Mesonotal pile brassy-yellow on the anterior half and forming a widely divergent stripe on the posterior two-thirds which loses itself among short black pile. The mesonotal pile just before the scutellum is broadly brassy. Pleural and scutellar pile wholly pale; scutellum with a pair of slender pale bristles; scutellar color dark sepia with a brassy tinge. The margin narrowly brownish-yellow.

Abdomen: first segment greenish-black becoming light brown in the middle. Second dark, opaque sepia; the base narrowly and the narrow margins are light brown, leaving a pair of elongate, posteriolaterally pointed, pale yellow spots, which do not reach the margin. Third segment similar in general color, the large pair of pale spots confluent narrowly at the base of the segment, pointed posteriorly and directed diagonally out towards the margin which they reach in almost their full length; the extreme basal corner is left dark brown. Fourth segment wholly shining greenish-black; it is black pilose mediobasally, elsewhere pale golden appressed pilose.

Legs: femora shining blackish; their apices and all of front and middle tibiae are light brownish-yellow. All of fore and middle tarsi except last one or two joints are pale yellow. Remainder of hind tibiae dark brown; their apex has a sharp spur.

Wings: pale brownish-grey; the stigma brown.

Holotype: one male, Sao Paulo, BRAZIL, November, 1940. (J. Lane collector).

A New Texas Agrilus (Coleoptera: Buprestidae).

By JOSEF N. KNULL, The Ohio State University.

Agrilus limpiae n. sp.

♂. Resembling *A. obsoletoguttatus* Gory in size and markings, only pubescent areas much more prominent, each elytron with five spots, also sides of pronotum and ventral surface on sides containing white pubescence, front green, rest of insect olivaceous brown.

Head convex, with slight depression on vertex, surface finely granulose, finely rugose on occiput, pubescent; antennae extending nearly to hind angles of pronotum, serrate from the fourth joint.

Pronotum wider than long, much narrower at base than at apex; sides broadly rounded in front, obliquely narrowed to base; when viewed from the side, marginal and submarginal carinae are narrowly separated in front and joined back of middle; anterior margin strongly sinuate, median lobe prominent; basal margin emarginate at middle of each elytron, median lobe deeply emarginate; disk convex with two median depressions, also oblique depression each side, prehumeral carinae sharp; surface finely transversely rugose, fine punctures between rugae. Scutellum transversely carinate.

Elytra wider than base of pronotum; sides subparallel at base, constricted at middle, obliquely narrowed, apices rounded, serrulate; disk flattened, each elytron with vague costa, basal depressions prominent, sutural margin elevated posteriorly; surface imbricate.

Abdomen beneath finely densely punctate, first segment slightly flattened at middle, rugose, suture between first two segments not indicated at sides; pygidium carinate, carina not projecting. Prosternum granulose, densely pubescent; prosternal lobe deeply emarginate. Tibiae slender, first and second pairs mucronate on inside at apex. Posterior tarsi same length as tibiae; tarsal claws similar on first two pairs of legs, posterior claws with inner tooth broader, inner teeth not turned inward.

Length 6.5 mm.; width 1.8 mm.

♀. Differs from the male by having the front olivaceous, antennae shorter, posterior tarsi shorter than tibiae, tibiae not mucronate and lack of pubescence on prosternum.

Type male, *allotype* and *paratypes* collected from the foliage of soapberry (*Sapindus drummondi* Hook. & Arn.) in the Davis Mountains, TEXAS, July 2, 1940; paratypes from the same locality ranging in dates from June 1 to July 12, D. J. and J. N. Knull collectors. Type, allotype and paratypes in writer's collection, paratypes in collections of The Ohio State University and Philadelphia Academy of Natural Sciences.

According to Fisher's key* this species would run to *A. obsoletoguttatus* Gory. It can be separated by being more olivaceous, pubescence more prominent, male posterior tarsi of about same length as tibiae and by the structure of the male genitalia. The lateral lobe of the aedeagus is serrate on outer margin near apex, otherwise this organ is similar to that of *A. obsoletoguttatus* Gory.

The writer is indebted to Mr. C. A. Frost, who kindly compared specimens with the type series of *A. interruptus* Lec.

Yellow Fever.

Attention now centers on jungle yellow fever which is the same disease as urban yellow fever but with this distinguishing epidemiological characteristic, that in its special forest environment it is not transmitted by *A. egypti*. Risk of yellow fever epidemics will remain as long as jungle yellow fever persists. A complete extermination of the disease now seems remote if not impossible.—Annual Report 1940, International Health Division, The Rockefeller Foundation, pp. 12-13. (1941).

* W. S. Fisher, U. S. National Mus. Bul. 145, pp. 1-347, 1928.

Dragonflies New to the Mount Desert Island Region, Maine (Odonata).

By Ranger-Naturalist CARSTEN AHRENS, Acadia National Park, Maine.

In ENTOMOLOGICAL NEWS for May, 1891, D. J. Bullock published brief notes on 8 species of dragonflies collected on Mt. Desert Island, Maine. In the same publication, October, 1894, Dr. P. P. Calvert listed 5 species collected by Bullock in this same region. Then in 1938, William Proctor, D. Sc., published the *Insect Fauna*, Part VI of the *Biological Survey of the Mount Desert Region*. In this volume is an annotated list of 54 species of dragonflies taken over a period of years (1927-1938). The three lists mentioned above include 55 species.

During the months of July and August of 1940 and 1941, the writer was a ranger-naturalist in the Acadia National Park, which is located on Mount Desert Island, Maine. During this period and for this region he raised the number of species from 55 to 80. Of the 25 species that are new records for the Mount Desert Region, 2 seem to be new records for the state of Maine. They are *Aeschna sitchensis* Hagen and *Sympetrum danae* Sulzer.

The writer wishes to thank Park-naturalist Maurice Sullivan of the Acadia National Park for his encouragement and helpfulness; to express again his appreciation to Mrs. Leonora K. Gloyd for going over the collection to check his identifications; to thank Dr. Donald Borror for literature. He also wishes to express his appreciation and admiration to Mrs. Ahrens who in two short seasons became an expert collector, and who never complained even when entomological paraphernalia covered every flat surface in the apartment.

ANISOPTERA.

1. HAGENIUS BREVISTYLUS Selys. Fairly common along Echo Lake and Jordan Pond, July 29-Aug. 14. Observed occasionally at the outlets of lakes, 1940, 1941.

2. DROMOGOMPHUS SPINOSUS Selys. A pair taken along Great Pond on Aug. 28, 1940. Several observed squatting on

the sand and rocks along or near the shore during late Aug. 1941.

3. Lanthus albistylus Hagen. Four males captured along the little stream that flows into boggy New Mill Meadow, July 16-Aug. 18. They fly close to the water, alighting frequently on the rocks that break the surface, 1940, 1941.

4. L. parvulus Selys. One male, Jordon Pond, July 19, 1940; one male at the beaver dam on Norway Drive, Aug. 7, 1940.

5. Epiaeschna heros Fabricus. One female taken while she was ovipositing along a heavily shaded part of Squid Creek, July 8, 1940.

6. Aeschna sitchensis Hagen. Two males captured on the bog at Sea Wall, Aug. 14, 1940. These insects were observed at the very edge of the bog, distant from the pools of standing water.

7. Ae. eremita Scudder. Fairly common in diverse habitats during late July and early Aug., 1940, 1941.

8. Macromia illinoiensis Walsh. Observed this species on a number of occasions during both summers as it patrolled the shady carriage roads. One male netted July 3, 1941.

9. Somatochlora tenebrosa Say. Collected this insect now and then along shady streams during Aug., 1940, 1941.

10. S. minor Calvert. Two females were collected while they were ovipositing along a tiny stream that flows into Aunt Betty Pond, Aug. 14, 1940.

11. S. walshii *Scudder.* One male taken in the wide marshy area of lower Northeast Creek, July 21, 1941; one male, Schoodic Peninsula, July 29, 1941.

12. S. forcipata *Scudder.* One female, Echo Lake, July 3, 1940.

13. S. williamsoni E. M. Walker. One male, lower Northeast Creek, July 21, 1941.

14. S. kennedyi E. M. Walker. One male, Echo Lake, July 3, 1941.

15. Celithemis martha Williamson. This species was less common than was C. *elisa,* but it was found in its company

around all the lakes during early and middle Aug., 1940. It was not observed during the summer of 1941, although C. *elisa* was common.

16. Ladona julia Uhler. Fairly common about the pools of standing water at the bog at Sea Wall during the first two weeks of Aug., 1940, 1941.

17. Libellula pulchella Drury. Common at Sargent Pond and at the beaver dam on Norway Drive during Aug., 1940, 1941.

18. Sympetrum danae Sulzer. Four males were netted in a tide swamp behind a sea wall on Great Duck Island, Aug. 3, 1940.

19. S. semicinctum Say. Fairly common in the New Mill Meadow during middle Aug., 1940, 1941. They are usually in the company of *Nannothemis bella* Uhler.

20. S. decisum Hagen. Found almost everywhere during July and Aug., 1940, 1941.

21. Pantala flavescens Fabricus. Observed frequently during Aug. in Bar Harbor, 1940, 1941.

Zygoptera.

22. Lestes eurinus Say. Taken occasionally at the bog at Sea Wall during the first two weeks of Aug., 1940, 1941.

23. L. rectangularis Say. Netted frequently during the latter part of July and early Aug., 1940, 1941.

24. Enallagma vesperum Calvert. Three males collected at Aunt Betty Pond, Aug. 7, 1940.

25. E. aspersum Hagen. Fairly common during the first week in Aug., 1940, 1941.

Why Does Gyrinus Circle? (Coleoptera: Gyrinidae).

By Cyril E. Abbott, Harding College, Searcy, Arkansas.

Several years ago a friend of mine attempted to determine the origin and function of the circular locomotion of the Gyrinidae. He finally decided that the beetles were not compelled to behave in that manner, and that the motion is "instinctive".

Now, the definition of behavior as instinctive really explains nothing, excepting that we have no adequate explanation. And so, after reading the paper by Brown and Hatch (1929) it occurred to me that circling might possibly be the result of visual responses. But when rather complex apparatus for testing such responses gave absolutely no positive results, the problem appeared, for a time, insoluble.

In the meantime I obtained and read a copy of the monograph on chordotonal organs by Eggers (1928). Eggers succeeded in demonstrating experimentally that the Gyrinidae avoid collision with solid objects through the perception of vibrations of the water's surface, and that the sense organs concerned are located in the second segment of each antenna. This recalled the familiar observation that when a small moth or other similar insect falls upon the water in the vicinity of a number of "whirligig" beetles, the latter soon surround it and tear it to pieces. For the Gyrinidae are predatory in both the larval and adult stages.

The foregoing observations suggested the experiments described below. From the moveable arm of an electric vibrator having a frequency of 60/sec. an iron ball weighing about 25 gms. was suspended on a 20 B & S guage wire about two feet in length. A large aquarium tank was so arranged that the weight hung about four inches below the surface of the water. About thirty specimens of *Gyrinus* (sp?) were then placed in the tank, and a screen so arranged that their movements could be observed without subjecting them to visual stimuli. Using this apparatus the following experiments were performed:

1. The beetles were observed for some time with the vibrator motionless. Under such circumstances the beetles circled aimlessly all over the exposed water's surface.

2. The vibrator was set in motion. Immediately, the beetles nearest the wire turned toward it, swam up to it, and made grasping movements with the prothoracic legs. And although the vibration of the wire flung each insect a distance of a centimeter or two, the beetle immediately repeated its orienting

and grasping movements. These "attempts", in the case of single specimens, were repeated at intervals of about two seconds.

3. The vibrator was stopped. The beetles at once began to wander all about the tank; if anything, they avoided the wire.

4. With the aid of a pair of fine forceps antennae were removed from fifteen beetles; these alone were replaced in the tank. When the vibrator was started the beetles paid no more attention to it than when it was motionless; that is, they wandered aimlessly all over the tank. One or two made a feeble and occasional attempt to seize the wire, but subsequent examination indicated that two or three specimens had parts of the antennae still attached.

The experiments described were repeated many times, under various circumstances: always the results were the same as there indicated. *Normal* beetles also oriented to tuning forks with vibration rates of 256/sec., 320/sec., and 384/sec., *when each of these was touched to the surface of the water.* Under no circumstances did any of the beetles respond to air vibrations alone, although efforts were made to induce such a response. Needless to say, beetles with amputated antennae did not respond to the forks under any circumstances.

Of further interest is the fact that Gyrinus made no orienting movements toward the vibrating object when and if that object was more than three or four centimeters from the insect.

Now the activities of the Gyrinidae in the adult stage are chiefly confined to the surface of the water, where they feed, as has been observed, upon hapless winged insects falling thereon, and which, through their struggles, set up a vibration of that surface; by means of such vibrations Gyrinus reaches its prey. But evidently the perception of such minute and rapid vibrations is effective only within a very limited area around the source of the vibration. By *circling*, Gyrinus greatly increases the area of surface which it covers in a given time, and hence, naturally increases its *chances* of encountering vibrations set up on the surface of the water.

In short, the circling beetle is literally "feeling for prey". And the organs upon which it depends for the discovery are the antennae.

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BROWN, C. R. and M. H. HATCH. 1929. Orientation and fright reactions of whirligig beetles.—Jour. Compar. Psychol., 9: 159-189.

The Dates of Publication of Two Articles on Coleoptera by John L. Leconte, Issued in 1845.

By HUGH B. LEECH[1], Vernon, British Columbia.

In examining the literature on one of Leconte's species, it was found that the original description was cited variously as of 1844, 1845, 1846 and 1847. Since beetles belonging to four families[2] date from the same article, the following notes may be of interest.

The two papers in question are Leconte's "Descriptions of some new species of coleopterous insects inhabiting the United States", in the *Proceedings of the Boston Society of Natural History,* Volume I, page 201; and his "Descriptions of some new and interesting insects, inhabiting the United States", in the *Boston Journal of Natural History,* Volume V, No. 2, pages 203-209. Although having a different title, the first paper is in fact merely an abstract of the second, giving the preliminary diagnoses of the species, but not the fuller descriptions and references. The second article is accompanied by a fine plate (No. 18) illustrating the species, and opens with a diatribe against American entomologists who sent their new species to Europe for description.

The title page of Volume I of the *Proceedings of the Boston Society of Natural History* is dated 1844. However, at the bottom of page 201 there is a printer's signature:

[1] Contribution No. 2080, Division of Entomology, Science Service, Department of Agriculture, Ottawa, Ontario.

[2] Cicindelidae: *Cicindela audubonii* Leconte. Carabidae: *Calosoma triste* Lec., *C. lepidum* Lec., *Scarites patruelis* Lec., *S. affinis* Lec., *S. ephialtes* Lec., *S. intermedius* Lec. Dytiscidae: *Dytiscus marginicollis* Lec. Cerambycidae: *Lamia bellii* Lec. (= *Plectrodera scalator* Fab.).

"Proceedings B.S.N.H. 22 March, 1845," which indicates that the volume was not published in 1844. On page 200 there is a paper by Richard Soule, Jr., "giving an account of experiments on the juice of Cornstalk, made Sept. and Oct. 1844"; it seems unlikely that the volume was published between that time and the end of the year. Fortunately the *Proceedings of the Academy of Natural Sciences of Philadelphia* contain records of accessions to the Academy's Library; the second half of Volume I of the Boston *Proceedings* (page 129 to end), was noticed at the stated meeting on September 2, 1845. As the previous stated meeting was on August 19, 1845, we have a fairly good indication of the time when these pages were mailed.

The title page to Volume V of the *Boston Journal of Natural History* is dated 1847. In the minutes of the meeting of the Boston Society of Natural History on October 15, 1845, the following statement occurs: "Dr. Gould announced that a new number of the *Journal*, being the second this year, was ready for distribution". This gives us the approximate date of publication. Referring again to the *Proceedings* of The Philadelphia Academy, we find that in the minutes of the stated meeting on December 16, 1845, Volume 5, No. 2 (really a Part) of the *Boston Journal of Natural History* is listed among the donations to the library. In the minutes of a meeting on May 6, 1845, Volume 5, No. 1 is listed as received.

Thus it appears that the Lecontean species of beetles described in these papers must all be cited as of 1845, the actual date of publication of the abridged paper being not long before September 2. It is unfortunate that the second paper did not appear first, since it contains the full descriptions and their accompanying illustrations; however, we do know that it was published between October 15 and December 16, 1845.

Acknowledgment. It is a pleasure to mention the cordial help of Dr. Richard Dow, of the Boston Society of Natural History. He searched through the older journals not available to me, and provided information from which the above notes on dates of publication were made.

Current Entomological Literature

COMPILED BY L. S. MACKEY, R. G. SCHMIEDER, A. G. RICHARDS, JR. and JOHN W. H. REHN.

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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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.

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, Correio 1043, Buenos Aires, Rep. Argentina.

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., Birmngham, 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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus **Nomada,** any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

Arctic Lepidoptera especially **Noctuidae**—Wanted to hear from collectors who desire the Arctic Species. Have large collection. R. J. Fitch. Lloydminster, Saskatchewan, Canada.

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ENTOMOLOGICAL NEWS

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Wooden-Walled Ant Nests (Hymen.: Formicidae).

By Laurence J. Lafleur, New York City.

The author has developed a type of formicary which has several advantages over types hitherto described, and which is suitable for temporary or permanent nests and for both large and small species of ants. It differs from older-type nests principally in the use of plywood in its construction.

One difficulty in the construction of formicaries is to have the glass cover fit snugly on top of the walls so that the ants do not escape through the crevices. This consideration becomes paramount when dealing with very small species, which manage to squeeze themselves into surprisingly small interstices in their efforts to escape or explore. The simplest method of producing a perfect fit is that developed by Santschi and described by Wheeler, where plaster of Paris is poured along the lines where walls and partitions are to be on a pane of glass used as a base, and quickly covered with another piece of glass whose under surface has been oiled. As the upper pane is pressed down, the plaster spreads into an even contact between the two panes, forming walls of regular height but irregular width, and with uneven vertical surfaces. It is desirable to place between the panes small pieces of glass or other material which will hold the panes at the proper distance apart.

The Santschi nest has the advantages of quick and easy production and of cheapness, and is reliable for the temporary housing of small ants, but it has several defects. First, it is available only for the smaller ants, as the panes are not usually more than an eighth of an inch apart and often less. Second, the method of manufacture gives highly irregular vertical surfaces, and, in places at least, very thick walls. In a small nest, as this type necessarily is, these are not only unaesthetic but constitute an important waste of space. Third, if the plaster is quite liquid, the walls will be impossibly thick: if the plaster has considerable body when poured, it dries quickly and there is no time to make either a large nest or extensive subdivisions. Fourth, plaster cracks readily, and any attempt to alter the nest after the plaster starts to set is apt to end disastrously. Fifth, ants need a great deal of moisture, and if kept wet a small piece of plaster will disintegrate. Finally, plaster is a dirty material to work with, for the ants as well as for the myrmecologist, and there are serious difficulties in providing the ants with water uncontaminated with plaster. In consequence, the author prefers some other type of nest for all but the smallest ants, and even in their case considers some modification desirable.

A second way to attain fit is by the use of compressible materials for the walls. The Fielde nest and Wheeler's modification, where towelling is used, is the best example of this type of construction. It is a satisfactory nest for large ants—even elegant in some respects—but it is difficult and expensive to make, and unsuitable for medium and small species, since the latter can make their way through the interstices. Even large ants may escape if the towelling, sponge, cotton, or similar material is not perfectly fitted and of even thickness: even a slight imperfection may be fatal, since a glass top is not sufficiently heavy to do much leveling of irregularities. Finally, this type of nest gets dirty quickly, and entails considerable trouble in replacing the towelling.

The simplest and most suitable way of ensuring a good fit is to use a material which is commercially available in accurate thicknesses, and the author has had much success with plywood, although doubtless a plastic will eventually find its way onto the market that will be still better. A good quality of plywood is reasonably warp-proof, perfectly even in thickness, and easily cut with a jig-saw into any arrangement of outside walls and partitions of any desired complexity. These walls and partitions are made in one single piece, and a variety of wall-sets may be stacked together in very little space while awaiting service. Such nests are satisfactory for all large species, most medium-sized, and some small; depending in part on the size of the nest and quality of the plywood, and partly on the species itself. Only experience will show which species need special treatment, for size alone is not a reliable guide: *Nylanderia vividula,* for example, though only half the length of *Tetramorium guineensis,* will not go through cracks sufficient to allow the larger species to squeeze through. Where the fit of glass to plywood is not accurate enough for a given species, the glass may be sealed to the wood by the use of wax or some similar material. In this case, of course openings must be provided in the walls for the introduction of food and water.

Wall-sets are made in a few standard sizes, so that all wall-sets and glass panes are interchangeable. The author has made them in three sizes, about 8 by 12, 6 by 8, and 4 by 6 inches; and in three thicknesses, one-eighth, one-quarter, and three-eighths of an inch. For permanent nests it is desirable to select a thickness such that the ants in the nest can touch the glass cover above them; in this way they combine sufficient room with the attainment of a feeling of security in the ants which they seem to have when they recognize that they are covered: for field work the one-quarter thickness is preferable, since it is sufficiently thick to take any ant as a temporary measure, and not inconveniently thick for the smaller species. For temporary nests it is sufficient to place a suitable wall-set upon a glass or plywood base, and cover with glass. For permanent nests the wall-set is glued, nailed, or screwed to the base.

Except when the formicary is to be used on the stage of a compound microscope, the author prefers a wooden base; partly because it permits the use of nails and screws, partly because it gives a good footing to the ants when used without further covering, and partly because it permits the sinking of water and food containers into the base. Three-eighths inch plywood is used for the base, no matter what the wall-thickness may be. Either a glass or a plywood base may be covered with paper before being used, the color of the paper being chosen so as to provide a contrasting background for both the adult ants and the young of whatever species is to be kept in the nest, but the use of paper is rarely advantageous if the wooden base is used.

When one-quarter or three-eighth inch walls are used, they may be nailed in position or preferably screwed from the base side. The advantage in the use of screws is that they aid in preventing warping, and that they may readily be removed for the interchange of wall-sets or the replacement of the paper; which, in this case, is a single sheet inserted between the base and wall-set and held in place by the screws joining the two latter. With the one-eighth inch wall-set, or when the one-quarter is to be used for field work where very small ants may be collected, the formicary should be put together with glue instead of screws or nails, since the latter distort the upper surface of the wall-set sufficiently to permit very small ants to escape. A glue must be selected, such as casein for example, which will not soften when wet and which does not make use of an ether or acetone base, which, in the confined space of the formicary, gives off vapors sufficient to kill the ants, even after drying for as long as six months. Glue is necessary for the one-eighth inch nests, and it is also perfectly suitable for the larger ones.

Except when special arrangements are made, access to the interior of the nest is obtained by sliding the glass cover so that one edge or corner is exposed. Consequently, food and water receptacles should be located in the corners when possible, and otherwise along the sides. Metal or other water-tight receptacles may be used, or a receptacle may be hollowed out in the wooden base and waterproofed with wax or varnish. In any case it is preferable that the container be sunk into the wooden base of the nest. Chiseling out a section of the plywood is a very simple operation, and food and water are thus kept sanitarily isolated, and where they are not so apt to spill over onto adjoining parts of the nest. Furthermore, this operation enables more water to be kept in the nest, so that it need not be renewed too often. The water container is made fairly large, say two inches in diameter for an eight by twelve nest, and an eighth to a quarter of an inch in depth. It is sunk to be flush with the base, and is filled with cotton which is kept thoroughly wet. For very small nests smaller containers must be used, and they have to be filled more often—once a day or even twice a day instead of twice a week, depending upon atmospheric conditions. Food containers are similar to the water containers, except that they are much smaller, and may even be omitted altogether. There may be one or two in a nest, and they should be located some distance from the water container when possible. For a fully developed nest, the food and water may be at opposite corners, but in an incipient one, both must be near the section used by the queen.

Opening the nest to renew the food and water supply becomes a more difficult problem as the number of workers in the nest increases, and with species that become alarmed easily or are of persistently exploratory habits. In these cases, Janet's device may be borrowed, and the glass cover perforated with conveniently placed holes, each with its individual cover: or a larger pane with one hole may be prepared and slid into place over any part of any nest where access is desired. A second method has been devised for the nests of the General Biological Supply House, where pipettes or medicine droppers are inserted in holes in the wall. This ingenious device permits the water to be replenished from the dropper, which need not be itself removed more than once a week. Adaptations of this device to nests with walls of lesser height are possible. The third method is to use a porous material for some part of the nest. Janet used a heavy porous base, which was quite suitable even if somewhat cumbrous. Water was kept in a reservoir in one end, and the whole block remained moist. I have used a modification of this method by carrying a few fibres of cotton through a hole in the wall, which was then sealed with wax around the cotton. The cotton is allowed barely to protrude on the outside, and by touching water to this protruding part, all the cotton inside the nest may be kept as wet as is desired. The sole objection to this method is that it permits more evaporation from the exposed surface, and hence requires more frequent replenishment of the water, than do nests where all the moisture is protected on the inside. In all other ways, however, this method is the simplest and the best; and it is the only one suitable for nests to which the cover is sealed. Of course it is necessary that the wood be waterproofed wherever it may come in contact with the cotton.

The use of plywood for walls enables the partitions to be made thinner and more complex than in any type of nest previously described, and there is a real advantage in the use of complex subdivisions in a nest. In their natural nests, ants may have a few large halls, but always have a complex system of small chambers and connecting galleries; and while ants readily adjust themselves to abnormal conditions, normal circumstances should be preserved as far as is consistent with easy observation and care and with the particular experiment being conducted. Furthermore, complexity is useful in experiments and observations on many aspects of ant life and psychology, such as orientation within the nest, communication, and parasitism.

A few special adaptations of the nest may be mentioned. An inner cubicle, a *sanctum sanctorum,* is almost always selected by the queen for her own residence, and in larger nests it may be just as well to provide one. If the sides of the nests are made perfectly straight, the entrances of two nests may be placed together and communication between the nests is secured without further elaboration. A slip of paper between the nests then allows the communication to be shut off at will: this is particularly useful when experimental set-ups are devised where entrances and exits are to be controlled. If it is desired to allow the ants access to the world, but to prevent their migration, holes may be bored in the walls large enough for the workers but too small for the queen: a similar device will permit observations of the parasitism of *Solenopsis* on larger species. In experiments on affiliation, cloth or wire partitions may be used within the nest. It is also possible to arrange interior galleries which can be closed from the outside.

It is frequently convenient, especially with smaller nests, not to make very small panes, bases, and wall-sets, but to make a single wall-set serve for two nests. When working with queens alone, twelve or more compartments may be constructed in one piece, and this form of construction, with a sealed cover, will also be found very appropriate for field use.

And finally, the question of cost may be considered. While cheapness may not be the primary merit in an article of research, it is not negligible either, and the type of nest described in this article is cheaper than the Santschi nest, incomparably cheaper than any other type. At present prices, forty cents for glass and thirty for wood is sufficient to make four of the largest nests. Sixteen of the smallest can be built for sixty-five cents. The cost of glue or nails, and of varnish or wax, is negligible; and the only tools to which access is necessary are a jig-saw and chisel. With any sort of a work-shop available, dozens of these nests may be turned out in an afternoon.

Types vs. Types.*

By Curtis W. Sabrosky, Michigan State College, East Lansing, Mich.

The appearance in recent years of two compendia of the terminology of types[1] has called attention to the apparent complexity of this subject in the biological sciences. An excellent critique by Williams[2] pointed out the desirability of greater simplicity in referring to type material. Beyond this, a few further comments may be in order.

The large number of recorded terms (233 entries by Frizzell; 108 by Fernald, who included only terms applicable to

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* Journal Article No. 563 (n. s.) from the Michigan Agricultural Experiment Station.

[1] Frizzell, Amer. Midland Nat., 14: 637-668, 1933; Fernald, Annals Ent. Soc. Amer., 32: 689-702, 1939.

[2] Williams, Annals Ent. Soc. Amer., 33: 621-624, 1940.

individual specimens) is unnecessarily deceiving to the casual observer. Both lists contain many names (a) whose usefulness is confined to botany, ecology, genetics and general zoology, (b) whose special application in paleontology may perhaps be defended on the grounds of the particular condition of their type material, or (c) whose meaning is obviously the same (e. g., combinations like alloparatype, paraallotype and, parallotype, and endings of—type,—typ, and—typus). Eliminating expressions in the above categories, there remain comparatively few terms which appear essential to the taxonomic zoologist for the accurate recording of the basic material for each species.

The introduction of the question of priority into the matter of terminology appears to be an undue complication. Terminology is language, and language is preeminently a matter of usage and not of priority. If equally understandable, the more euphonious and the more widely disseminated word may be expected to prevail over the less so, even though the latter have chronological priority. The principle of priority in generic and specific nomenclature is quite another matter, being a considered plan for stability in the binominal surnames of organisms.

In particular, there appears to be no need for going far afield in establishing priority in terms. Why replace the simple word *homotype* with the more awkward *homocotype,* merely because the former is preoccupied elsewhere in biology? Indeed, the fact that there is another use for homotype need not preclude its usefulness for specialists in taxonomy, any more than the use of *genotype* in genetics should cause taxonomists to abandon their long established term in favor of generotype.

The published lists contain numerous examples of the extent to which the naming of original type material has been carried. Even more complicated are the various names revolving in the orbits of topotype and metatype. The possible combinations of these with the simple arrangement of holotype—allotype—paratype are numerous enough, without introducing further frills.

Lastly, one may question, with Williams, the value of proposing "type" names for soldier castes, worker castes, larvae, pupae, etc. After all, they can have no other scientific name than that of their species. There is already a type for the species (perhaps even a number of different kinds of "types"!). Adequate description and preservation of biological forms would seem to be sufficient without adding "type" names to the already overburdened terminology.

In spite of criticisms, such compendia are extremely useful as reference works, like dictionaries, even though they contain many superfluous terms. As reference works, it is to be regretted that neither is perfection in itself, though others will thereby be stimulated to be alert for omissions and corrections. No attempt has been made to check the literature in detail, but it may be appropriate to record here a few items which do not appear in either list.

1. *Allotype*—The type of the female sex, even if the only known specimen. Knowlton and Rowe: Annals Ent. Soc. Amer., Vol. 27, p. 582, 583, 1934.

2. *Diatype*—The type of a genus substituted for a homonym. Lindsey: Annals Ent. Soc. Amer., Vol. 18, p. 76, 1925.

3. *Gonotype*—All descendants of the type (and allotype) when these were bred. Sturtevant: Annals Ent. Soc. Amer., Vol. 9, p. 324, 1916.

4. *Metamorphotype*—"A comprehensive term for the specimen and its parts which serve as proof of an association of stages in the life cycle separated by a metamorphosis". M. J. Milne: Jour. N. Y. Ent. Soc., Vol. 46, p. 435, 1938.

5. *Paratopotype*—Used by Viereck: Proc. Ent. Soc. Wash., Vol. 11, p. 210, 211, 1909. (Antedates Alexander, 1916).

6. *Phototype*—Used by Pierce: Proc. Ent. Soc. Wash., Vol. 8, p. 61, 1906 (1907). (Antedates Kellerman, 1912).

7. *Sexitype*—Probably refers to the holotype and allotype together, as for example, "sexitypes in my collection". Blaisdell: Bul. U. S. Nat. Mus., vol. 63, p. 58 et al. 1909.

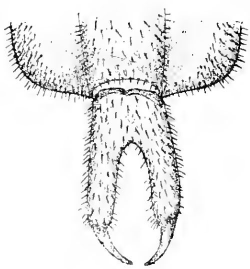
A New American Centiped of the Genus Scutigera (Chilopoda: Scutigeridae).

By Ralph V. Chamberlin, University of Utah.

The centiped described below is the third species of the genus *Scutigera* to be recorded from the United States. The other two species are the familiar "house centiped", *Scutigera coleoptrata* (Linne), more commonly known in this country as *Scutigera forceps* (Rafinesque), and *Scutigera lincesi* (Wood), described many years ago from Texas. The new species, from Arizona, differs obviously from the other two in the uniform coloration of the body, longitudinal stripes, so conspicuous in them, being wholly absent from *S. homa.*

Scutigera homa, new species.

Dorsum a light ferruginous yellow without trace of stripes or other markings. Venter pale, in part nearly white of a slightly greenish tinge. Legs also pale, the proximal joints of a faint greenish tinge, entirely without annuli or other markings. Antennae ferruginous yellow.



Scutigera homa, new species. Gonopods of female, ventral view.

First division of antennae consisting of 80 articles, of which all excepting those at ends are short and very short; second division consisting of about 165 articles; of a third division of which the apical portion is missing 20 articles remain.

First division of tarsus of leg I composed of 14 articles, the second division of near 36. In the second legs the first tarsal division has 13 articles, the second 32. In the third legs the first division of tarsus has 24 articles, the second 17. In the fourth the numbers of articles are 11 and 28 respectively. In the fifth, 9-14 and 29. In the sixth, 8 and 25. In the seventh, 9 and 27.

Stomata short, reaching caudal margin and projecting slightly into the caudal emargination. Caudal margin of last tergite emarginate.

The gonopods of the female as shown in the accompanying figure.

Length, 15 mm.

Locality.—ARIZONA: 22 miles southeast of Ajo. *Holotype*: One female taken by S. and D. Mulaik on Jan. 3, 1941, in the writer's collection.

Weevils (Coleoptera, Curculionidae) Affecting Chufa (Cyperus esculentus).

By A. F. SATTERTHWAIT,
Bureau of Entomology and Plant Quarantine, United States Department of Agriculture.

INTRODUCTION[1].

The present treatise on the weevils affecting chufa represents work incidental to the investigation of the weevils of the genus *Calendra* (*Sphenophorus*), agriculturally known as billbugs. It is not the result of the study of insects from the standpoint of chufa as an agricultural crop. However, as the chufa is a common host plant of several species of billbugs and probably the preferred host plant of *Calendra callosa* (Oliv.), of *C. venatus* (Say), and of *C. destructor* (Chitt.), this plant has been subjected to careful scrutiny in the Mississippi Valley and some of the Eastern States.

[1] The writer wishes to thank W. H. Larrimer and others in the Bureau of Entomology of the United States Department of Agriculture for the many routine favors rendered at the time these studies were being made, especially in securing determinations of insects affecting chufa. He wishes to thank Francis Pennell, of the Academy of Natural Sciences of Philadelphia, Pa., for the helpful information that *Cyperus esculentus* has a scaly underground root stock, upon which the root nut develops, and is thus readily distinguished from *C. strigosus*, which has neither root stock nor nut; also the Missouri Botanical Garden, particularly J. M. Greenman and John Kellog, and J. A. Drushel of New York University, for determining particular specimens. He wishes also to thank Margaret M. McDonough for able and sympathetic assistance in assembling data and Joe S. Wade for information concerning chufa insects from official records.

During 1931, calls for information concerning the control of insects affecting chufa were received from Henry Dietrich and J. P. Kislanko in the service of the State Plant Board of Mississippi; from Tom O'Neill, State entomologist, Atlanta, Georgia; and from J. M. Robinson, of the Alabama Polytechnic Institute, Auburn, Alabama.

BARINUS SQUAMOLINEATUS Casey.

Immature forms of this small weevil were collected about Lafayette, Indiana, August 12, 1916, incidental to the investigation of corn billbugs. Three stumps of *Cyperus esculentus* were planted in each of a series of 5-inch flowerpots for the purpose of rearing the destructive billbug (*Calendra destructor*). On October 4, the contents of a cage were sifted and an adult weevil, *Barinus squamolineatus* Casey as determined by L. L. Buchanan, was found under circumstances indicating that it had developed in a galled flower stalk. It may be that this species causes the same galling excavation of the stem as is produced by *Sibariops confusa*. Two immature forms of *B. squamolineatus* were taken at Medaryville, Indiana, August 16, 1916; one adult issued October 5 and another October 18, and both were determined by L. L. Buchanan.

BARINUS CURTICOLLIS Casey

A pupa of a little weevil was collected at the base of a chufa stalk at Morehouse, Missouri, September 23, 1918. The adult issued September 26, and was determined by L. L. Buchanan as *Barinus curticollis* Casey.

This species was reared also from *Cyperus erythrorhizos* Muhl., collected at Tallapoosa, October 17, 1918, in the pupal stage, with parasite larvae in cocoons; at Charleston, September 6, in the adult stage, and with parasite cocoons; and at Woodrow, August 20-21, 1919, all in Missouri.

SIBARIOPS CONFUSA (Boh.)

Eggs, larvae, pupae, and adults of small weevils, *Sibariops confusa* (Boh.), were found rather commonly in chufa. The larvae developing in the flower stalks make the stalks bulge considerably at the base, as if the stems were galled. This appearance is conspicuous and readily enables one to find the infestation. Specimens proving to be this species were taken on October 30, 1915, in *Cyperus esculentus* at West Lafayette, Indiana, observed as pupae on November 2, and yielded adults November 18; a specimen was also found at West Lafayette, July 14, 1916, presumably as a larva, ultimately yielding an adult of *S. confusa.*

The following collections were made in Missouri: At Anniston, September 8 and October 17, 1918, 3 adults in their larval excavations; at Charleston, presumably adult when collected, August 8, 1917, 4 larvae and 2 pupae, of which 1 larva became adult by September 14, and 1 pupa by August 14; at Charleston, 4 males and 5 females which issued July 12, 1918, another male which issued by July 26, and another by July 31; at Gray Ridge, August 23, 1918, 1 adult, 1 pupa, and some larvae, of which one larva became a pupa by August 30 and an adult on September 15, and from another collection on the same day 1 adult which issued by August 31—total, 4 males, 1 female; at Newburg, 6 adults which issued between September 20 and October 1, and 3 more adults which issued by October 8; at Ten Brook, 7 adults which issued by October 27, and 3 which issued by November 12; at Thayer, September 6, 1917, immature stages from which 1 female issued by September 27, 1 male and 2 females by October 8, and 1 female by February 20. All these were determined by L. L. Buchanan.

BARILEPIS GRISEA (Lec.)

Several larvae of the diminutive *Barilepis grisea* (Lec.) were received in crowns of chufa collected by Elmo Ragsdale, County Agent, Brunswick, Georgia, on October 6, 1931, and sent the writer by Tom O'Neill, State entomologist, Atlanta. Specimens were collected by the writer, in company with Henry Dietrich, Mississippi State Plant Board inspector, in a cultivated field near Lucedale, Miss., December 12, 1931.

There was no evidence of gall formation as a result of the work of any of these larvae. In each case the larva was in a hibernation cell in the crown of a chufa stalk. One of the Georgia larvae was placed in an individual cage on March 2. Pupation occurred between March 31 and April 4. The description of the *pupa* follows:

Length 3.69 mm., width 1.75 mm., pronotal width 1.31 mm. Rostrum reaching almost across anterior tibiae. Head with a pair of large setae some distance from base of rostrum but fairly in line with rostral setae, and 2 fine setae on sides between this pair of large setae and rostrum; a pair of setae of intermediate size at base of rostrum, 2 pairs of small setae between this pair and antennal fossae, and another pair of small setae about half way between fossae and apex of rostrum. Apex of rostrum concave above; antennal club touching fore femur.

Apices of wings, elytra, hind femora, and hind tarsi forming an almost straight transverse line across pupa, femora extending farthest caudad, tarsi next. Thoracic setae consisting of 4 anterolateral pronotals, 4 postlateral pronotals, 6 mediopronotals, 4 spiraculopronotals (above edge of disk near thoracic spiracle), 4 mesothoracic setae, and 4 metathoracic setae.

Setal tubercles of seventh tergite large, those next median line much larger than corresponding pair of eighth tergite, with bases larger than bases of those of ninth tergite. The dominant seta on each side of the ninth tergite is actually a heavily chitinized spine at the apex of the large fleshy tubercle which bears a secondary small seta. By April 15, the compound eyes appeared brown, the rest of the pupa white; by April 18, the compound eyes were black, the rest of the body white.

By April 21, the adult had issued. It was determined by Mr. L. L. Buchanan to be *Barilepis grisea* (Lec.).

On February 29 a larva was segregated from the mass collection from Mississippi and placed in an individual cage. It pupated between April 18 and 21. A description of the *pupa* follows:

♂. Length 3.63 mm., width 1.84 mm., pronotal width 1.39 mm. Rostrum long, reaching well beyond fore tibiae. Setal arrangement on rostrum as in the Georgia specimen except that there are 3 pairs between basal setae and antennal fossae.

Thoracic appendages forming a transverse line, as in the Georgia pupa. Thoracic setae arranged essentially as in the Georgia pupa.

Caudal setae about 6 on the seventh tergite, 2 on the eighth, and about 6 on the ninth, 2 of the last being large, coarse, and fleshy. By May 2, the compound eyes were pale brown, definitely darker by May 4, and black by May 5, when the tips of the mandibles were red.

The adult issued between May 6 and 7, making the duration of the pupal stage between 15 and 19 days.

In the *adult* stage the body is oblong, suboval, densely clothed with large scales above and beneath, the beak rather short and arcuate. The antennae are somewhat short, with a relatively large, short, and ovate 4-jointed club, which is as long as the preceding 6 joints of the funicle; the first funicular joint is barely as long as the next 4; the anterior coxae are separated by more than their own width; the prosternum is flat, unarmed in the male; the scutellum is quadrate, narrow, and nude.

The specimen described had a length of 3 mm. and a width of 1.35 mm. Its general color above was piceous, with rufous legs, the scales being almost white.

Two *eggs* were obtained July 20, 1932, from parents reared from larvae from the mass collection from Mississippi. A few eggs were laid later, but one of the first two eggs yielded an adult May 16, 1933. This egg was laid at the edge of the membranous part of the leaf sheaf. It was 0.67 mm. in length and 0.25 in width or thickness. A tuber was cut in halves, the egg placed in a niche in one, and the halves bound together with paper and laid in a 2-ounce tin cage with damp soil. It hatched by 7:50 P. M., July 25, the time required for incubation of eggs of this species probably being about 7 days.

At the time of hatching the *larva* was about 1 mm. in length and its head width 0.9 mm. It was left in the tuber in which it hatched until August 6, when it was placed in a fresh tuber. Six hours later it was found that the larva was not feeding in the root nut, whereupon it was placed in a leaf-base cup in a growing chufa plant in a 25 by 100 mm. vial. This plant was growing from a tuber planted in a little soil in the box. Between 3 and 4 hours later the larva fell from the leaf sheath to the soil and disappeared. On August 8, it was found inside a decapitated crown not showing at the surface of the soil at the time the larva was placed on the plant. At this time the larval head width was 0.25 mm. The larva was placed in a 9 by 35 mm. vial containing a chufa tuber pared down to fit the vial. This little vial was then placed in the larger vial with the growing chufa plant. On August 10 and subsequently the larva was observed through the glass in its excavation in the tuber. On April 25, 1933, it was obviously in the prepupal stage and by April 29 it was a pupa.

The duration of the larval stage was between 276 and 280 days. As the adult issued May 16, the duration of the pupal stage was between 16 and 19 days. The period from oviposition to the issuance of the adult covered between 299 and 304 days.

(To be continued.)

A New Genus and Species of Coleoptera (Chrysomelidae) from Southwestern United States.

By Burdette E. White, Merced, California.

On a recent collecting trip into the desert region of Southern California, the writer discovered a tiny species of Chrysomelidae (Subfamily Galerucinae) apparently feeding on some part of the blossoms of a species of *Rhus* (Sumac). Having a certain familiarity with this coleopterous family, and not recognizing one of our described species in this diminutive form, he directed considerable energy in its pursuit that resulted in the capture of twenty-eight specimens. Subsequent study proved this insect to represent a new species and a new genus, which in the opinion of the author, must constitute a new tribe —Serraticollini—and is tentatively placed preceding the tribe Luperini. During the course of study germane to this problem, the writer found six specimens strikingly similar to the above beetles among some material received for identification from F. H. Parker of Globe, Arizona. Careful comparison of the California and Arizona specimens show that they are abundantly distinct. It would seem peculiar that two species of such an unique character should be unknown to science; however, they are early season forms, probably depending on the blossoms of their host for their livelihood, a fact which may have contributed to their previous obscurity.

The writer wishes to express his sincere appreciation for assistance received from Mr. J. J. du Bois of Turlock, California, Mr. F. H. Parker of Globe, Arizona, and Dr. E. Gorton Linsley of the University of California at Berkeley.

SERRATICOLLIS new genus.

Elongate, parallel, sparsely pubescent above and beneath. Head four-fifths as wide as greatest width of pronotum, eyes broadly oval, front not carinate between the antennal insertions; antennae feebly clavate, attaining the basal third of elytra; segments subequal in length, 8th, 9th, and 10th segments perceptibly shorter; the ultimate segment a little longer, the apical five segments noticeably but not strongly tumescent, the apical segment fusiform. Pronotum slightly longer than wide in

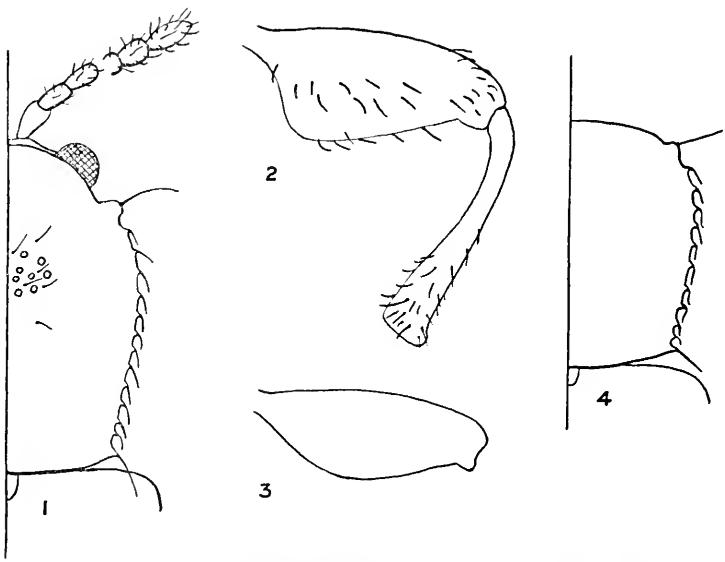


Fig. 1. Pronotum of *Serraticollis rhois* n. sp. (♂); Fig. 2, Mesothoracic femur of *S. rhois* (♂); Fig. 3, same for *S. parkeri*, n. sp.; Fig. 4, Pronotum of *S. rhois* (♀).

male, quadrate or feebly transverse in female; narrowest at base, gradually widening to apical third and then gradually narrowing to apex; apical angles forming prominent, blunt denticles, basal angles with smaller acute teeth; base margined, a transverse impression near base producing a moderate transverse ridge between basal and ante-basal impressions; lateral margins finely serrate; apex rounded, anterior margin obscure; in the male the apex is moderately, arcuately produced over the vertex of the head. Elytra elongate, parallel-sided; epipleura nearly vertical, reaching to apex; surface coarsely punctate, the punctures arranged in closely approximate striae producing relatively narrow intervals, the intervals with a row of minute setigerous punctures, the setae arranged in a row, one seta in width alternating with the primary striae. Anterior coxal cavities closed behind, coxae realtively widely separated by prosternum. Femora all subequally tumid, tibae curved and more slender near base, all tibae unarmed; first and second tarsal segments subequal on all legs; claws appendiculate, divergent.

Genotype: *Serraticollis rhois* n. sp.

To compare *Serraticollis* with any known North American genus would only lead to confusion. It apparently has no close relative in our fauna. In fact, it appears out of place in the subfamily Galerucinae and seems to be as closely related to Sagrinae and Orsodacninae. Later studies including all the Chrysomelid genera may result in changing the position of *Serraticollis* possibly to another subfamily; but the margined pronotum places it for the present in Galerucinae. In Bradley's "Key To The Genera Of N. A. Beetles", 1930, *Serraticollis* would key out to the tribe Monoleptini on the basis of the closed anterior coxal cavities. Its affinities with this tribe, other than the coxal character, are extremely remote and the proposed new tribe would appear to be amply justified. The sexes are definitely dimorphic as regards the structure of the pronotum.

Serraticollis rhois new species.

Size small, elongate, parallel, rufotestaceous; antennae, legs, and sometimes pronotum slightly lighter; pronotum sparsely covered with coarse punctures at base, more densely punctate near apex, with a secondary system of fine, setigerous punctures. Average length, 2.25 mm.

♂ : Head rufotestaceous, darker on the vertex, sparsely punctate with small setigerous punctures, vertex strongly alutaceous; antennal sockets approximate, separated by half the length of first antennal segment; a small, median, circular impression lies just above and between the sockets; clypeus broadly rounded across apical margin. Antennae extending to basal third of elytra, moderately clavate, rather densely clothed with whitish setae except basal segment which is noticeably less setigerous.

Pronotum coarsely sparsely punctate on disc, more densely so near apex, smaller setigerous punctures sparsely placed among the primary punctures, the setae moderately long, fine and closely appressed; ante-basal impression strongly developed; margin minutely serrate, the denticles each bearing a seta, the seta of the four angular denticles relatively long; the apical margin of pronotum produced as a hood which does not contact the head beneath but forms a shallow cavity with the apex of pronotum as a roof; the side margins are subparallel with the greatest width at apical third. Scutellum flat, faintly alutaceous with a few minute setigerous punctures; broadly rounded apically.

Elytra elongate, parallel, rufotestaceous; surface slightly depressed near basal fourth, humeri well developed; surface with relatively coarse punctures arranged in ten well defined, even, closely placed striae and a short scutellar stria on each elytron, the seventh also short, not reaching near base; the intervals with a single row of minute setigerous punctures, the setae whitish, long and directed caudad, forming even rows one seta wide, these rows alternating with the coarsely punctured striae.

Body beneath fuscous, the prothorax and legs rufotestaceous, meso-thoracic, meta-thoracic, and abdominal sternites alutaceous, sparsely covered with minute setigerous punctures; prosternum smooth and shining at least over apical half; middle femora strongly, abruptly constricted on lower margin near base; last ventral segment with a crescentiform genital orifice near apex. Length 2.35 mm.; width, .9 mm.

♀ : Differs noticeably from male in structure of pronotum and genital orifice. The pronotum of female is not produced to form the hood as in male, but is subquadrate; the middle femora are not strongly constricted at base; the last ventral segment of the female is entire, feebly constricted approaching apex. Length, 2.75 mm.; width, 1.2 mm.

Holotype male, *allotype* female, captured six miles west of Beaumont, Riverside County, CALIFORNIA (Main road from Riverside to Beaumont), IV-5-1941, from flowers of *Rhus* sp., by the author in whose collection they are deposited. Twenty-six paratypes (16 ♀, 10 ♂) with same data are deposited as follows: One pair each in collections of The Academy of Natural Sciences of Philadelphia, C. A. Frost, California Academy of Sciences, and R. G. Dahl; one female each in the collections of Mr. J. J. du Bois, Mr. K. S. Hagen, Mr. W. F. Barr, Mr. Borys Malkin and Dr. W. J. Brown; the balance remain in the writer's collection.

In the series of twenty-eight specimens there appears to be very little variation other than size and the normal sexual differences. The structure of the pronotum, middle femora, and last ventral segment greatly facilitate sex determination. The types represent close to the maximum of size which ranges from 2 mm. to 2.75 mm. The males average slightly larger than the females. This species is one of the smallest North American members of the Galerucinae known to the writer and can be easily identified from the generic and specific descriptions. Figures of the salient characters of this species as well as the following one are included to enhance speedy determination.

Serraticollis parkeri new species.

Size, form, and color of S. *rhois;* pronotum less elongate and less arcuate in male, transverse in female; middle femora of male evenly, gradually tapering to base; elytral intervals not convex. Average length, 2 mm.

♂ : Head feebly punctate, vertex alutaceous, a few relatively long setae between upper limits of eyes; antennae reaching near basal third of elytra, segments subequal in length, outer segments slightly tumesent to form a feeble club.

Pronotum rufous, one-fourth longer than wide, widest at apical two-fifths; surface sparsely punctate on disc, more densely and coarsely punctate at apex; ante-basal, transverse impression well developed; lateral margins finely serrate; the apical angles produced to form a prominent, blunt denticle; apical margin feebly arcuate, finely margined; surface sparsely, finely pubescent.

Elytra rufotestaceous; punctures moderate sized, striately arranged, the intervals flat with minute setigerous punctures, the setae directed caudad but obliquely so; apex truncate.

Body beneath alutaceous and rufotestaceous in great part, the anterior and lateral surface of prothoracic sclerites smooth and paler—rufous; surface sparsely, finely punctate, finely pubescent; last ventral segment with crescentiform genital orifice near apex; legs rufous; the mesothoracic femora evenly, gradually constricted to base. Length, 2 mm.; width, 0.8 mm.

♀ : Similar to male but with pronotum slightly wider than long; last ventral segment feebly constricted to apex, with genital orifice at apex. Length, 2 mm., width, 0.8 mm.

Holotype male, *allotype* female, collected at Globe, Arizona, IV-25-1933, on *Rhus,* by Mr. F. H. Parker are in the author's collection. Four paratypes (3 ♂, 1 ♀) with same data are in the collection of Mr. Parker in whose honor the species is named.

There seems to be no appreciable variation among the six specimens at hand other than the normal sex differences.

Parkeri superficially resembles *rhois* but is much more feebly sexually dimorphic. The greatest differences are present in the males. The differences in the structure of the pronotum (more strongly produced and arcuate apically in *rhois*) and the meso-thoracic femora (strongly constricted on lower edge near base in *rhois*) will readily separate the two species. However, the elytral punctures are coarser in *rhois* which condition makes the intervals more convex than in *parkeri.* The elytral setae in the former are longer and parallel to striae where in the latter they are externally oblique to the striae. The females seem to be more coarsely sculptured and with pronotum a bit less transverse in *rhois.* Otherwise they are quite similar in the two forms.

OBITUARY

Prof. J. J. Davis contributes to *Science* for November 28, 1941, an obituary notice of Prof. James Troop, emeritus professor of entomology at Purdue University since 1920. Prof. Troop was born at Bennington, New York, March 14, 1853, and died at Urbana, Illinois, October 14, 1941. He became connected with Purdue in 1884, and was active in teaching and horticulture.

The Corn Lanternfly in New Jersey (Homopt.: Fulgoridae).

Those who have observed serious outbreaks of the corn lanternfly (*Peregrinus maidis* (Ashmead)) in the Southern States cannot but have been impressed by its capacity for very serious injury to growing corn, which may even result in complete destruction of a crop. An instance was observed by the senior author in the Lake Okeechobee region of Florida in February and March, 1937, when scarcely a usable ear of corn was harvested because of injury of the growing plants by this insect. Fortunately *Peregrinus* rarely invades the Northern States and, consequently, records of outbreaks in the North are of considerable interest.

During the summer of 1939, this insect was present in New Jersey, where no previous records of its occurrence were known. Infestations were general and of light or medium severity during August and September. By late fall populations of considerable size were observed in late sweet corn. It was particularly abundant in a field of Golden Cross Bantam sweet corn at Rancocas, observed on September 17. As usual, it fed in colonies located largely in protected positions such as in the bud of younger plants and between the ear and the stalk or between the leaves and the stalk of older plants. At the mentioned date infestation was sufficient to cause the hands of one harvesting corn ears to become covered with honeydew. However, in no instance was the infestation sufficient to cause serious injury to the plants other than possibly slight stunting.

In 1940, *Peregrinus* was observed only once, in a locality about 2 miles east of Old Bridge, New Jersey, attacking plants of late Golden Cross Bantam corn.

It is of interest to note that the first recorded invasion of *Peregrinus* in New Jersey, in 1939, coincided with one of the most serious infestations by *Laphygma frugiperda* S. & A. so far recorded in corn in the Northeast. It seems probable that the circumstances that resulted in the unusual invasion of the latter insect were also those that resulted in the invasion by *Peregrinus*.—G. W. Barber, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, and Bailey B. Pepper, New Jersey Agricultural Experiment Station.

Sponge Rubber: Its Use in Shipping Containers.

When shipping insects mounted on pins or on card points attached to pins, it is necessary to firmly fix each pin in the bottom board of the shipping container. Subsequent removal of the firmly imbedded pins is frequently difficult especially when the specimens are numerous and crowded. Forceps employed in the operation must be attached at the base of the pin, and this placement is often hazardous with crowded specimens. Sponge rubber (the type used in kneeling pads) substituted for the usual pinning base has been found to eliminate these difficulties. Specimens firmly fastened in this material can be removed without the aid of forceps or if the latter are employed they can be attached on the upper portion of the pin. Danger of injury to any of the specimens is lessened, and at the same time the speed of transference is greatly increased. In all respects sponge rubber appears superior to other pinning media.

In addition to its use in shipping containers, the material may also be employed in the temporary pinning of insects for study. In some instances insect boxes may be lined with sponge rubber. The ease with which insect pins may be inserted in or removed from the rubber makes it an excellent pinning base. It is durable; samples giving satisfactory results after four years of use.

No claim for originality in this use of sponge rubber is made; the writer has found the material so satisfactory for use in shipping containers that it was felt a note on the subject might possibly be of value to those concerned with specimen transportation. The rubber may be purchased at any general store at a nominal price.—H. F. Schoof, N. C. State College, Raleigh, North Carolina.

Instituto Español de Entomologia.

Herewith we have the honor to communicate to you the foundation of the Instituto Español de Entomologia in Madrid, which now contains the former Section of Entomology of the Museo Nacional de Ciencias Naturales with all the collections, library and publications that the Section mentioned formerly possessed. Please direct your correspondence and exchange of publication to the new Institute Palacio del Hipódromo, Madrid. The Institute hopes to continue the best relations with you as formerly for the advantage of both.—The Director, Gonzalo Ceballos y Fernandez de Cordoba.

Madrid, May, 1941.

Livia marginata Patch attended by Ants (Homoptera: Chermidae; Hymen.: Formicidae).

During the last week of August, 1939, in Lakeville, Connecticut, I observed workers of the ant *Formica pallide-fulva nitidiventris var. fuscata* Emory upon the stem of a tall species of goldenrod (*Solidago* sp?).

Upon closer examination, the ants proved to be attending nymphal Chermids, apparently in the final instar. These were to be found in herds on the under sides of the leaves, with a few individuals ranged along the stem. These young Chermids reached the imago stage (in a breeding cage) during the first week of September. They proved to be *Livia marginata* Patch.

The nymphs evidently secreted large quantities of honey-dew as the gaster of the attendant ants was quite distended.—ALBRO TILTON GAUL, Brooklyn, New York.

On the Relationship between the Moth, Camptylochila americalis Gn. and Formica rufa obscuripes Forel (Lepid.: Noctuidae; Hymen.: Formicidae.).

Recently, F. Smith (1941 Entomological News: 109) reported finding the lepidopterous larva, *Camptylochila* (*Epizeuxis*) *americalis* Gn. in the mounds of *Formica rufa obscuripes* Forel, and the writer is able to confirm this observation. The writer reported (1929 Proc. Entomological Soc. of British Columbia 26: 44-46) how he found the lepidopterous larvae which subsequently to that publication were identified for him. The writer is able, further, to add some information on the relation between *C. americalis* in the adult stage and the ants for he has frequently, at sundown, seen moths which were apparently of that species enter the mounds. The moths dropped freely to some entrance hole in the mound, closed their wings and walked in apparently without any attention from the ants. Similar tolerance on the part of the ants to moths, which were newly emerged, was not observed by F. Smith.—GEOFFREY BEALL, Dominion Entomological Laboratory, Chatham, Ontario.

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.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bolletino 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.
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.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
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.
55. Pan-Pacific Entomologist. San Francisco, Cal.
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.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
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.
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.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
87. Archiv für Entwicklungsmechanik 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, Chicontimi, Quebec.
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.
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.
117. Microentomology, Stanford University.
118. Ward's Ent. & Nat. Sci. Bull., Rochester, N. Y.
119. American Midland Naturalist, Notre Dame, Ind.
120. The Great Basin Naturalist, Provo, Utah.
121. Ciencia, Mexico City.
122. Revista Museo de la Plata, Buenos Aires.
123. Indian Journal of Entomology, New Delhi.

Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF.

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.—Carter, W.—Insects and the spread of plant diseases. [Smithson. Report 1940] Publ. 3619: 329-342, ill. **Chermock & O'Brien.**—A new method of sectioning chitin. [Pro. Penna. Acad. Sci.] 15: 59-60. **DeBach, P.** and **H. S. Smith.**—Are population oscillations inherent in the host-parasite relation. [84] 22: 363-369. **DeLeon, D.**—Notes on some forest insects found in Pinus occidentalis Swartz near Jarabacoa, Dominican Republic. [Carribean Forester] 3: 42-45. **Derickson, C.**—Study of climatic differences for one degree of latitude in Pennsylvania. [Pro. Penna. Acad. Sci.] 15: 131-133, ill. **Fantham, Porter & Richardson.**—Some microsporidia found in certain fishes and insects in eastern Canada. [116] 33: 186-208, ill. **Hoyt, Fracker & Colcord.**—Lee Abram Strong. [10] 43: 156-166, ill. **Raymond, P. E.**—Insects: the first aviators. [Prehistoric Life] 1939: 200-208, ill. **Salt, G.**—The effects of hosts upon their insect parasites. [Biol. Reviews] 16: 239-264, ill. **Simpson, G. G.**—Range as a zoological character [Amer. Jour. Sci.] 239: 785-804. **Soraci, F. A.**—Important nursery insects of New Jersey. [N. J. Dept. Agric.] Circ. 326: 72 pp., ill. **de Souza Lopes, H.**—Relacao do material entomologico capturado. [111] 35: 641-696, ill. **Thompson, W. R.**—The war against insects. [Pro. Ry. Canadian Inst.] 6: 53-54. **Travassos, L.**—Relatorio da terceira excursao a zona da Estrada de Ferro Noroeste do Brasil realizada em Fevereiro e Marco de 1940. [111] 35: 607-641, ill. **Travassos & Teixeira de Freitas.**—Relatorio da excursao cientifica realisada na zona da Estrada de Ferro Noroeste do Brasil em Julho de 1939. [111] 35: 525-556, ill. **van der Veen, R.**—Enkele schimmelvretende insecten. [De Trop. Nat.] 30: 140-143, ill.

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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—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, Correio 1043, Buenos Aires, Rep. Argentina.

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., Birmngham, 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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

Arctic Lepidoptera especially **Noctuidae**—Wanted to hear from collectors who desire the Arctic Species. Have large collection. R. J. Fitch. Lloydminster, Saskatchewan, Canada.

Subscriptions for 1942 are now due

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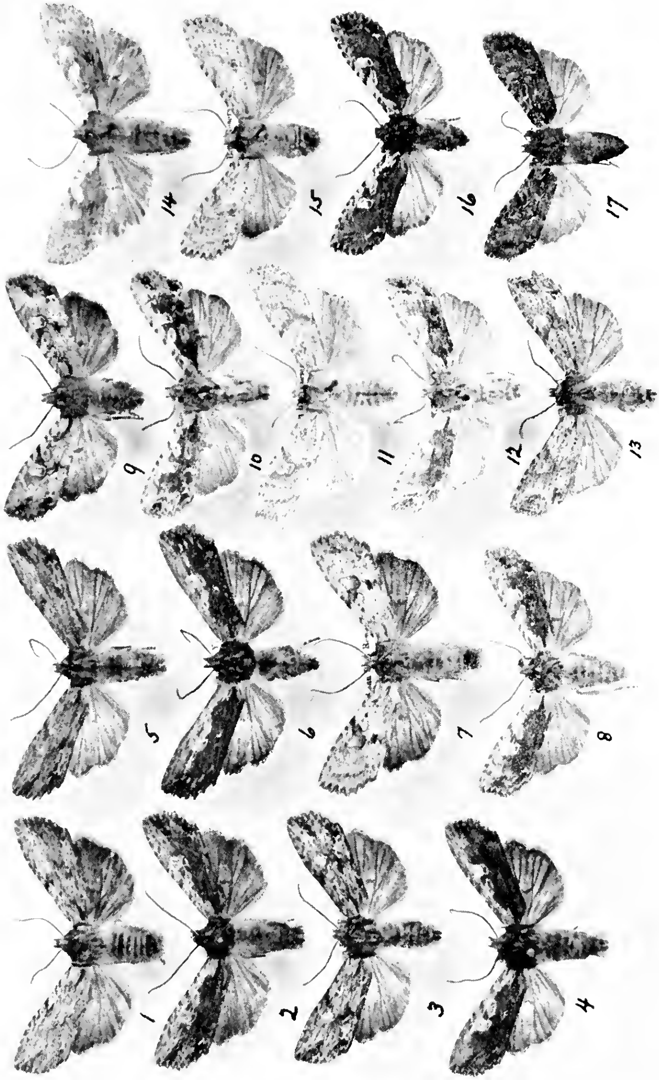

CUCULLINAE—Franclemont.

ENTOMOLOGICAL NEWS

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Notes on Some Cucullinae (Phalaenidae, Lepidoptera) II.

On the Identity of Lithophane ferrealis Grote and Xylina innominata Smith, with Descriptions of Some New Forms of the Genus Lithophane[1] Hübner.

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

(Plate I.)

LITHOPHANE PETULCA form FERREALIS Grote (Pl. I, fig. 2). *Lithophane ferrealis* Grote, 6th Ann. Rept. Peab. Acad. Sci., 32, 1874.

This form has troubled everyone who has attempted to work on the species of the genus *Lithophane* (*Graptolitha*, ‡*Xylina*). I think that one reason has been that no one, in all probability, has had a really 'pure' series of this form, as the same color form occurs in six other species, not including *oriunda*, and there can be no doubt that this has helped to create some of the confusion which seems to have always surrounded this form. There has also always existed the doubt as to the validity of this form as a species, but no one seems to have been able to decide to which species this form should fall. As

[1] *Lithophane* was proposed by Hübner, Verz. bek. Schmett., 242, 1821; *Graptolitha* follows immediately on the same page. Grote, considering *Graptolitha* a subgenus of *Lithophane*, designated the types of both names in the Sixth Annual Report of the Trustees of the Peabody Academy of Science, 1874, on pages 31 and 34 respectively; choosing as the type of *Lithophane*, *Noctua socia* Rott. (*petrificata* D. & S.), a species very closely allied to *amanda Smith*, in fact the latter species may prove to be but a geographical race of the former; and as type of *Graptolitha*, *Noctua furcifera* Hufn. (*conformis* D. & S.), a very close ally of *pexata* Grote. Hampson's (Cat. Lep. Phal. B. M., vi, 243 and 246, 1906) division of the species he includes in *Lithophane* and *Graptolitha* is purely artificial, in fact the characters of differentiation employed are non-existent! It is proposed here to use *Lithophane* for all the species included in both this genus and *Graptolitha* by Hampson; as a result *Lithophane* will replace *Graptolitha of McDunnough's* 1938-39 Checklist, page 83.

a result the name has stood on American lists as a valid species, and this is in part traceable to mixed series.

True *ferrealis* is the suffused form of *petulca* Grote. The fore wings have the costa, reniform and orbicular ashen with a slight bluish cast; the remainder of the wing is reddish, ferruginous black. The hind wings are blackish fuscous, with the fringes ruddy. The abdomen has the lateral and anal tufts ruddy.

This form is correctly figured by Smith, Trans. Am. Ent. Soc., xxvii, pl. III, figs. 11 & 12; normal *petulca* (‡*signosa* Smith) is figured on the same plate, figure 13, also figure 4 as "*disposita*—a little suffused."

Specimens examined: 57 from New Jersey, Pennsylvania, New York, Massachusetts and Maine; Ontario and Manitoba, Canada.

LITHOPHANE HEMINA form **lignicosta** form. nov. (Pl. I, fig. 4).

The costa, orbicular and reniform of the fore wing are wood brown; the remainder of the wing is vinous black to blackish brown; the ordinary markings where visible are as in normal *hemina*.

This form differs from *ferrealis* in its generally darker color, especially that of the costa, orbicular and reniform; it also lacks the warm reddish tints of that form. The fringe of the hind wings is dark brown, not ruddy; the lateral and anal tufts of the abdomen are aslo brown.

Holotype: ♂, Ithaca, NEW YORK, Sept. 29, 1940 (J. G. Franclemont), [in Coll. Franclemont].

Allotype: ♀, Ithaca, New York, Sept. 29, 1940 (J. G. Franclemont), [in Coll. Franclemont].

Paratypes: 97 ♂ ♂, 74 ♀ ♀ Ithaca, New York, Sept-April (J. G. Franclemont); 35 ♂ ♂, 49 ♀ ♀, McLean Bogs Reserve, Tompkins County, New York, Sept.—March (J. G. Franclemont); 3 ♂ ♂, 2 ♀ ♀, Chaffee, New York, September (J. G. Franclemont); [all in coll. Franclemont]. 8 ♂ ♂, 9 ♀ ♀, Horseheads, New York, October-April (L. R. Rupert), [15 in coll. Rupert, 2 in coll. Franclemont]. 1 ♂, 2 ♀ ♀, Lambs Creek, PENNSYLVANIA (L. R. Rupert), [in Coll. Rupert]. 1 ♂, Ottawa, ONTARIO, Canada, Sept. 11, 1905 (C. H. Young);

2 ♂ ♂, 1 ♀, Lobe, Ontario, Canada, Oct. 2, 1924 (A. A. Wood), [in Coll. Canadian National Museum]. 1 ♂, 2 ♀ ♀, Bear Mt., New York (H. J. Erb); 1 ♂, 1 ♀, Lakehurst, New Jersey (F. Lemmer); 2 ♀ ♀, Pennsylvania (Merrick), [in Coll. Buchholz].

Lithophane signosa form **pallidicosta** form. nov. (Pl: I, fig. 6).

The costa, orbicular and reniform of the fore wing are grayish with some brown streaking; the remainder of the wing is blackish brown. This form agrees with normal *signosa* Walker in its streaked appearance; except in very intensely suffused specimens, the normal pattern is evident.

This form differs from *ferrealis* and *lignicosta* in its longer and narrower wings, and in its more streaked pattern. The wing shape will separate both the normal and suffused forms from the corresponding forms of *petulca* and *hemina*. The costa, orbicular and reniform are distinctly darker than *ferrealis*, and the suffused area is darker also, lacking the warm red tints of *ferrealis*.

Holotype: ♂, Ithaca, New York, Sept. 27, 1940 (J. G. Franclemont), [in Coll. Franclemont].

Allotype: ♀, Ithaca, New York, Oct. 2, 1940 (J. G. Franclemont), [in Coll. Franclemont].

Paratypes: 23 ♂ ♂, 18 ♀ ♀, Ithaca, New York, Sept.-April (J. G. Franclemont), [in Coll. Franclemont]. 14 ♂'s & ♀'s, Bristol, Rhode Island, Sept.-May (Howard L. Clarke), [10 in Coll. Bost. Soc. Nat. Hist., 2 in Coll. U. S. N. M., 2 in Coll. Franclemont]. 1 ♀, Randolph, Vermont, September, [in Coll. Bost. Soc. Nat. Hist.]. 1 ♀, Lafayette, Indiana, Sept. 1, 1916 (H. J. Hart), [in Coll. U. S. N. M.]. 1 ♂, Nantucket Island, Massachusetts, Oct. (C. P. Kimball), [in Coll. Kimball]. 2 ♂ ♂, 3 ♀ ♀, New Jersey [in Coll. Buchholz].

I wish to thank Dr. Richard Dow of the Boston Society of Natural History for the loan of the material referred to above from that Institution.

Lithophane patefacta form **niveocosta** form. nov. (Pl. I, fig. 8).

The costa, reniform and orbicular of the fore wing clay white; the remainder of the wing vinous brown; the ordinary markings of the normal form are present and discernible.

This form is very similar to *ferrealis*, but differs in the slightly less reddish hue of the suffused area and in the more yellowish hue of the costa, reniform and orbicular, that of *ferrealis* being somewhat ashy-gray in hue.

Holotype: ♂, Ithaca, NEW YORK, Sept. 6, 1940 (J. G. Franclemont), [in Coll. Franclemont].

Allotype: ♀, Lakehurst, NEW JERSEY, October 10 (Frederick Lemmer), [in Coll. Franclemont].

Paratypes: 26 ♂ ♂, 25 ♀ ♀, Lakehurst, New Jersey, Oct.-March (Frederick Lemmer), [20 in Coll. Lemmer, 19 in Coll. Franclemont, 7 in Coll. Buchholz, 3 in Coll. U. S. N. M., 2 in Coll. Cornell Univ.].

I wish to express my sincere thanks to the late Mr. Frederick Lemmer for his most generous loan of the material of this form.

LITHOPHANE DISPOSITA form **argillocosta** form. nov. (Pl. I, fig. 10).

Fore wing with the costa, reniform, orbicular and a subterminal shade luteous gray; the remainder of the wing suffused with blackish sepia. The ordinary markings visible, and as in normal *disposita*.

This form differs from all the rest in its very distinctly outlined reniform and orbicular, in this respect resembling *oriunda*. It has none of the brown or red shades of *ferrealis* and the foregoing new forms.

This is the form figured as "*hemina* Grt.—melanic" by Smith, Trans. Am. Ent. Soc., xxvii, pl. III, fig. 2. As a means of explanation, it might be well to say, that the *hemina* of the Smith collection were hibernated specimens of *disposita*, thus in the light of this information, Smith's statement is understandable.

Holotype: ♂, MANITOBA, Canada, Sept. 13, 1905 (ex. Coll. Buchholz), [in Coll. Franclemont].

Allotype: ♀ Cartwright, Manitoba, Canada (ex. Coll. Buchholz), [in Coll. Franclemont].

Paratype: 1 ♂, Miniota, Manitoba, Canada, Sept. 13, 1905; 1 ♀, Manitoba, Canada, Sept. 13, 1905; [in Coll. Buchholz]. 1 ♀ Aweme, Manitoba, Canada, Sept. 4, 1922 (N. Criddle); 1 ♀ Lobe, ONTARIO, Canada, Oct. 18, 1924 (A. A. Wood);

[in Coll. Canadian National Museum].

LITHOPHANE BETHUNEI form **luteocosta** form. nov. (Pl. I, fig. 12).

Forewing with the costa, reniform, orbicular and a subterminal shade white with a slight luteous cast; the remainder of the wing dusky black. The ordinary markings evident and as in the normal form of this species.

This form closely resembles *niveocosta* and *ferrealis* in its light costa, but differs from these two forms in lacking all the warm reddish shades of these two forms.

Holotype: ♂ Lobe, ONTARIO, Canada, Sept. 23, 1924 (A. A. Wood), [in Coll. Canadian National Museum.]

This form was most generously loaned to me for description by Dr. J. H. McDunnough, and I wish to thank him for this kindness.

LITHOPHANE BETHUNEI form **duscalis** form. nov. (Pl. I, fig. 13).

The fore wing deep olive umber brown, slightly irrorate with gray; the ordinary markings as in bethunei proper; the reniform outlined by reddish russet; orbicular oblique, inconspicuous; the subterminal line an irregular series of pale spots with an irregular reddish russet shade on their inner side; the terminal area with a blackish shade below the costa and another at the anal angle, these bordered on their inner side by the subterminal line; the antemedial line indicated on its inner side by a double series of black dots on the veins, the postmedial by a similar series on its outer side; median shade irregular and diffuse, enveloping the reniform. The hind wing dusky black; the fringe pale russet contrasting with the rest of the wing.

This form resembles both *petulca* and *hemina*, but perhaps the former more than the latter; it is somewhat lighter than *hemina*, being of the general tone of *petulca*, but lacking the evident ashy-blue overcast of that species. One of the most outstanding features of this form is an oval spot of light grayish brown, just above the inner margin and between the postmedial and subterminal lines; this stands out very markedly and is not possessed by either *petulca* or *hemina*.

Holotype: ♂, Ithaca, NEW YORK, Sept. 27, 1940 (J. G. Franclemont), [in Coll. Franclemont].

Paratypes: 11 ♂ ♂, 10 ♀ ♀ (Bred ex ova), Ithaca, New York, 1941 (Franclemont), [in Coll. Franclemont].

(To be continued.)

The Male of Pagasa fasciventris H. M. Harris (Hemiptera, Nabidae).

By H. M. Harris, Ames, Iowa.

The February, 1940, issue of "The Entomological News" (Vol. 51, p. 35) carries the original description of this prettily marked species which has been known only from the female sex. Through the courtesy of Dr. R. H. Beamer, I now am privileged to characterize the male. Dr. Beamer writes that three hours of careful search in the same blue-stem patch where he collected specimens in 1939 yielded a single nymph. Fortunately, he was able to rear it to adulthood and thus make these notes possible. The species lives in the bases of clump-forming grasses such as blue-stem and, although ranging from Virginia to Nebraska and south-eastern Kansas, it apparently is very locally distributed and quite adept at hiding on the ground among the stem and roots of these plants. In the proportions given in the following description 48 units equal one millimeter.

Brachypterous male: Color as in female, head, anterior lobe of pronotum (except for spot on collar) and apical part of abdomen shiny black, the remainder of body and the legs reddish-orange. Body smaller than that of female and slightly more elongate. Head faintly longer than broad (40: 38). Vertex broader than eye (14: 11), the latter twice as long as wide (23: 11). Antennae colored as in female, but more intensely contrasted; proportion of segments, 14: 11: 43: 45: 40. Rostrum concolorous with legs, the base dark; proportions, 31: 32: 15. Pronotum narrow, longer than wide (65: 60), strongly shining. Scutellum dull. Hemelytra shiny, short, truncate apically, the costal margins almost parallel, the surface with punctures as in female. Legs slender, the front femur about two and two-thirds times as long as deep (55: 20), armed as in female. Venter not so hairy as in *P. fusca* (Stein), the claspers dark, much shorter and proportionately broader than in that species, but of same general type.

Length, 5.2mm. Width, (pronotum) 1.25 mm.; (abdomen) 1.65 mm.

Allotype, Brachypterous male, Cherokee County, Kansas, reared from nymph taken Aug. 24, 1941, R. H. Beamer; in collection of University of Kansas.

Weevils (Coleoptera, Curculionidae) Affecting Chufa (Cyperus esculentus).

By A. F. Satterthwait, Bureau of Entomology and Plant Quarantine, United States Department of Agriculture

(Continued from page 16.)

Calendra callosa (Oliv.).

The adult curlew bug (*Calendra callosa* (Oliv.)) has a broad depression in the basal third of each wing cover, a prominence at the outer basal angle, another near the apex of each wing cover, and fine punctures on the basal portion of the lateral pronotal carina. The new adult stays in its cell a few days, and at this time it has a burnished-gold sheen over its olive-brown body. After it has traveled in the moist soil it loses its beauty and in its usual haunts becomes very difficult to distinguish from the soil. Like many other species of insects whose larvae are internal tissue feeders, the curlew bug varies much in size. The usual length in the adult stage is from 9.5 to 12 mm., although the range is from about 7 to 12 mm.

The *egg* is pearly white, 1.84 to 2.11 mm. long and 0.73 to 0.95 mm. wide, and rounded at the ends.

The mature *larva* measures approximately 13 mm. in length. Its head is yellow or red and from 0.71 to 2.60 mm. in width from hatching to maturity; its body is white, about half as thick at the middle as long. It makes its pupal cell in the plant by packing shredded plant tissue in the ends of the excavation or in the soil. It will smooth the surface of the excavation and press it, perhaps modify it with body juice; at any rate, the cell is fairly strong and resistant to possible predatory insects. The pupal stage covers about 5 days.

The *pupa* is about 8.17 to 12.83 mm. long, with 6 rostral tubercles, the basal pair elevated, granular or trilobed, darker than the rest of the head, and usually is without setae.

The *adult* usually feeds head downward, inserting the beak in the root crown or in the stem within 50 mm. of the soil level. The curlew bug oviposits to some extent in 15 known species of plants, appearing definitely to prefer chufa to any other. The egg is laid in the leaf sheath or top of the crown; the larva hatches and excavates the inner leaves, or, in the event the flower stalk has developed, the interior of the flower stalk. As the larva grows and progresses in its feeding, the central leaves die, or, if the flower stalk is present and infested, the flower stalk dies. A cursory examination of a stand of chufa within a few days after the eggs have hatched reveals conspicuously the feeding places of the larva. As the chufa season progresses, the greatest number of destroyed plants is chargeable to the work of this billbug. The larva normally requires from 3 to 5 weeks to complete its growth, and if it cuts its way out of one plant before having completed feeding it will enter the base of another. It may pupate in the larval excavation in the plant or leave the plant and make a pupal cell in the soil within about 2 inches of the plant.

The seasonal history of this insect appears to vary according to locality. In Alabama, in the vicinity of Mobile, it has been found in egg, larval, and pupal stages on September 16. From an egg collected September 16, a larva issued September 23 and pupated October 26. From this pupa an adult issued December 18, at Webster Groves, Missouri. Its development would no doubt have been substantially accelerated in the higher temperature of Mobile.

In Mississippi, at Jackson, eggs were collected June 14, 1922, and larvae were found from June 15 to September 19, one of those collected on the last date being newly hatched. At Holly Springs, a pupa was taken June 17, 1922; other immature forms collected June 18 and subsequently fed at Webster Groves, yielded adults in the period June 23 to November 20.

In Arkansas, at Fayetteville, eggs and larvae were collected June 11, 1923; at Blytheville, eggs and larvae on June 25, 1922; at Osceola, larvae on June 26, 1922; at Benton, eggs and larvae on June 18, 1922. Pupation at Webster Groves took place in material of the Blytheville collection as early as July 10, yielding the adult July 12, and as late as August 19 from the Osceola collection, yielding the adult August 28.

It is probable that in the vicinity of the Gulf coast, and possibly also throughout Arkansas, the species may overwinter in two or more stages, but there is no evidence that any stage excepting the adult winters successfully in the area as far north as St. Louis.

These studies of the curlew bug have failed to show any tendency on its part to oviposit in corn in Ohio, Indiana, Kentucky, Tennessee, Michigan, Wisconsin, Iowa, Illinois, Missouri, Kansas, Arkansas, or Oklahoma. On the other hand, Z. P. Metcalf found, first, that the species in eastern North Carolina did oviposit in corn,* and, second, that probably no other corn insect caused so great a loss, both directly and indirectly, in the eastern part of this State as did the curlew bug. Where the curlew bug is thus able to develop in corn, the elimination of chufa from corn ground becomes less important in the control of this weevil.

In the vicinity of St. Louis, Missouri, this species and the destructve billbug (*Calendra destructor*) feed chiefly on chufa. The curlew bug has an earlier feeding period or a shorter season, for in this locality it is the dominant species in chufa late in August whereas the destructive billbug is the dominant species in this host plant in September.

The foregoing generalized statement is based on records of over 1,500 living specimens of the curlew bug.

CALENDRA DESTRUCTOR (Chitt.).

The destructive billbug (*Calendra destructor* (Chitt.)) ranges in length from 7 to 12 mm. and may be distinguished from the curlew bug, which frequently it closely resembles, by having the bases of at least two of the first three even intervals depressed at the bases of the elytra and by the presence of coarse punctures on the bases of the lateral pronotal carinae. The corresponding punctures of the curlew bug are fine. The newly developed adult exhibits a velvety texture but entirely without the burnished-gold sheen of the curlew bug. The

* E. G. Kelly (note files) records eggs on corn at Wellington, Kansas.

color is dark brown or black.

The egg closely resembles that of the curlew bug and ranges in length from 1.66 to 1.83 mm. and in width from 0.73 to 0.84 mm.

The larva likewise closely resembles that of the curlew bug. The width of the head ranges from 0.49 mm. in the first instar to 2.14 mm. at maturity.

The pupa ranges in length from 8.05 to 10.84mm. The rostrum bears six similar seta-bearing tubercles, and the mesonotum, the metanotum, and the tergite of the eighth abdominal segment each bear one or more pairs of setae. As usual in this genus of snout beetles, the adult of the destructive billbug usually eats with its head directed downward, inserting the beak through an inconspicuous puncture and feeding at large in the interior of the leaf sheath of the bud or flower stalk, often enlarging the feeding cavity by tearing the plant tissue longitudinally without withdrawing its beak.

Oviposition occurs in some of the feeding punctures. When the beak is withdrawn, the punctured slit of the plant closes fairly well. The oviposition period appears to begin as early as with any of the other billbug species in the Mississippi Valley and continues definitely later in the season, with fair volume, than that of other species working in chufa. This period, in the St. Louis section, extends from May 12 to September 22.

The incubation period of the eggs is not appreciably different from that of other species and averages about 5 days. The larva begins excavating in the egg cell and may work part way up or down the stem . When it emerges from its excavation it usually enters the base of another plant. Pupation occurs either in the larval excavation or in the soil close by. The pupal cell is limited, in the larval excavation, by packed, torn plant tissues; when located in the soil, a fairly good cocoon is made of torn plant tissue. The pupal period lasts from about 8 to 18 days. The life cycle of the destructive billbug and its size in larval and adult stages are rather similar to those of the curlew bug.

The following collections were made: At Chandler, Oklahoma, numerous eggs and larvae in chufa on June 11, 1923; at Manhattan, Kansas, numerous eggs on June 16, 1924; at Thayer, Missouri, one egg on May 24, 1918, and one larva June 13, 1921; in St. Louis County, Missouri, eggs on July 11, 1924, newly hatched larvae on September 22, 1923, and larvae, pupae, and new adults on September 27 of the same year; at Dupo, Illinois, one larva on August 15, 1922; and at Athens, Indiana, eggs and larvae on June 21, 1916.

CALENDRA CARIOSA (Oliv.).

One larva of *Calendra cariosa* (Oliv.) was found in one of three plants of *Cyperus esculentus* collected at Delchamps, Alabama, July 1, 1923; it pupated August 6.

A mature larva of *Calendra cariosa* was collected December 12, 1931, in a pupal cell in the soil under a chufa plant at Wiggins, Mississippi. A female adult issued January 2.

This species is distinguished from any other billbug by the peculiar elytral sculpture, in which rather large, shallow, depressed areas include two or more broad, shallow strial punctures or interval punctures. The pronotum has a central, diamond-shaped, polished area and is broadly canaliculate on both sides of the central elevation. The species attains a length of 13.5 mm.

The preferred host plant of this billbug appears to be the horned rush (*Rynchospora corniculata*), though it is rather a general feeder on sedges.

The *pupa* of this species has the rostrum with only six seta-bearing tubercles, all conical, the basal pair set on broad, moderately high, and wrinkled prominences, the prominences not darker than the head, the base wrinkled, not appearing lobed or granular. Its length is 9.31 to 17.00 mm., the average being 12.49 mm.; the pronotal width is 2.66 to 4.40 mm., averaging 3.55 mm.

CALENDRA PARVULA (Gyll.)

Three eggs of a corn billbug were found in *Cyperus esculentus* at Arkansas City, Kansas, on June 5, 1924. One egg, measuring 1.50 mm. long by 0.52 mm. thick, hatched June 10, yielding a pupa on August 4 and an adult female of *Calendra parvula* (Gyll.) on August 7.

This is the blue-grass billbug, definitely bred from 18 species of plants, but rarely from chufa. This little weevil has a fairly uniformly punctured pronotum, fairly smooth intervals on the elytra, and a long beak; its length is about 7 mm.

The *pupa* has only four rostral tubercles, all seta-bearing. The eighth abdominal tergite has one pair of large dorsal setae as large as the largest on the ninth tergite. The species is slender, from 5.58 to 10.22 mm. in length, and the pronotal width from 1.93 to 3.98 mm., the beak appears to be long and slender, and the ninth tergite has six to eight large setae.

CALENDRA VENATUS (Say.).

The hunting billbug (*Calendra venatus* (Say)) ranges from 6 to 11 mm. in length. It is smaller than the curlew bug and is best distinguished from the other species mentioned by a depression on the disk of the pronotum immediately back of the head. The color of this billbug is black.

The egg closely resembles that of the curlew bug and ranges from 1.34 to 1.87 mm. in length and from 0.46 to 0.83 in diameter.

The larva passes through the same number of instars and requires approximately the same length of time to mature as the curlew bug. The width of the head ranges from 0.29 mm. in the first instar to 1.97 in the last.

The pupa is about 9.22 to 12.75 mm. long, with six rostral seta-bearing tubercles.

The hunting billbug appears to breed more freely in chufa than in any other of its known host plants.

In Indiana, near Chalmers, numerous eggs have been taken in chufa on June 20, 1916, and in Missouri at Webster Groves on August 5, 1925. Larvae were taken near Charleston, Missouri, July 20, 1918.

Numerous adults have been taken associated with chufa or attacking corn on ground heavily infested with chufa, circumstances which strongly indicated that these adults had developed in chufa.

RECOMMENDATIONS FOR CONTROLLING CHUFA INSECTS.

Although the chufa crop is grown almost entirely as food for hogs and represents a limited acreage, producers are confronted with the problem of control of its insect enemies. The present studies indicate that the tubers, which are the all-important part. of the crop, are not subject to direct insect attack. This is very fortunate, for there would seem to be no effective control for tuber-destroying insects except such as might be effected by the prevailing practice of allowing hogs to harvest the crop.

Since the chufa is grown as an annual crop, it appears that all the insects noted in this paper can be controlled through the destruction of crop residues, by clean cultivation, and by disturbing the soil deeply enough to destroy the crowns. Where practicable, all the tops of the plants should be destroyed before midwinter. It is suggested that the grower smooth the ground and burn whatever chufa material the hogs have left on the surface, even though this may include some tubers.

The most injurious chufa pests so far recognized are weevils. The habits of the weevils afford almost no opportunity for control outside of cultural practices. In the case of the billbugs as pests of corn or small grains, our best recommendation is the elimination of the preferred host plant in proximity to the corn or other grain fields. As chufa is the preferred host plant of several of these insects, control recommendations are restricted to clean cultural practices not incompatible with the hog-harvesting method of handling the crop.

Notes Concerning Eschatomoxys wagneri Blaisdell (Coleoptera: Tenebrionidae).

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

In 1935, a new Triorophid was collected in Death Valley, Inyo County, by Roy L. Wagner, of Fresno, California. The unique specimen was submitted to the Author for determination. It was recognized as an unusual species, and was described in the Pan-Pacific Entomologist of July, 1935, as *Eschatomoxys wagneri* Blais.

It was learned later that Mr. P. H. Timberlake, of Riverside, California, had also collected a specimen. Dr. E. C. Van Dyke during a recent visit with him, obtained the following data: "The species was found in the Painted Canyon near Mecca, Imperial County, California, April 18, 1925. Mr. Timberlake is confident that it was taken from beneath a stone."

In April of the present year, three additional specimens were received from Glen M. Kohls, Assistant Entomologist of the Rocky Mountain Laboratory, Hamilton, Montana. Mr. Kohls has very kindly supplied the following data concerning their discovery and habitat, also with permission to retain them in the collection of the Entomological Laboratory of the California Academy of Sciences. The specimens "were taken in a mine located about fifteen miles north-east of Yuma, Arizona, in California on the road out of Bard."

"The mine is operated during the Winter by a Mr. Clapp. The entrance goes down at an angle of about 20 degress, to a depth of over 200 feet." Mr. Kohls also stated: "At the 160 foot level, we turned off into a drift and followed it about 100 yards or so, to the end where we stopped to search mainly for bat ticks (Argasidae) in the cracks and fissures of the rocks. In prying off the loose pieces of rock from the walls and top of the tunnel, several of the beetles were found. Only three were preserved, but several more could have been collected, since they were not at all scarce. The psychrometric readings were: Wet bulb 72, dry bulb, giving a relative humidity of about 78, without corrections for elevation, etc. Bats were present and there were a few small deposits of guano; no other organic material was noted."

"We were working near the end of drift where there was no timbering. An enclosed photograph gives some idea of the semi-desert country surrounding the mine."

The type of *Eschatomoxys wagneri*, a male, measures in length 9 mm. and 4 mm. in width. Those secured by Mr. Kohl, are one male and two females, the larger of the latter measures 11 mm. in length and 5 mm. in width. Only four specimens are known; the species is more or less subterranean.

Misidentified Genotypes.

By N. D. Riley, Dept. of Entomology, British Museum (Natural History), London.

The preparation of the reports on the Generic Names of British Insects, now being published by the Royal Entomological Society of London, is providing an interesting test, on a fairly large scale, of the efficiency of the International Rules of Zoological Nomenclature in their present form. When it is considered that practically all the really knotty problems in entomological nomenclature are the unwitting creation of the early European authors, and concern the European genera, it is satisfactory to find how relatively few are the cases in which it has been necessary, in order to avoid "greater confusion than uniformity", to apply for suspension of the Rules.

As an official of the British Museum (N. H.), in which a good deal of the work on these lists has been and is being done, and in other capacities, I have been privileged to see in MS. most of the reports already published, and to have before me others in various stages of completion. And it is instructive to find that practically the only constantly recurring difficulty now remaining is that which centres around the fixation of genotypes when the species concerned have been misidentified either by the original author of the genus or by an author who subsequently designated the type species.

This particular difficulty was dealt with at some length in Opinion 65, but so inconclusively as to have left the whole matter in doubt ever since. For this, the unfortunate phrase "it is to be assumed that his determination of the species is correct" is largely to blame since some authors have taken this to be mandatory, overlooking the necessary implication of the phrase to the effect that if the assumption is *proved* incorrect the whole argument falls to the ground. That this is the correct interpretation of the phrase is clear if the full and unanimous Opinions published up to that time (not just the summaries) be consulted. Here, notably in Opinions 19 and 46, phrases such as "an identification is to be accepted as correct until shown to be incorrect", "an author's recognition" of a species is "assumed to be correct until proved incorrect" occur not once but many times over. There seem, in fact, no grounds for maligning the Commission by the suggestion that, by this phrase in Opinion 65, they had any intention of forcing zoologists to accept as correct identifications which are demonstrably false.

Yet to the writer, and to his colleagues, this argument seems in reality quite beside the point. If difficulty and doubt have arisen they have been created by the Commission itself, and notably by Opinion 65, for the Rules themselves are quite unequivocal. The whole matter is covered by Article 30, which deals with the designation of the type *species* of genera. It is implicit in this article that the types of genera are *species*, and if this fundamental fact be borne constantly in mind, there should be no difficulty whatever in arriving at the correct solution. This may entail more labour than is involved in the arbitrary practice of accepting *albus* as the generic type of *X-us,* without reference to the identity of either, a practice which, though it may be sound in nomenclature, may equally well be very unsound taxonomy. But inasmuch as we are to assume that an identification is correct, unless proved incorrect, it is seldom that any considerable research will be needed since the cases involving an obviously doubtful identification are relatively few, and will diminish.

The writer will be very grateful for expressions of opinion from taxonomists interested in this question, for he feels that his interpretation of Article 30 of the Rules is the correct one and that it automatically removes a serious obstacle to nomenclatural progress. He also believes that the opposite course, referred to above as an arbitrary practice, yet adopted by some writers, will be found on ultimate analysis to rest on no more substantial grounds than a misunderstanding of the Article or their own convenience, and that should this practice be allowed to grow it cannot fail, because of its inherent falsity, to bring the work of the International Commission on Zoological Nomenclature into disrepute.

Taxonomic Notes on the Genera Chelostoma and Ashmeadiella (Hymenoptera, Megachilidae).

By Charles D. Michener, University of California, Berkeley, California.

Since but four species of the genus *Chelostoma* are known from the Western Hemisphere, all occurring along the Pacific Coast of the United States, the discovery of a fifth species in northern California is of considerable interest. In addition several facts affecting the nomenclature and known distribution of various species of *Ashmeadiella* have come to light since the publication of a revision of the genus (Michener, 1939, Amer. Midl. Nat., 22: 1-84). These are recorded in the following pages.

Chelostoma tetramerum n. sp.

This is a moderate sized, slender, black species.

♂: Length 6.5 mm. Pubescence sparse, whitish, not forming transverse bands on abdominal terga. Punctation of body fine and rather even, that of mesoscutum as coarse as that of vertex; horizontal area of propodeum finely rugose, shorter than metanotum. Proboscis not greatly elongate, glossa as long as face; first segment of labial palpi about one-third as long as second; maxillary palpi four-segmented, first segment short and globular, second longest, third but little shorter than second, and fourth markedly shorter than third. Wings dusky, veins and stigma black; second abscissa of cubital vein shorter than fourth. Posterior margins of abdominal terga one to six narrowly brownish; seventh tergum ending in three processes, the median, which is triangular and about as long as basal width, directed more ventrally than the incurved laterals which are about one and one-half times as long as their basal widths; seventh tergum with large, median, dorsal, longitudinally elongate depression; second sternum with transverse elevated area; parameres pointed but not attentuate apically; coxopodites of genitalia slender and straight, slightly enlarged apically, with a few rather long hairs near apices.

Holotype male (Ent. No. 5216, Calif. Acad. Sci.): Shingletown, Shasta County, California, May 23, 1941, flying over nearly bare ground (C. D. Michener). *Paratype* (author's collection), same data but on a small, yellow-flowered species of *Mimulus*.

This species resembles *C. phaceliae* Michener in the four-segmented maxillary palpi but differs from that form in the much shorter proboscis, proportions of the segments of the labial palpi, absence of the abdominal hair bands, shorter processes of the seventh tergum with the median one directed more downward than the lateral ones, more enlarged apices of the coxopodites of the male genitalia, and simple rather than attenuated apices of the parameres similar to those illustrated (Pan-Pac. Ent., 14: 36-45, 1938) for *minutum*. This species is also larger than most specimens of *phaceliae*, although certain individuals of that species from Mt. Diablo, California, are 6.5 mm. long. In its large size *tetramerum* approaches *C. californicum* Cresson, differing by the longer processes of the seventh abdominal tergum, the absence of pubescent fasciae on the terga, the relatively straight rather than downcurved parameres and coxopodites of the male genitalia, and the four-segmented maxillary palpi. From *C. bernardinum* Michener, the other American species with three processes on the seventh abdominal tergum of the male, *C. tetramerum* may be distinguished by the shorter processes of the seventh tergum, the more coarsely punctate mesoscutum, and the four-segmented maxillary palpi.

Ashmeadiella.

The late Grace A. Sandhouse wrote to me stating that the three original type specimens of *Ashmeadiella cactorum* (Cockerell) are in the National Museum, bearing Cockerell's label, "*H. cactorum* n. sp.", and that they belong to the form previously regarded as *A. curriei* Titus. My identification of *cactorum* was based upon specimens determined by Cockerell subsequent to the time the species was described. Unfortunately it is from the three cotypes that a lectotype of *cactorum* must be selected; that bearing Cockerell's number 3449 is here designated as lectotype. The name *cactorum* therefore replaces *curriei*, and for the species which I have previously regarded as *cactorum* the name *meliloti* Cockerell is available. The following synonymies indicate the nomenclatorial changes resulting from the correction of the use of the name *cactorum*.

For the sake of brevity only the key citations are here indicated; others may be found in the revisional paper already referred to.

ASHMEADIELLA (ASHMEADIELLA) MELILOTI MELILOTI (Cockerell). *Heriades meliloti* Cockerell, 1897, Ann. Mag. Nat. Hist., (6) 20: 141, ♂ ♀. *Ashmeadiella meliloti,* Cockerell, 1898, Bull. Denison Univ., 11: 64, ♂. *Ashmeadiella cactorum cactorum,* Michener (misidentification), 1936, Amer. Mus. Nov., 875: 8, ♀ ♂. *Ashmeadiella* (*Ashmeadiella*) *cactorum cactorum,* Michener, 1939, Amer. Midl. Nat., 22:42, ♀ ♂.

A. (A.) MELILOTI ASTRAGALI Michener. *Ashmeadiella* (*Ashmeadiella*) *cactorum astragali* Michener, 1939, Amer. Midl. Nat., 22: 44, ♀ ♂.

A. (A.) MELILOTI CRASSA Cockerell. *Ashmeadiella crassa* Cockerell, 1924, Proc. Calif. Acad. Sci., (4) 12: 558, ♀ (part). *Ashmeadiella* (*Ashmeadiella*) *cactorum crassa,* Michener, 1939, Amer. Midl. Nat., 22: 44, ♀.

A. (A.) MELILOTI ARIDULA Cockerell. *Ashmeadiella aridula* Cockerell, 1910, Entom., 43: 91, ♂. *Ashmeadiella cactorum aridula,* Michener, 1936, Amer. Mus. Nov., 875: 9, ♂ ♀. *Ashmeadiella* (*Ashmeadiella*) *cactorum aridula,* Michener, 1939, Amer. Midl. Nat., 22: 44, ♀ ♂.

A. (A.) CACTORUM CACTORUM Cockerell. *Heriades cactorum* Cockerell, 1897, Ann. Mag. Nat. Hist., (6) 20: 140, ♀. *Ashmeadiella cactorum,* Cockerell, 1898, Bull. Denison Univ., 11: 64, ♀. *Ashmeadiella curriei* Titus, 1904, Proc. Ent. Soc. Wash., 6: 100, ♀ (new synonym). *Ashmeadiella* (*Ashmeadiella*) *curriei curriei,* Michener, 1939, Amer. Midl. Nat., 22: 15, ♀ ♂. *Ashmeadiella basalis nigra* Michener, 1936, Amer. Mus. Nov., 875: 7, ♀ ♂. *Heriades prosopidis* Cockerell, 1897, Ann. Mag. Nat. Hist., (6) 20: 140, ♂, nec ♀.

A. (A.) CACTORUM ECHINOCEREI Cockerell. *Ashmeadiella echinocerei* Cockerell, 1911, Can. Ent., 43: 132, ♀. *Ashmeadiella* (*Ashmeadiella*) *curriei echinocerei,* Michener, 1939, Amer. Midl. Nat., 22:16, ♀.

A. (A.) CACTORUM BASALIS (Michener). *Ashmeadiella basalis basalis* Michener, 1936, Amer. Mus. Nov., 875: 6, ♂ ♀. *Ashmeadiella* (*Ashmeadiella*) *curriei basalis,* Michener, 1939, Amer. Midl. Nat., 22:17, ♀ ♂.

Additional localities for this subspecies are: Santa Rosa Mountain, Riverside County, California, 6000 to 7500 feet elevation, May 31, June 8 and 16, 1940, on *Lotus davidsonii* (C. D. Michener) and Westgard Pass, Inyo County, California, May 26, 1937 (N. W. Frazier). The latter specimens are of interest since they, like the specimens from the Clark Mountains recorded in 1939, are from a desert mountain range in which this ordinarily cismontane subspecies would not be expected.

A. (A.) OCCIPITALIS Michener. This species was collected ten miles south of Tucson, Arizona, August 7, 1940, on *Verbesina exauriculata,* also taken at several localities in Cochise County, Arizona, on the same flower (C. D. Michener).

ASHMEADIELLA (AROGOCHILA) FOXIELLA Michener. *Ashmeadiella* (*Arogochila*) *foxiella* Michener, 1939, Amer. Midl. Nat., 22: 73, ♂. *Ashmeadiella* (*Chilosima*) *washingtonensis* Michener, 1939, Amer. Midl. Nat., 22: 80, ♀. (new synonym).

The female described as *A. washingtonensis* was placed in the subgenus *Chilosima* with considerable doubt, but its relationship with a male *Arogochila* was not suspected. The two sexes, however, were collected together by the author at Hat Creek, Shasta County, California, on June 4, 1941, visiting the slender whitish flowers of a species of *Pentstemon.* Although the female is a peculiar form not closely related to any other species and possibly worthy of separation as a distinct subgenus, the similarity of the male to that of *Arogochila* leads to the belief that this species, like *A. barberi* Michener, the female of which also has quadridentate mandibles, is a derivative of *Arogochila.*

In the key to the females of *Arogochila* this species runs to 2 and is separated from *A. sculleni* Michener and *A. barberi* Michener by the absence of the lateral lobes of the clypeus. One of the males from Hat Creek, unlike other specimens studied, has the median teeth of the sixth abdominal tergum twice as long as broad.

A. (A.) TIMBERLAKEI TIMBERLAKEI Michener. This form was collected on Santa Rosa Mountain, Riverside County, California, 6000 to 7500 feet elevation, on *Lotus davidsonii,* May 31, June 15 and 18, 1940 (C. D. Michener); five miles east of Burney, Shasta County, California, on *Phacelia,* June

8, 1941 (C. D. Michener). In one female from the latter locality the median lobe of the clypeus is unusually broad and rounded and but feebly notched at the apex.

A. (A.) SALVIAE Michener. Although previously known only from southern California, a specimen of *A. salviae* was taken at Mount Diablo, Contra Costa County, California, June, 1939.

ASHMEADIELLA (CHILOSIMA) RHODOGNATHA Cockerell. Among numerous typical individuals of this species from El Mayor, Lower California, Mexico, April 3, 1940, on *Prosopis chilensis* (C. D. Michener) is a single female in which the legs are red and the posterior margins of the abdominal terga broadly red. This may indicate that *A. rhodognatha* is a black subspecies of the New Mexican *A. holtii* Cockerell.

ASHMEADIELLA (CUBITOGNATHA) XENOMASTAX Michener. Mr. P. H. Timberlake has very kindly allowed me to study a male and female of this species which he collected three miles southwest of Victorville, California, on *Dalea saundersii*, May 12, 1939. The male of this subgenus, which has not previously been described, runs to *Ashmeadiella* s. str. and *Titusella* in my key to subgenera, and differs from most of the species included in those groups by the somewhat emarginate apex of the labrum. The male is described as follows:

Length 6 mm. Anterior margins of eyes divergent below; face densely covered with white pubescence largely obscuring surface; clypeus finely and densely punctate, its apical margin with broad, shallow emargination; frons and vertex a little more coarsely punctate than clypeus but densely so; anterior ocellus but little posterior to midpoint between antennal bases and posterior margin of vertex; posterior ocelli separated by a distance equal to that to nearest eye margin and hardly less than distance to posterior edge of vertex; flagellum reddish brown beneath; mandibles bidentate, red except bases and apices; labrum elongate, apex with broad, shallow emargination. Punctures of scutum and scutellum and mesepisternum coarser and less dense than those of vertex; all tarsi reddish; posterior legs red beyond trochanters except for black posterior surfaces of tibiae. Abdomen red except for black basal mid-dorsal spots on terga, spot of fourth tergum largest, spots of preceding and following terga diminishing in size; sixth tergum with lateral margins slightly sinuate, lateral teeth not broad, but short and rounded apically, median teeth much broader than long, irregularly rounded and separated by an emargination much broader than a semicircle.

Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF.

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.—Altsheler, B.—Natural History Index Guide. Section 10. Zoology. 1940. 249-265. **Anon.**—Prof. S. Kopeć. [31] 148: 655. **Brodsky, Nevsky, Beliaeva & Tcholpankulov.**—Zoocenoses of the high mountain Pamir. [Acta Univ. Asiae Med.] Ser. 8, (Zool.) fasc. 23: 21 pp. **Brown, F. M.**—A gazetteer of entomological stations in Ecuador. [7] 34: 809-851, ill. **Callan, E. McC.**—Resistance of plants to insect attack. [Jour. Imp. Coll. Trop. Agric.] 18: 229-231. **Hamly, D. H.**—Color systems. [68] 94: 586. **Hatch, M. H.**—The logical basis of the species concept. [Biol. Symposia] 4: 223-293. **Hyslop, J. A.**—Insects and the weather. [Climate & Man.] 1941: 503-507. **McIntosh, A.**—The designation of type specimens in describing new species. [Suppl. Jour. Parasit.] 27: 11. **Merrill, M. C.**—The publications of the United States Department of Agriculture and the policies covering their dstribution. 1941. 23 pp. **Scott & Opydyke.**—The emergence of insects from Winona Lake. [Ind. Dept. Conserv. Div. Fish & Game] 2: 5-15, ill.

ANATOMY, PHYSIOLOGY, ETC.—Barton-Wright, E.—Flour and the growth of Tribolium. [31] 148: 565-566. **Bodine, J. H. and T. H. Allen.**—Enzymes in ontogenesis (Orthop.). XX. The site of origin and distribution of protyrosinase in the developing egg of the grasshopper. [42] 88: 343-352. Enzymes in ontogenesis. [92] 81: 388-

391, ill. **Carlson, L. D.**—Enzymes in ontogenesis (Orth.) [92] 81: 375-387, ill. **Gatenby, J. B.** — The neck body in normal and x-radiated insect spermatogenesis. [Pro. Ry. Irish Acad.] 47: 149-159, ill. **Gayden, J. H.**—Studies in the embryology of Cylas formicarius. [La. Acad. Sci.] 5: 32. **Gobeil, A. R.**—La diapause chez les Tenthredes. [Canadian Jour. Res.] 19: 383-416. **Kalmus, H.** — The resistance to desiccation of Drosophila mutants affecting body colour. [Proc. Royal Soc.] 130 (B): 185-201. **Prebble, M. L.** — The diapause and related phenomena in Gilpinia polytoma. [Canadian Jour. Res.] 19: 417-436; 437-454. **Ray, C. N.** — Extra strong heliotropic effect of neon lights. [68] 94: 585-586. **Yakhontov, V.**—Thysanoptera found in the process of soil investigation of middle Asia. [Acta Univ. Asiae Med.] Ser. 8, (Zool.) fasc. 49: 7 pp. **Yeager & Munson.**—Histochemical detection of glycogen in blood cells of the southern armyworm (Prodenia eridania) and in other tissues, especially midgut epithelium. [47] 63: 257-294, ill. (See also various authors under Arachnida, Hemiptera, Diptera and Coleoptera below).

ARACHNIDA AND MYRIOPODA. — Archer, A. F. — Supplement to the Argiopidae of Alabama. [Ala. Mus. Nat. Hist.] Mus. Pap. 18: 47 pp., ill. **Chamberlin, R. V.**—On a collection of Millipedes and Centipedes from northeastern Peru. [Bull. Amer. Mus. Nat. Hist.] 78: 473-535, ill. New genera and species of North American geophiloid centipeds. [7] 34: 773-790. **Doetschman, W. H.**—The occurrence of mites in Pinnipeds, including a new species from the California sea-lion, Zalophus californianus. [Suppl. Jour. Parasit.] 27: 23. **Jiles, E. C.**—The skeletal musculature of the centipede. [La. Acad. Sci.] 5: 33. **Lavers, C. H., Jr.**—A new species of Limnochares from North America. [Univ. Wash. Publ. Biol.] 12: 6 pp., ill. **Semans, F. M.** — Black widow spider. Distribution in Ohio. [Ohio J. Sci.] 41: 380. **Sternhold & Getzonok.** Influence of some factors upon the life-cycle of Boophilus annulatus calcaratus. [Acta Univ. Asiae Med.] Ser. 8, (Zool.) fasc. 47: 12 pp. **Warren, E.**—On the genital system and modes of reproduction of certain gamasid mites. [Ann. Natal Mus.] 10: 95-126, ill. On the occurrence of nematodes in the haemocoel of certain gamasid mites. [Ann. Natal Mus.] 10: 79-94, ill.

THE SMALLER ORDERS OF INSECTS. — Bickley, W. E. — Records of Tennessee Chrysopidae. [10] 43: 187-189. **Cowley, J.**—A new species of Protoneura from Peru and a review of the group of Protoneura tenuis. [36] 91: 145-173, ill. **Crawford, J. C.** — A new Taeniothrips from Panama [10] 43: 184-186, ill. **Geijskes, D. C.** — Notes on Odonata of Surinam. [7] 34: 719-734, ill. **Holdsworth, R. P., Jr.** — Additional information and a correction concerning the growth of Pteronarcys proteus. [7] 34: 714-715, ill. **Svihla, R. D.**—A list of the fleas of Washington [Univ. Wash. Publ. Biol.] 12: 11-19. **Walker, E. M.**—The nymph of Somatochlora walshii [4] 73: 203-205, ill. **Ward, J. W.**—The occurrence of Heterodoxus longitarsus (Mallophaga) on dogs in Mississippi. [Suppl. Jour. Parasit.] 27: 30. **Wheeler, Douglas & Evans.**—The role of the burrowing owl and the sticktight flea in the spread of plague. [68] 94: 560-561. **Whitehouse, F. C.** — British Columbia dragonflies with notes on distribution and habits. [119] 26: 488-557, ill. **Kennedy, C. H.**—Perissolestes paprzyckii, a new Perilestine dragonfly from Peru. (Lestid.) [7] 34: 852-854, ill. (See also Howell, T., under Diptera, and Austin & Richardson under Coleoptera).

ORTHOPTERA. — Gurney, A. B. — Taxonomic and bionomic notes on the grasshopper Melanoplus impudicus (Acridid.) [119] 26: 558-569, ill. **Moreau, R. E. & W. M.**—Birds eating a "Distasteful" grasshopper. [The Ibis] 5: 615. **Roberts, H. R.**—A comparative study of the subfamilies of the Acrididae primarily on the basis of their phallic structures. [Proc. Acad. Nat. Sci. Phila.] 93: 201-246, ill. **Semans, F. M.** — Protozoan parasites of the Orthoptera, with special reference to those of Ohio. [43] 41: 457-464. **White & Rock.** — New records of Acrididae from Alberta [4] 73: 216.

HEMIPTERA.—Caldwell, J. S.—A preliminary survey of Mexican Psyllidae. [43] 41: 418-424. (k). **de Carlo, J. A.**—Descripcion de dos especies nuevas del genero Limnocoris. Nuevas consideraciones sobre Cryphocricus daguerrei y Cryphocricus rufus de Carlo. (Naucorid.). [Rev. Soc. Ent. Argentina] 11: 37-41, ill. **deLong, D. M.**—Some new species of Mexican Osbornellus (Cicadellid.). [An. Esc. Nac. Cien. Biol., Mexico] 2: 263-270, ill. **Drake & Hambleton.** Two new Peruvian Tingitidae. [Iowa State Coll. Jour. Sci.] 16: 329-330. **Ferris, G. F.** — The genus Aspidiotus (Diaspidid.). [117] 6: 33-69, ill. **Knowlton & Stains.** — Geocoris atricolor feeding. [19] 36: 201-202. **Mathis & Nicolle.** — Sur le comportement des Réduvidés hématophages Rhodnius prolixus et Triatoma infestans, et leur aptidude a transmettre la maladie de Chagas. [77] 135: 28-30. **Nicolle & Mathis.**—Le thermotropisme, facteur déterminant primordial pour la piqure des Réduvidés hématophages. [77] 135: 25-27. **Rosewall, O. W.** — The male genital segment of Pentatomidae. [La. Acad. Sci.] 5: 33-34. **Russell, L. M.**—A classification of the scale insect genus Asterolecanium. [U. S. Dept. Agric.] Misc. Publ. No. 424: 322 pp., ill. **Sampson & Drews.**—A review of the Aleyrodidae of Mexico. [An. Esc. Nac. Cien. Biol., Mexico] 2: 143-189, ill. (*k). **Smith, C. F.**—The genus Drepanaphis Del Guercio east of the Rocky Mountains. [Jour. E. Mitchell Sci. Soc.] 57: 226-242, ill. **Usinger, R. L.**—Rediscovery of Emesaya brevicoxa and its occurrence in the webs of spiders (Reduviid.). [19] 36: 206-208.

LEPIDOPTERA. — Beall, G. — The monarch butterfly, Danaus archippus. General observations in southern Ontario. [Canadian Field Nat.] 55: 123-129. **Bell & Comstock.**—The synonymy of Papilio coridon, Papilio phocion and others. [6] 49: 371-374. **Brower, A. E.**—A new species of Metalectra from eastern North America. (Phalaenid.). [1] 67: 271-274, ill. **Clark, A. H.**—Notes on some North and Middle American Danaid butterflies. [50] 90: 531-542, ill. **Clarke, J. F. G.**—The North American moths of the genus Arachnis, with one new species. [50] 91: 59-70, ill. Revision of the North American moths of the family Oecophoridae, with descriptions of new genera and species. [50] 90: 33-286, ill. **Floyd, E. H.** — Investigations on the biology and control of the alfalfa caterpillar, Colias eurytheme. [La. Acad. Sci.] 5: 31-32. **Janse, A. J. T.**—Contribution to the study of the Phycitinae. [Jour. Ent. Soc. So. Africa] 4: 134-166, ill. **Johnson & Comstock.** — Anaea of the Antilles and their continental relationships with descriptions of new species, subspecies and forms (Nymphalid.). [6] 49: 301-342, ill. **Lindsey, A. W.**—A new form of Hesperia colorado [7] 34: 770-772. **Nevskij, V.**—On the causes of fluctuations in population density of the codling moth (Cydia pomonella). [Acta Univ. Asiae Med.] Ser. 8, (Zool.) fasc. 37: 14 pp. **Simpson, L. R.** — The buck moth. [Canadian Nature] 1942: 3, ill. **Wyatt, A. K.**—Collecting Heliothinae in 1940. [19] 36: 203-205.

DIPTERA.—Alexander, C. P.—Records and descriptions of neotropical crane-flies (Tipulid.). [6] 49: 345-356. New Nearctic crane-flies (Tipulid.). [4] 73: 206-213. **Barretto,**

M. P. — Morfologia dos ovos, das larvas e das pupas do Phlebotomus intermedius e neiva 1912 (Psychodidae). [An. Fac. Med. Univ. S. Paulo] 16: 91-105, ill. Observacoes sobre a biologia do Phlebotomus intermedius e neiva, 1912 (Psychodid.) em condicoes experimentais. [An. Fac. Med. Univ. S. Paulo] 16: 143-157 pp., ill. **Correa, M. L.** — La Quetotaxia de la larva de Anopheles occidentalis. [An. Esc. Ñac. Cien. Biol., Mexico] 2: 217-238, ill. **Dampf, A.** — Mochlostyrax trifidus nuevo miembro de la fauna Culicidologica Mexicana. [An. Esc. Nac. Cien. Biol., Mexico] 2: 251-257, ill. **Dobzhansky & Spassky.**—Intersexes in Drosophila pseudoobscura. [119] 26: 556-562, ill. **Gordon & Sang.** — The relation between nutrition and exhibition of of the gene Antennaless (Drosophila melanogaster). [Proc. Royal Soc.] 130 (B) : 151-184, ill. **Greene, C. T.**—A remarkable new species of the genus Pseudacteon (Phorid.). [10] 43: 183-184, ill. Two new species of cecidomyiid flies from Phlox. [50] 90: 547-551, ill. **Howell, T.**—Notes on Ephemeroptera and aquatic Diptera of western North Carolina. [Jour. E. Mitchell Sci. Soc.] 57: 306-317. **Hull, F. M.** — Some new species of the genus Baccha from the New World. [10] 43: 181-183. New American syrphid flies. [40] No. 1151: 3 pp. **James, M. T.** — New species and records of Mexican Stratiomyidae. [An. Esc. Nac. Cien. Biol., Mexico] 2: 241-249. **Johannsen, O. A.** — Occurrence of Orbellia hiemalis in Maine. [19] 36: 202. **Khodukin & Sternhold.**— On the resistance to cold of some Anopheles. [Acta Univ. Asiae Med.] Ser. 8, (Zool.) fasc. 45: 11 pp., ill. **Komp, W. H. W.**—The species of Nyssorhynchus confused under Tarsimaculatus goeldi, and a new name, A. emilianus, for one species found in Para, Brazil (Culicidae). [7] 34: 791-807, ill. **Philip, C. B.**—Notes on three western genera of flies (Tabanid.). [19] 36: 185-199. (*k). **Renn, C. E.**— The food economy of Anopheles quadrimaculatus and A. crucians larvae: relationships of the air-water interface and the surface-feeding mechanism. [Symposium on Hydrobiol.] 1941: 329-342, ill. **Rowe, J. A.**—Preliminary report on Iowa mosquitoes. [Iowa State Coll. Jour. Sci.] 16: 211-225. **Sabin & Ward.** — Flies as carriers of poliomyelitis virus in urban epidemics [68] 94: 590-591. **Sabrosky, C. W.** —An annotated list of genotypes of the Chloropidae of the World [7] 34: 735-765.

COLEOPTERA.—Austin & Richardson.—Ability of the firebrat to damage fabrics and paper. [6] 49: 357-365.

Blake, D. H.—New species of Chaetocnema and other Chrysomelids from the West Indies. [10] 43: 171-180, ill. **Chisholm, J. J.**—Combating the Japanese beetle. [Fauna] 3: 122-123, ill. **Elliott, D. C.**—The biology of the cottonwood leaf beetle Lina scripta. [La. Acad. Sci.] 5: 31. **Halilova, R.** — On the conditions resulting of poisoning Tribolium confusum. [Acta Univ. Asiae Med.] Ser. 8, (Zool.) fasc. 44: 14 pp. **Howard, N. F.** — Feeding of the Mexican bean beetle larva. [7] 34: 766-769, ill. **Khabirova, M.** — Some data concerning the bioecology of Sitophilus granarius. [Acta Univ. Asiae Med.] Ser. 8, (Zool.) fasc. 43: 14 pp. **Knull, J. N.**—New Coleoptera. (Buprestid. & Cerambycid.). [7] 34: 691-695, ill. Nine new Coleoptera (Plastoceridae, Buprestidae & Cerambycidae). [Ohio J. Sci.] 41: 381-388, ill. **Leech, H. B.** — The generic name Thermonectus (Dytiscid.). [4] 73: 197. **Leonova, N.** — Influence of external factors on the intestine fauna of Tribolium confusum. [Acta Univ. Asiae Med.] Ser. 8, (Zool.) fasc. 34: 12 pp. **Luginbill & Painter.**—A new species of Phyllophaga. [7] 34: 716-717, ill. **MacLeod, G. F.**—X-ray studies of starving mealworm larvae. [7] 34: 696-701, ill. **Malkin, B.**—An addition to the New York State List of Coleoptera No. 5. Long Island records. [19] 36: 209-212. **Pieltain, C. B.**—Estudio de la larva del Paratrechus (Hygroduvalius sylvaticus.) [121] 2: 208-209. **Saakian, A.** — Influence of temperature and carbon dioxide on the respiration intensity of Tribolium confusum. [Acta Univ. Asiae Med.] Ser. 8, (Zool.) fasc. 38: 15 pp. **Ward, I. J.**—The bean weevil, Acanthoscelides obtectus in stored white beans. [4] 73: 216.

HYMENOPTERA. — Balch, Reeks & Smith. — Separation of the European spruce sawfly in America from Gilpinia polytoma (Diprionid.) and evidence of its introduction. [4] 73: 198-203. **Bequaert, J.**—Gymnopolybia cayennensis introduced with bananas in Texas. A correction [19] 36: 205. **Chamberlin, T. R.**—The wheat jointworm in Oregon, with special reference to its dispersion, injury, and parasitization. [U. S. Dept. Agric.] Tech. Bull. No. 784: 47 pp., ill. **Gaul, A. T.** — Experiments on the taste sensitivity of Dolichovespula arenaria (Vespid.). [6] 49: 367-369. **Gemignani, E. V.** — Una nueva especie del genero Trypoxilon. [Rev. Soc. Ent. Argentina] 11: 42-44, ill. **Kloet, G. S.**—A new observation nest for wood boring Aculeates. [8] 77: 241-244, ill. **Lafleur, L. J.**—Tolerance in Ants. [90]

76: 85-93. The founding of Ant colonies. [92] 81: 392-401. **Lanham, U. N.** — Bees of the genus Andrena of Boulder, Colorado. [7] 34: 702-713. (k). **Muesebeck, C. F. W.** — A new ant parasite (Bracon) [19] 36: 200-201. **Smith, M. R.** —Two new species of Aphaenogaster (Formicid.). [Gt. Basin Naturalist]. 2: 118-121. **Walley, G. S.**—On the genus Petalodes, with descriptions of two new North American species (Braconid.). [4] 73: 213-215.

SPECIAL NOTICES.—Comity of Spiders. By W. S. Bristowe. Volume 2. 1941. 229-560 pp., ill. London. **Index to Farmers' Bulletins.** Nos. 1501-1750. By M. H. Doyle. 1941. 135 pp. **Index to Technical Bulletins.** Nos. 501-750 By M. H. Doyle. 1941. 169 pp. **Microbe's Challenge.** By F. Eberson. The Jaques Cattell Press, Lancaster, Pennsylvania. 1941. pp. VIII, 354. The role of insects in epidemics, plague, tularemia and virus diseases is discussed. **Natural History and the American Mind.** By W. M. & M. S. C. Smallwood. Columbia University Press, New York. 1941. pp. xiii, 445, ill. A brief section on "Entomology" in chapter XII, "The passing of the naturalist," deals with William Dandridge Peck, Thomas Say and Thaddeus William Harris, whose chief publications are listed in the bibliography near the end of the book. **New or Little-known Tipulidae** from eastern Asia. By C. P. Alexander. [Philippine Jour. Sci.] 76: 27-66, ill. (Reference made to some new North American species).

Colorado Lepidoptera Records (Pieridae, Noctuidae)

In 1936 I reported in this journal the occurrence of the South and Central American pierid, *Gonepteryx clorinde* (Godart), in Colorado. Another specimen has come to my attention but, in contrast to the frayed and rubbed condition of the other, collected in perfect condition. The specimen, a male, was collected by Howard Rollin a few miles north of Weldona, Colorado, about September 1, 1929, while feeding on Sultana.

A very badly frayed and rubbed specimen of the large noctuid moth, *Thysania zenobia* Cramer, was taken in Boulder, flying about theater lights on September 9, 1941. This is another neotropical species which occasionally strays far from its usual range, and has been found as far north as Maine.—Hugo G. Rodeck, University of Colorado Museum, Boulder, Colorado.

OBITUARY

Dr. JAMES ALLEN NELSON was born in Urbana, Ohio, April 29, 1875, and died at Gambier, Ohio, August 9, 1941. He attended Kenyon College, from which he was graduated in 1898 with the degree of Ph. B. He then attended the graduate school of the University of Pennsylvania from which institution he received the degree of Ph. D. in 1903, serving part of the time there as an assistant in Zoology. His thesis at Pennsylvania was on the cell lineage of a species of *Dinophilus* and later he described this species and named it *conklini* after Professor E. G. Conklin under whom his thesis had been prepared. This was in the days when cell lineage was the biological style, and this paper served to place *Dinophilus*, which had been a matter of zoological dispute.

After receiving his degree, Nelson felt the need of more work on insects and spiders, so he accepted an honorary fellowship at Cornell University where he worked under the direction of Professor J. H. Comstock, especially on the palpi of male spiders. He remained at Cornell for four years.

His detailed methods of investigation seemed especially to fit him for some work then needed in the Bureau of Entomology, so in 1908 he was appointed to the bee culture office of that Bureau to investigate the embryology of the honeybee. The results of this excellent piece of work are published in book form by the Princeton Press.[1]. Later he described the anatomy of the larval honeybee[2] and either alone or in cooperation with others in the same office he investigated certain larval growth curves of scientific and practical value.[3]

[1] The Embryology of the Honey Bee. Princeton, October, 1915. Pp. vi, 282, 95 text figs. Reviewed in the NEWS for Jan., 1916, vol. 27: 41-43.

[2] Morphology of the Honey Bee Larva. Journ. Agric. Research, 28 (12): 1167-1213, 8 pls. 1924.

[3] Nelson, J. A., Sturtevant, A. P. and Lineburg, B. Growth and Feeding of Honey Bee Larvae. U. S. Dept. Agric. Bull. No. 1222. 37 pp. figs. 1924.

After ten years of service in the Bureau he resigned and went to Mt. Vernon, Ohio, to live. This relatively early retirement was brought about by poor health and the sad death of his only son. In Mt. Vernon he took keen interest in his garden which became a veritable show place, and he also renewed his earlier interest in music and became a highly skilled pianist. He did not again undertake any biological inquiries.

After a few years of residence in Mt. Vernon, Nelson moved to his old college community at Gambier where he spent his remaining years, a respected and useful member of the community, active in civic and church affairs and much interested in everything pertaining to the college for which he had such an affection. His death is a loss to his friends who have known him for so many years and must be an even keener loss to those with whom he had closer associations in later years. He is survived by his wife and a married daughter.

Nelson was a member of the A. A. A. S., the American Society of Zoologists, the American Association of Economic Entomologists, and Entomological Society of America and the Ohio Academy of Sciences, in all of which he took interest, even though in recent years he had not been able to attend meetings with regularity.—E. F. PHILLIPS.

We are indebted to Mr. Hugh B. Leech for the announcement of the deaths of Mr. RALPH HOPPING, veteran Coleopterist of the western United States and Canada, at 8 A. M., Wednesday, October 29, 1941, at his home in Vernon, British Columbia, and of Mr. F. C. HENNESSEY, artist for the Entomological Branch of the Canadian Department of Agriculture at Ottawa, on November 8, 1941. Ralph Hopping was born in New York City, April 8, 1868, but spent much of his life in the Sierras of California with the United States Forest Service (1907-1919). He went to British Columbia in December, 1919, to take charge of the Dominion Forest Insect Laboratory. His large collection, chiefly of Coleoptera, we believe, goes to his son, George R. Hopping, and eventually to the California Academy of Sciences at San Francisco.

Science for January 16, 1942, quoting *Nature*, records the death of Dr. H. ELTRINGHAM, president of the Royal Entomological Society of London in 1931-32, on November 26, at the age of 68 years. He was one of the secretaries of the 2nd International Congress of Entomology held at Oxford, England, in August, 1912.

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—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, Correio 1043, Buenos Aires, Rep. Argentina.

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., Birmngham, 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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

Arctic Lepidoptera especially **Noctuidae**—Wanted to hear from collectors who desire the Arctic Species. Have large collection. R. J. Fitch. Lloydminster, Saskatchewan, Canada.

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LAGOCHIRUS ARANEIFORMIS—BEARD.

PHOTOGRAPH, SUBMITTED BY DR. WHITNEY, SHOWING EXIT HOLES OF THIS CERAMBYCID BEETLE.

ENTOMOLOGICAL NEWS

Vol. LIII MARCH, 1942 No 3

A Note on Lagochirus araneiformis L. (Coleop.: Cerambycidae).

By Raimon L. Beard, Connecticut Agricultural Experiment Station, New Haven, Connecticut.

(Plate II.)

A communication addressed to the Yale Forestry School, and referred to the Entomology Department of the Connecticut Experiment Station, aroused the interest of several entomologists.

The letter, from Dr. Willis Whitney, of Schenectady under date of March 23, 1941, reported the finding at Nassau, British West Indies, of numerous circular cavities under the bark of *Bursera simiruba*. The cavities, found only in dead or dying wood, were approximately two inches in diameter and covered in many cases with the bark which remained attached by a thin edge in the manner of a "trap door". Leading into the wood from the large cavity was a tunnel of much smaller diameter. A native of the islands related to Dr. Whitney that a "small black bee" cut out the flap with its "nose". The "bee" then went behind the "trap door" to deposit an egg, after which it left to return only to release its offspring when the latter matured. Dr. Whitney questioned the story, but could find no information about it.

The present writer could find no reference to this type of insect habitat in the literature nor any information from correspondence with some other workers. The nature of the "trap door" did not suggest the work of a carpenter bee as the story of the native of the Bahamas would imply. Nor was it the work of a trap-door spider, which might have taken advantage of a pre-existing cavity in the wood—a fact verified by Dr. Petrunkevitch, of Yale University. Rather, the bark covering of the cavity, by its bevelled shape, showed that it had been chewed from the inside out, as would be done by an emerging insect, and not from the outside in, as would be done by one seeking to oviposit. A cerambycid beetle would be the most likely suspect.

Correspondence with Dr. George N. Wolcott elicited the correct answer. Dr. Wolcott first reported that *B. simiruba*, or almacigo as it is called in Puerto Rico, quite commonly shows the type of injury described by Dr. Whitney, but that he had seen only material too old to contain the insect responsible. He later found fresher material containing larvae and pupae in the wood several inches beneath the bark. He was able to rear these through and identify the adult as a cerambycid, *Lagochirus aranciformis* L. Dr. Wolcott suggested that the callow adult made the large cavity just under the bark in which it rested until its wings hardened.

Leng (1920) gave the distribution of this species of cerambycid as South America, West Indies and Florida. Bates (1879-1886) included Mexico, British Honduras, Guatemala, Nicaragua, Costa Rica, West Indies, South America, Tahiti, and the Sandwich Islands. Dr. Wolcott mentioned that *L. aranciformis* is not specific as to host, he having reared it from mahogany as well as from the almacigo. Smith (1921) and Wilson (1923) have reported this insect attacking sugar-cane, and Craighead (1923) mentioned *Ficus* as a host.

References.

Bates, H. W. .1879-1886. Biologia Centrali-American. Insecta. Coleoptera, Vol. V. Longicornia.

Craighead, F. C. 1923. North American Cerambycid Larvae. Canadian Department of Agriculture, Tech. Bull. 27.

Leng, C. W. 1920. Catalogue of the Coleoptera of America, North of Mexico, p. 282.

Smith, L. 1921. Virgin Islands Agricultural Exp. Sta. Bull. 2: 22.

Wilson, C. E. 1923. Virgin Islands Agr. Exp. Sta. Report, 1922: 16.

Since this article was submitted, a complete and delightfully written story of this insect appeared under title of "Isn't Research Fun" by Willis R. Whitney, in The Caribbean Forester, 3: 47-57, 1942.

Notes on Some Cucullinae (Phalaenidae, Lepidoptera) II.

On the Identity of Lithophane ferrealis Grote and Xylina innominata Smith, with Descriptions of Some New Forms of the Genus Lithophane Hübner.

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

(Continued from page 35.)

LITHOPHANE INNOMINATA Smith (Pl. I, fig. 14). *Lithophane signosa Grote,* 6th, Ann. Rept. Peab. Acad. Sc. 33, 1874 [misidentification, not *signosa* Walker, 1857].

Xylina innominata Smith, Bull. U. S. N. M., xliv (Cat. Noct.), 227, (nom. nov. for *signosa* Grt. nec Wlk.) 1883 [not *innominata* Smith, Trans. Am. Ent. Soc., xxvii, 20, pl. III, figs. 8 & 9, 1900].

This species has been generally misdetermined in collections; it actually is a rare form colored like *ferrealis.*

When Smith proposed this name for *signosa* Grote [nec Walker], he said, "The new name is intended to apply to that species identified and labeled as *signosa* by Mr. Grote and has no type specimen." In the last part of his statement he is decidedly in error, as the type of the name *innominata* was the specimen Grote had before him when he drew up his description of the species he considered *signosa.* Grote's description is here reproduced, so there can be no doubt as to what that author had before him.

"*Lithophane signosa. Xylina signosa* Walker, p. 627. ♂. Base of the forewing and costal region broadly ashen, with an ochreous tinge. The wing is else ferruginous, and the ordinary spots are pale, and lie on the cell surrounded by the darker ground color. The orbicular is oblique, rounded, moderate; the erniform upright; the spots are not distinctly annulated. The veins are dotted and black-marked beyond the t. p. line. The ordinary lines are lost and merely marked against the costal region by ferruginous streaks as in *ferrealis.* The claviform is indicated by a pale diffuse shade, and a broad diffuse blackish shade streak unites it with the transverse posterior line. The subterminal line is pale, more even, less strongly dentate than in *ferrealis,* preceded by the usual ferruginous marks, the narrow terminal space is almost entirely blackish, caused by diffuse black streaks accompanying the veins, and there is a double row of terminal dots, more distinct than in *ferrealis*. The fringes are more straightly cut with pale than its near ally. Hind wings fuscous with ochrey tinted fringes. Abdomen flattened, with exceedingly slight dorsal tufts. Expanse 40 mm. Quebec (F. X. Bélanger)."

Mr. W. H. T. Tams very kindly furnished me with a photograph of the type of this species.

LITHOPHANE INNOMINATA form **illecebra** form. nov. (Pl. I, fig. 15).

Xylina innominata Smith, Trans. Am. Ent. Soc., xxvii, 20 pl. III, figs. 8 & 9, 1900 [not *innominata* Smith, Bull. U. S. N. M., xliv (Cat. Noct.), 227, 1883].

Head and thorax olive rufous; fore wing russet olivaceous to ochre buff; the basal line obsolescent; the antemedial line represented by a double series of black dots on the veins; the postmedial line, as the antemedial, represented by a series of dots; both lines obsolescent except for the aforementioned black dots; the median shade reddish russet to olive, diffuse, present on the outer as well as the inner side of the reniform; subterminal line an irregular light shade, edged on its inner side by russet or olive; the terminal line a series of small black lunules; the fringe concolorous with the general tone of the wing, but with an irregular dark line through its center and parallel to the termen; the orbicular vague, elliptical and oblique, edged on its inner side by the russet or olive of the median shade; the reniform evident, large and erect, constricted at the middle, outlined by russet or olive russet; a dark dash of varying length and intensity present in the submedian fold; the veins marked with black in the terminal area, the black is often diffuse and shades the whole terminal area. Hind wing shining fuscous black; the fringe rufous to olive, contrasting with the remainder of the wing. The abdomen blackish above.

This is the form that stands as *innominata* in most collections, but as has been pointed out previously, *innominata* is a suffused form equivalent to *ferrealis, lignicosta, pallidicosta*, etc.

This is the common (normal!) color form of this species and as such it agrees with *bethunei* and *patefacta;* from these two species, which it most closely resembles, it can be readily separated by its luteous to reddish olive color, the two aforementioned species being whitish or grayish.

This form is figured as typical *innominata* by Smith, Trans. Am. Ent. Soc., xxvii, pl. iii figs. 8 & 9, 1900.

Holotype: ♂, Ithaca, New York, Sept. 28, 1940 (J. G. Franclemont), [in Coll. Franclemont].

Allotype: ♀, Ithaca, New York, Sept. 30, 1940 (J. G. Franclemont), [in Coll. Franclemont].

Paratypes: 27 ♂ ♂, 32 ♀ ♀, Ithaca, New York, Sept.-April (J. G. Franclemont); 22 ♂ ♂, 25 ♀ ♀, McLean Bogs Reserve, Tompkins Co., New York, Sept.-Oct. (J. G. Franclemont); 5 ♂ ♂, 1 ♀, Chaffee, New York, Sept. (J. G. Franclemont); 1 ♂, 1 ♀, Sardinia, New York, Sept. (J. G. Franclemont); [all in Coll. Franclemont]. 1 ♂, Ithaca, New York, Oct. (L. R. Rupert); 1 ♂, 5 ♀ ♀, Richmond Gulf, Sardinia, New York, Sept. (L. R. Rupert); 1 ♂, East Concord, New York, Oct. (L. R. Rupert); 1 ♂, Third Lake, Fulton Chain, New York, Oct. 1934; [all in Coll. Rupert].

Lithophane oriunda form **canentissima** form. nov. (Pl. I, fig. 17).

This form lacks the white costa, the white annuli of the reniform and orbicular and the white filling of the reniform. The fore wing is a uniform claret brown, very strongly irrorate with hoary white; the reniform and orbicular are narrowly encircled with the same color, and then beyond this by blackish; the antemedial line hoary, oblique, irregularly dentate; the postmedial line hoary, dentate on the veins, excurved from below costa, then evenly incurved to submedian fold, then excurved to inner margin; claviform outlined by black. The hind wing rufous fuscous.

This form is a striking contrast to normal *oriunda* and undoubtedly corresponds to the unicolorous forms of the other species, corresponding in color to *petulca, hemina,* signosa and the others.

Holotype: ♂, Ithaca, New York, October 23, 1940 (J. G. Franclemont), [in Coll. Franclemont].

Paratypes: 1 ♂, 2 ♀ ♀, McLean Bogs Reserve, Tompkins County, New York, Oct. 5 & 12, 1940 (J. G. Franclemont), [in Coll. Franclemont]. 1 ♂, Ithaca, New York, Oct. 21, 1934 (L. R. Rupert); 1 ♂, 1 ♀, McLean Bogs Reserve, Tompkins

County, New York, Oct. 5, 1940 (L. R. Rupert); [in Coll. Rupert]. 5 ♂ ♂, 2 ♀ ♀ (Bred ex ova) Ithaca, New York, 1941 (Franclemont), [in Coll. Franclemont].

EXPLANATION OF PLATE I.

Fig. 1. *Lithophane petulca* Grt. (Ithaca, N. Y.)
Fig. 2. *L. petulca* form *ferrealis* Grt. (Ithaca, N. Y.)
Fig. 3. *L. hemina* Grt. (McLean Bogs Reserve, Tompkins Co., N. Y.)
Fig. 4. *L. hemina* form *lignicosta* form. nov. (Holotype).
Fig. 5. *L. signosa* Wlk. (Ithaca, N. Y.)
Fig. 6. *L. signosa* form *pallidicosta* form. nov. (Holotype).
Fig. 7. *L. patefacta* Wlk. (McLean Bogs Reserve, Tompkins Co., N. Y.)
Fig. 8. *L. patefacta* form *niveocosta* form. nov. (Holotype).
Fig. 9. *L. disposita Morr.* (Ithaca, N. Y.)
Fig. 10. *L. disposita* form *argillocosta* form. nov. (Holotype).
Fig. 11. *L. bethunei* Grt. & Rob. (McLean Bogs, Reserve, Tompkins Co., N. Y.)
Fig. 12. *L. bethunei* form *luteocosta* form. nov. (Holotype).
Fig. 13. *L. bethunei* form *duscalis* form. nov. (Holotype).
Fig. 14. *L. innominata Sm.* (Ithaca, N. Y.)
Fig. 15. *L. innominata* form *illecebra* form. nov. (Paratype, McLean Bogs Reserve, Tompkins Co., N. Y.)
Fig. 16. *L. oriunda* Grt. (Ithaca, N. Y.)
Fig. 17. *L. oriunda* form *canentissima* form. nov. (Holotype.)

Aquatic Plants and Mosquito Larvae.

The value of plants as indicators of aquatic conditions was demonstrated by variations in the species which occurred in waters of varying suitability for mosquito breeding. A remarkable example was the prevalence of a certain sedge as the dominant mat-forming plant in an area consistently free of mosquito breeding while certain grasses were the chief components of mats in the troublesome mosquito-production areas.—Annual Report, Gorgas Memorial Laboratory (Panama), 1940. Washington, 1941.

Spring Aphid Aero-Plankton (Homoptera).

By H. Elliott McClure, Ord, Nebraska.

Aero-Plankton, flying and floating arthropods, were collected by means of a net attached to the fender of an automobile during the year from May 3, 1934, to May 11, 1935. From May 3 to June 19, 1934, the collections were made along a four-mile stretch of paved road, route 68, east of Horse Cave, Kentucky. The remainder of the studies were made at Danville, Illinois. The route travelled in Kentucky was bordered by fields the majority of which were unplowed and abounded with flowers especially composites. The country was rolling and there were no streams along the route. This paper concerns the aphids collected in this way. The species listed were identified by Dr. L. G. Strom, 604 South 28th, Milwaukee, Wisconsin, who has been of inestimable assistance. Data concerning the entire collection has been given in an earlier paper (McClure, 1938[1]).

The four-mile route was covered each morning between six and eight and each evening between six and seven. The length of day increased from 13.65 hours to 14.5 hours, a period of 51 minutes, from sunrise to sunset during the seven weeks of observation. During May the daily increase in light was greater than during June. In general, nebulosity during the morning collections was slightly lower and the light intensity greater than in the evening. The evening humidity and nebulosity were slightly higher and less variable than were those of the morning, therefore light intensity was less in spite of the fact that the sun set later each day. There was rain during 14 of the 38 days and most of this came during the first ten days of June. On May 11 there was a heavy dust storm. During the time of collections the evening temperatures were about five degrees higher than the morning temperatures.

In the 100 trips over the route a total of 16,687 specimens were collected. The average collection included 166 insects, or one to 63 cubic feet of air. The net strained approximately 10,500 cubic feet of air during each drive. The average morn-

[1] Insect Aerial populations. Ann. Ent. Soc. of Am., XXXI: 504-513.

ing collection was much less than the evening collection, 70 and 262 insects respectively. This is the equivalent of one insect to 151 cubic feet and one to 40 cubic feet.

The species of aphids taken are shown in the accompanying table. Twenty-seven were represented, of which eight were of economic importance. Four hundred and forty-eight specimens were collected and of these four species made up 53 percent. They were as follows: *Rhopalosiphum prunifoliae* (Fitch) 21 percent, *Toxoptera graminum* (Rhodani) seven percent, *Macrosiphum pisi* (Kalt.) 14 percent, *Pemphigus lactucae* (Fitch) 11 percent. The accompanying table shows the numbers of individuals taken over four-day periods, and indicates the periods of heaviest flight and relative abundance. The species are arranged in the order of their appearance during the period of observation so that the table shows their succession as well.

The numbers of aphids caught in morning collections were erratic, with the greatest flight activity during the four days preceding June 3. Evening collections were more than double those of the morning and were comparatively regular in numbers until what appeared to be the period of spring migration during the 12 days from May 27 to June 7. This vernal flight appeared to be associated with rising daily temperature and humidity.

RHOPALOSIPHUM PRUNIFOLIAE (Fitch). Ninety-four specimens of this species were taken, 63 in the evening and 31 in the morning. They were most abundant in the morning collections in the first four days of May and fell off rapidly to May 10. They disappeared from the morning collections by May 22 and did not appear again until June 8. The peak of evening numbers came eight days later than that of the morning, and then the numbers fell off to more or less regular low activity for the rest of the observations. Apparently the spring flight for this species came during the first fifteen days of May.

TOXOPTERA GRAMINUM (Rhodani). Only 33 individuals of this species were taken, 21 in the evening and 12 in the morning. This group was taken erratically, but apparently the period of greatest activity was during the last of May and the first of June.

TABLE 1

The succession and numbers of 27 species of aphids taken during flight in the seven weeks from May 1 to June 19, 1934, at Horse Cave, Kentucky. Numbers collected indicate the total taken in four days preceding each date.

	Numbers Collected												
	May							June					Total
Species	6	10	14	18	22	26	30	3	7	11	15	19	
Rhopalosiphum prunifoliae (Fitch)	18	13	18	6	4	0	5	4	6	7	6	7	94
Macrosiphum pisi (Kalt.)	2	2	5	5	4	8	28	8	1	1			64
Pemphigus lactucae (Fitch)	5	2	5	9	7	0	2	16	2				48
Aphis gossypii (Glover)	2	2								1			5
Pemphigus populi transversus (Riley)	2										2		4
Toxoptera graminum (Rondani)	0	1	1	0	9	0	5	7	2	5	1	2	33
Drepanaphis monelli (Davis)		1						1					2
Myzocallis ononidis (Kalt.)		1					3	3	2	3			12
Hyalopterus atriplicis (Linn.)			1		1		4	5	1	1		1	14
Aphis sp.				1	5		5	6	1		1	2	21
Myzocallis asclepiadis (Monell.)					1		1						2
Aspidaphis adjuvans (Walker)					1								1
Macrosiphum sp.					1			1	1				3
Drepanaphis acerifoliae (Thomas)					2	4	4	4	3				17
Anoecia querci (Fitch)					7		1	7					15
Eriosoma lanigerum (Hausmann)					1			1					2
Aphis rosea (Baker)						1	2						3
Macrosiphum erigeronensis (Thomas)							1	3	1	4			9
Aphis bakeri (Cowan)							1						1
Macrosiphum granarium (Kirby)								5	6	1	1		13
Clavigerus populifoliae (Fitch)								1					1
Prociphilus (fraxinifoliae (Thomas)									1				1
Aphis coreopsidis (Thomas)									1				1
Aphis illinoisensis (Thomas)										2			2
Aphis tulipae (Boyer)										1			1
Colopha ulmicola (Monell.)										2			2
Macrosiphum frigidicola G. and P.)											1		1

MACROSIPHUM PISI (Kalt.). Of the 64 specimens taken, only six were collected in the morning. The numbers in the evening collections were low and regular, until none were caught during the four days preceding May 22. The collections were greatest during the four days preceding May 30, and the numbers encountered dropped abruptly after this. The temperature was rising and the weather dry during this flight.

PEMPHIGUS LACTUCAE (Fitch). This species was represented by 48 specimens, 25 taken in the morning and 23 in the evening. The numbers collected in the morning were constant and low until they ceased flying, during the four days preceding May 26. Then they increased during the four days preceding June 3, and disappeared from the air by June 7. The evening numbers were constant and low, with the only peak during the four days preceding May 18. None were collected after June 7.

Immature and Adult Stages of New Species of Chironomidae (Diptera).

By O. A. JOHANNSEN, Ithaca, New York.

In 1896 Dr. S. W. Williston described a male specimen of *Chironomus* from the island of St. Vincent without attaching a specific name to it. That he had several specimens before him from the same region, some of them females, is evident from his statement "......and, rarely, the posterior part of the abdomen also brownish......Length, 2-2.5 mm." In 1905 I rashly attached the specific name *willistoni* to the species without having examined a specimen, not realizing that in the Cornell University Collection there were two female specimens from St. Vincent bearing a label with the manuscript name *Chironomus delicatulus* in Dr. Williston's handwriting. Why no specific name was published by Williston cannot be conjectured. It is possible that the male upon which the description was based was destroyed or that having discovered that the term *C. delicatulus* was preoccupied for one of Philippi's species from Chili, Williston cancelled the name. A letter received from Dr. C. H. Curran of the American Museum of Natural History and another from the late F. W. Edwards of the British Museum, indicates that in neither of the institutions mentioned is there a specimen of this speces among Williston's St. Vincent Diptera. Since the specimens in the Cornell University collection are co-types it seems desirable to enlarge upon Dr. Williston's five-line description.

CHIRONOMUS (STENOCHIRONOMUS) WILLISTONI Johannsen.

♀. Head, including antennae, proboscis and palpi yellow. Antennae 0.5 mm. long, intermediate segments bulbous on basal half, slender apically, the penultimate three-fourths as long as the slender and tapering apical segment. Basal palpal segment short, second and third subequal, each nearly three times as long as the first, fourth distinctly longer (shrivelled in the specimen). Eyes black, separated above the antennae by a distance nearly equal to the width of the narrow dorsal extension. .

Thorax pale yellow, mesonotum shining, with three slightly darker yellow vittae; pronotum much reduced.

Abdomen pale yellow, the last segment pale brownish.

Wings hyaline, unmarked, veins yellowish white; first radial branch ends at three-fourths the length of the wing measured from the humeral crossvein, the second radial branch is nearly contiguous with the first, the posterior branch ends slightly distad of the level of the apex of the media, the cubital fork lies over .06 of the wing length distad of the proximal end of the crossvein, measurements made parallel to the costal margin. Squamae with hairs; halteres yellow.

Legs yellowish white, the two spurs on each of middle and hind tibiae conspicuously black and equal; fore tibiae a sixth shorter than the femora, the combined fore femur and tibia one-sixth longer than the wing. Empodium and pulvilli well developed. Fore tarsi broken off in both specimens. Length 2 mm., wing 2 mm.

The male as described by Williston resembles the female in coloring. The fore basitarsi are said to be one-fourth longer than their tibiae. The length is given as 2 to 2.5 mm. from which one may infer that the male measured 2.5mm.

Dr. H. K. Townes called my attention to the similarity between *Chironomus* (*Stenochironomus*) *macateei* Malloch and *C. willistoni.* Both belong to that group of the subgenus *Stenochironomus* in which the wings lack dark markings. They are similar in coloring although the apex of the abdomen in *C. macateei* is much darker. They appear to differ, however, in the basitarsus-tibial ratio which is given at 1.25 by Williston for *C. willistoni*, and as 1.20 by Malloch for *C. macateei.* Specimens of the latter, one from the type locality, have the ratio of 1.14-1.16. The cubital fork also is not so far distad of the crossvein in the latter, which species is also a trifle greater in size.

Orthocladius (Dactylocladius) dubitatus n. sp.

This is a species which in American literature has in part been referred to *O. sordidellus* Zett. Though resembling it in color, Zetterstedt's species differs in some structural characters being now referred to the subgenus *Psectrocladius.*

♂. Head yellow, eyes bare, reniform; antennae including basal segment brownish, ratio of apical segment to the remaining flagellar segments of the antennae, 0.85; apical segment with numerous short hairs toward the tip. Palpi brownish, ration of lengths of segments to each other as 7: 13: 13: 18.

Thorax yellow including pronotum and scutellum; the three mesonotal vittae, metanotum, pectus and spot on pleura, dark brown, mesonotum somewhat shining.

Tergum of abdomen dark brown or blackish, venter brown, both with slight greenish tinge. Hypopygium brown, its tergite without anal point, basistyle with nearly straight inner margin and without mesad projecting lobe; dististyle simple, inner margin straight, subapical spine, blunt, brown.

Legs dusky yellow, ratio of fore basitarsus to its tibia, 0.65; fore tibia with one, middle tibia with two, hind tibia with one long and one short, slightly flexed spur; hind tibial comb present; empodium large, nearly as long as the claws; pulvilli vestigial; claws with minutely bifid or trifid apex.

Wings somewhat milky, microtrichia not evident; costa distinctly produced; R_1 and Cu_2 end equidistant from the wing base, R_{2+3} ends slightly before the mid distance between the tips of R_1 and R_{4+5}; Media ends slightly behind the wing tip; R_{4+5} ends well beyond the level of the tip of Cu_1; cubitus forks distad of the crossvein; anal vein is produced far beyond the cubital fork; anal lobe well developed, right angled. Squama with complete fringe; halteres yellow. Length of insect 2.1 mm., a fifth longer in life, wing 1.5mm.

♀. Similar to the male in coloring though tending to be lighter, the vittae of the mesonotum in some cases reddish brown. The first flagellar segment of the antenna is two-thirds, the sixth is over twice as long as each of the three oval intermediate segments. Tarsal claws sharp. Length of insect 1.75, a fifth longer in life.

Ithaca, New York. Types in the Cornell University collection.

The larva finds a place in couplet 32 in my key (Aquatic Diptera III, p. 60, 1937), the pupa in couplet 24 (l. c., p. 62.)

Cricotopus flavipes n. sp.

Larva. The larva lying on its side, mines in the leaves of the pondweed, *Potamogeton*. When full grown it measures 6.5 mm. in length. Near each caudo-lateral margin of body segments 4 to 9 (abdominal segments 1 to 6) there is a hair pencil composed of 4 to 6 hairs and on the tenth there is another with 2 to 5 hairs. Ventro-laterally there are in addition several single shorter and very slender hairs on each side of each intermediate segment and dorsally several fine, still shorter hairs.

The head is brown with the margin of the labial plate and the apex of the mandible blackened. There are two eyespots on each side of the head the anterior spot very much smaller than the other. The antennae are very minute (Fig. 7), less than one-fourth as long as the mandible, the first segment scarcely longer than wide, the larger of the two blade-bristles at the tip of the basal segment rather wide and extending nearly to the tip of the fourth segment, the apical four segments together about as long as the basal segment. On the ventral side of the labrum are the usual curved bristles of which a subapical pair is distinctly larger and stouter than the others. A median pair of bifid bristles was not observed. The premandibles (Fig. 6) are unusually stout, curved and blunt-pointed apically. The mandibles (Fig. 2) which lack wrinkles on the convex side, likewise are stout, darkened at the tip, with two lateral bristles, a short accessory tooth, but apparently lacking a mesad projecting brush. The labial plate is very convex in cross-section. When viewed from the ventral side (Fig. 4) only five median teeth show distinctly, the head being strongly laterally compressed, but when the plate is flattened out (Fig. 3) 13 teeth are clearly in evidence, the second laterals being shortest. Prolegs, claws, anal gills and preanal bristle-bearing papillae are similar to those of *C. trifasciata*.

Pupa. The pupa, which measures 4 mm. in length, exhibits the adult coloring a short time before transformation. The thoracic respiratory organs are minute, delicate, white in color, without spinules and clavate in shape, the diameter at the apical fourth about .02 mm. which is a quarter of the total length. The first, seventh and eighth tergites are bare, the second to sixth with a large transverse patch of shagreen on the anterior half and a narrow transverse shagreened fascia near the posterior margin. The intersegmentalia of segments two to six have anteriorly directed spinules which are strongest on the posterior margin of the second tergite. The anal segment, which lacks shagreen, bears lateral lobes each terminating in three nearly straight bristles. The genital sacs in the male extend well beyond the apices of the bristles (Fig. 8), in the female the bases of the bristles lie distad of the caudal ends of the sacs.

Adult. ♂ and ♀. Yellow in ground color, the pronotum, scutellum, halteres, legs and terminalia yellowish white. The broad mesonotal vittae, the pectus, a pleural spot, metanotum, anterior three-fourths of each abdominal tergite except the first and last two or three, dark brown to blackish, in teneral specimens somewhat paler. Antennae brown, basal segment darker, palpi brown; eyes pubescent. Antennal ratio of the male 1.65; of the female 0.44, the sixth segment 1.75 times as long as the fifth, the division line between them feebly marked.

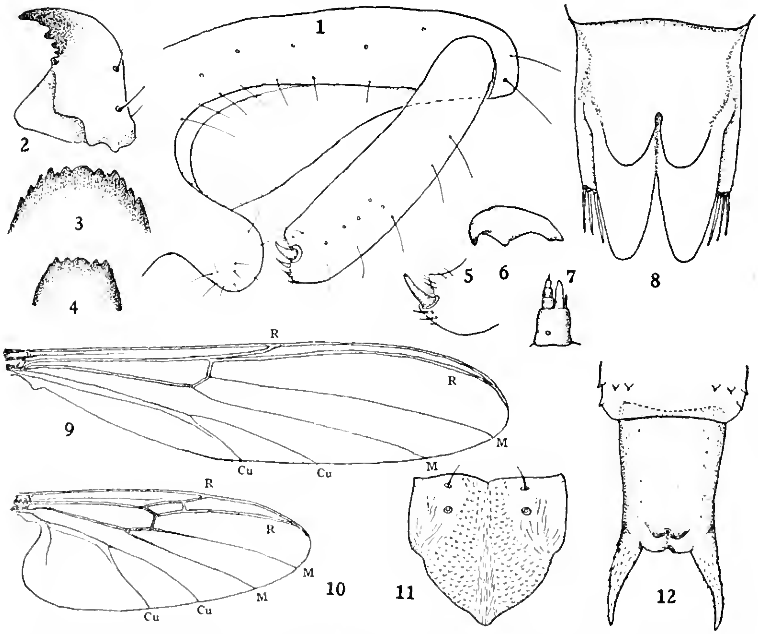
Ratio of fore basitarsus to tibia 0.55 to 0.60; fore tarsi not bearded; empodium 2/3 as long as the claws, pulvilli minute.

Wings milky hyaline, veins pale, R_{2+3} ending about half-way between the tips of the anterior and posterior branches of the radius; costa indistinctly produced beyond the tip of R_{4+5} which ends well beyond the level of the tip of Cu_1; media ends slightly behind the tip of the wing; cubitus forks distad of the crossvein; anal lobe well developed. Squamae fringed.

The hypopygium is of the normal *Cricotopus* type (Fig. 1), the anal point lacking; basisityle with prominent basal lobe which is slightly wider beyond the middle; the apical spine of the dististyle is about 2/3 as long as the diameter of the dististyle near the apex (foreshortened in Fig. 1). Length of male 3.25 mm., of female 2mm., of the wing of both sexes 1.75 mm.

Reared by Mr. C. O. Berg, July and August at Ocqueoc Lake, Presque Isle County, MICHIGAN. Types in Cornell University collection.

The adult of this species is readily distinguished from other members of the genus in having non-annulate yellow legs. The larva will find a place in couplet 1 in my key (Aquatic Diptera III, p. 52, 1937) with Group *Eucricotopus*, differing in having unusually short antennae. It will also find a place in couplet 29, p. 60, which again leads to *Cricotopus* (Group C) but differs in having short antennae and in lacking a mandibular brush. The pupa will find a place in couplet 3, second paragraph, in the key on page 52, differing from *C. fugax* in having non-spinose respiratory organs. It will also trace to the second paragraph of couplet 26, p. 62, *Cricotopus*, differing in the form of the respiratory organ.



Cricotopus flavipes n. sp.: 1, Male clasper, X285; 5, Apex of dististyle, X285. Larva: 2, Mandible, X190; 3, Labial plate (flattened), X190; 4 Same, ventral aspect, X190; 6, Premandible, X190; 7, Antenna, X380 Pupa: 8, Caudal segment of male, X75.

Macropeza similis: 9, Wing, X12.

Jenkinshelea albaria: 10, Wing, X12. Pupa, female: 11, Operculum, X75; 12, Caudal segment, X37.

Ceratopogon albarius Coquillett and Related Species (Diptera: Ceratopogonidae).

By O. A. Johannsen, Ithaca, New York.

Described in 1895 by Coquillett from Florida, it was redescribed in 1908 by me under the name of *magnipennis* and assigned to the genus *Johannseniella* Will. Later, together with several other species, it was placed by Malloch in the genus *Johannsenomyia* Mall. An examination of *albaria* however reveals that if we are to recognize the numerous genera into which *Ceratopogon* of Meigen has been divided, this species must be transferred to *Jenkinshelea* Macfie (emendation for *Jenkinsia* Kieffer, preoc.), the type of which is *J. setosipennis* Kieffer, from India, and of which a figure is given by Macfie (1939). The American species agrees with other species which have been assigned to this genus by Macfie and deMeillon in having the thorax somewhat jutting over the head; an unusually broad wing, a costa more or less produced (Fig. 10), wing surface covered with microtrichia, medial fork broadly sessile, strongly developed anal angle; unarmed femora, and the fifth tarsal segments with strong spines below.

In *Johannsenomyia* the thorax is rounded in front and not projecting over the head, the wing is of moderate width, the costa is no produced, and the anal angle is not prominent. Kieffer (1917) assigned a South American species, which he named *J. boliviensis,* to the genus. An examination of the type specimen in the National Museum in Budapest, however, showed that it does not belong in *Jenkinshelea*. It is a normal *Palpomyia* with a tubercle or spine in the middle of the front margin of the thorax, the latter not produced over the head, the fore femora provided with spines, the middle and hind femora, as well as the fifth tarsal segments, unarmed; thus falling in *Palpomyia,* Group A, of Edwards (1926).

DeMeillon (1937, p 263) has suggested that *Jenkinshelea* be regarded as a subgenus of *Macropeza* to contain *J. setosipennis* Kieffer (type), *boliviensis* Kieff, and probably *Macropeza similis* Johannsen (1927) and that a new genus be erected for the Ethiopian species with enlarged basal angle of the wing, namely *acraensis* Ingram and Macfie, *polyxenae* DeMeillon, and *rhodesiensis* DeMeillon. This suggestion however cannot be entertained, since Macfie's figure shows that *J. setosipennis* has an enlarged anal angle while *boliviensis* is a normal *Palpomyia* as stated above. As for *Macropeza similis* from Formosa, the figure here given (Fig. 9) indicates that it is clearly a true *Macropeza* as defined in Macfie's key (1940). It should be noted that this key contains misprints in couplet 5; the figures at the right should read 6 and 7 respectively instead of 5 and 6.

A pupa was collected by Dr. J. G. Needham at Old Forge, New York, from which a female of *J. albaria* was reared. The exuviae indicate that the insect belongs to the *Palpomyia* group of the Ceratopogonidae.

The respiratory organs were unfortunately broken off and lost. The operculum (Fig. 11) is shield-shape with an anterior pair of setae, a seta-base (sense pit?), behind each seta, the posterior half rugose with numerous minute low tubercles. The last segment (Fig. 12) is more deeply pigmented than the anterior parts; the pair of terminal processes slender, elongate, and only slightly divergent. The surface of this segment is provided with closely set, minute, stout spinules, the spinules on the terminal processes larger and more sparsely distributed. The spines in the transverse rows of the intermediate segments are short and stout. The condition of the exuviae does not permit a more extended description. Malloch has described the respiratory organs.

I have seen specimens of *J. albaria* from New York, New Jersey, Georgia, Florida, and Illinois.

References: Coquillett, D. W., Proc. Ac. Nat. Sci. Phila., 1895, 308. Edwards, F. W., Trans, Ent. Soc. Lond., 1936, 417. Johannsen, O. A., Bull. 124: N. Y. State Mus. 1908, 268; and Ent. Mitt., 16: 424, 1927. Kieffer, J. J., Ann. Mus. Nat. Hungr., 15: 331, 1917. Macfie, J. W. S., Trans. Roy. Ent. Soc. Lond., 89: 7, 1939; and Ann. Trop. Med. Parasit., 34: 13-30, 1940. DeMeillon, B., Ann. S. Afr. Mus., 32: 263, 1937.

Descriptions of two new Nearctic species of the genus Hydrellia reared from Pond-weed (Diptera: Ephydridae).

By Ezra T. Cresson, Jr.

Among some material received from Mr. C. O. Berg of the University of Michigan reared from several species of pond-weed of the genus *Potamogeton*, I found the following apparently undescribed species. Mr. Berg has kindly allowed the types to be placed in the Collection of The Academy of Natural Sciences of Philadelphia.

Hydrellia luctuosa new species.

Similar to *H. caliginosa* Cresson, 1936, but entirely black except the halteres, and without any cinereous vestiture; also is considerably smaller.

Antennae, palpi and tarsi, black; halteres pale yellow.

Opaque, except scutellum and abdomen somewhat shining. Vestiture dark grayish in certain aspects, never cinereous; lunule slighter lighter.

Ocellars distinctly stronger than proclinate orbital. Antesutural dorsocentral well developed and about as far removed from postsutural one as their distance from each other. Genital segment small, inconspicuous. Anterior series of three to four strong setae on mid femur, particularly in the males, and the mid tibiae of that sex somewhat thickened. Costa III about as long as II.

Length, 1.5 mm.

Type.—Male; Bessey Creek, Cheboygan County, Michigan; August 14, 1941; (C. O. Berg; from *Potamogeton zosteriformis*); [A. N. S. P., no. 6620].

Paratypes.—5 ♀; topotypical, with same data. 1 ♂; with same data except from *P. richardsoni*. 1 ♀; with same data except from *P. natans*. 1 ♀; Douglas Lake, Cheboygan County, VII 3, 1941; from *P. richardsoni*. 2 ♂; Nigger Creek, Cheboygan County, VIII 21, 1941, from *P. tenuifolius*.

Hydrellia ascita new species.

Very similar to *H. bilobifera* Cresson, 1936, but appearing different in having the mesonotum, including humeri and notopleura uniformally dark, and the tibiae mostly black.

Pale, yellow to orange: ground of face, apex of antenna III, palpi, apex of fore coxa, extremity of femora, base and apex of tibiae and base of tarsi. Halteres whitish. Wings clear with black veins.

Vestiture of dorsal surfaces brownish; lunule, pleura and ventral surfaces more cinereous. Face sericeous, niveous to golden. Mesonotum, humeri and notopleura dark, contrasting with the lighter pleura.

Frons transverse. Face about one-fifth width of head; orbits strongly flaring to moderately broad cheeks. Antesutural dorsocentral well developed, but shorter and rather approximate to the postsutural one; no second postsutural dorsocentral noticeable. Setation of legs inconspicuous. Segment V of male with distinct, bilobed, caudal margin. Costa II not much longer than III.

Length, 1.5 mm.

Type.—Male; Nigger Creek, Cheboygan County, MICHIGAN; August 21, 1941; (C. O. Berg; from *Potamogeton tenuifolius*); [A. N. S. P., no. 6621].

Paratypes.—4 ♂, 11 ♀; topotypical, with same data.

The Terms Instinct and Intelligence as Used in Discussions of Insect Behavior.

By PHIL RAU, Kirkwood, Missouri.

I have a predilection for the good old-fashioned word instinct, and propose to use it in preference to any one of the many substitutes invented to take its place. It is true many sins have been committed in the name of instinct, but these have been by scholasticists, lay writers and philosophers, and not by students of comparative psychology. The misuse of the word has not been sufficiently great, however, to warrant its disuse in studies of insect behavior. In my opinion, nothing is to be gained by substituting for it such terms as "innate behavior", "inborn capacities", "inborn powers", "stereotyped behavior", "automatic acts", "spontaneity", "inherited propensity", "mechanical automata", "automatized reasoning", "unlearned acts", "motor memory", "muscle memory", "species memory", or what not. Such terms seem ambiguous, are con-fusing and hard to define, and lend themselves too readily to the imagination.

Of course, in the early days of the study of insect behavior, naturalists (and even the great Fabre was one of them) misused the word by defining it as something which divine Providence had by special creation implanted in lowly creatures, since if left to their own intelligence they would not survive. If anything at all should be attributed to Providential implantation, it should be the mere physiological processes, such as egg-laying, silk-spinning, reflex bleeding in certain beetles, defecation, etc.; but in this connection the term reflex is perfectly safe to use, since such phenomena are produced without the necessary intervention of choice or intention.

The classic description of instinct in the lower orders "as it recurs, with unimportant modifications in countless works on the subject" is given by Wheeler (Essays in Phil. Biol. p. 38-39, 1939) when he states:

"Any behavior is designated as instinctive which originates in an impulse. * * * The impulse is evidently the center or core of the instinctive activity, which is peculiarly fixed and mechanized, very rigidly dependent on inherited structure or organization and therefore very uniform, or variable only within very narrow limits, in all the individuals of one or both sexes of a species. Behavior of this kind has the attributes of compulsion or necessity and it is at the same time highly adaptive or purposive, though the organism manifesting it is unaware of any purpose, or at any rate it is usually aware only of an immediate purpose, even when the behavior is accompanied by consciousness."

It seems to me that instinct is even more than this, for instincts are subject to change in the long view; new instincts are acquired and become rooted in the make-up of the species, and unused ones are thrust into the limbo of obsolescence. That instincts are not something unchangeable may best be seen if we review something of the origin of instincts. Wheeler,[1] Bouvier[2] and many other leaders in the study of insect psy-

[1] Essays in Philosophical Biology, 1939.

[2] Psychic Life of Insects, 1922.

chology of the last thirty years believe that instinct is inherited habit, that it is the sum total of the cumulative effects of actions that had their beginnings in acts of intelligence, and by repetition of the acts they become habits, which in time become fixed and maintained by heredity and thereby become crystallized as instinct. This, let it be understood, does not mean that instincts once acquired are forever rigid and immutable, but rather that instinct is susceptible to change, permitting intelligence to reach out to acquire new habits which may place the organism in better harmony with its environment.

The word intelligence used in comparative psychology should, I think, also be retained. The word itself implies its meaning without much head work on the part of the reader. I sometimes like Forel's term "plastic behavior," which means the same thing, but after all there is something mysterious about the phrase. One would hardly use it in describing human behavior that smacks of intelligence, and I think that after all, since infra-humans differ from us so little in mental equipment, we should not discriminate against them. I often wonder why Forel coined the phrase, since he had recourse to such a meaningful word as "intelligence". But he lived at a time when intelligence was conceded to the human race alone, and all other creatures were limited to instinct. Forel knew that this was not true, for he had occasion repeatedly to see behavior in ants that had a semblance of intelligence, and in his human wards at the Zurich Insane Asylum, as well as in the work-a-day world, I am sure he often saw human behavior that was more or less instinctive. He tried, therefore, to bridge the gap with the phrase "plastic behavior." But in the light of new experiments and interpretations in animal behavior, I think his phrase has outlived its usefulness, and that henceforth we should use the word intelligence, thus giving animals full credit for all that is due them.

Probably the best definition of intelligence as used in insect behavior is to be found in the monumental work of Warden, Jenkins and Warner,[3] in which they say that intelligence may

[3] Comp. Psychol. 2: 808, 1940.

be "(a) the capacity to learn, (b) the ability to adapt learned or unlearned behavior to new situations, (c) the ability to understand situations, (d) the power of generalization and abstraction." Intelligence may fall into any one of the above categories or in several of them.

And now a word about the term "mind," which probably connotes something different to each user of the word. Discussions grow ponderous and disagreements wax hot without either party offering any definition of this key term. One often meets the phrase "the mind of the insect"; in fact, I have in mind important works by Snodgrass and by Washburn with that title. There is a certain vagueness about such a term which makes the reader wonder where the seat of it is and of what it is composed.

The insect mind is, it seems to me, composite, and the ingredients are combinations in various degrees of reflex, instinct, and intelligence, as defined above; mind is the sum total of these three.

Ever mindful of the limitations of the terms reflex, instinct and intelligence, it is my plea, in conclusion, to urge the return to these homely phrases in the study of animal behavior, in preference to the ambiguous substitute terms that have crept into the language, evidently because it was easier to sidestep a disagreeable issue that had a direct bearing on human mental equipment than to bravely face the issue.

Appius ilaire ilaire Godart in Colorado. (Lepid. Pieridae). On several occasions in the past ten years I have suspected that I saw this tropical species on the prairie near Colorado Springs. This morning, July 7, 1941, I had the opportunity of verifying its occurrence in the State. A slightly worn female fed for better than five minutes within two feet of me at the blossoms of "Amur River Privet". I had no net at home and so did not make a capture. However, I am quite familiar with American tropicals and particularly neotropical *Pieridae*. I have collected them extensively and hold one of the largest collections of the family in North America. Thus I feel competent to determine this species and race "in the bush" and not necessarily in the hand.

This specimen had the wide margins and typical coloration of the nymotypical race. I had the opportunity to study its pattern very fully even to the slight yellow-ochre scalation along the costal margin of the forewing on the underside. The specimen was definitely not a form of *A. monuste* or *A. josepha*. The great breadth of the marginal band and the color of the underside of the hindwings, faintly creamy rather than strongly yellow rule out race *poeyi Butler*, the only form that is definitely accepted as flying in the United States by McDunnough (*Mem. So. Calif. Acad. Sci.*, 1: 10. 1938). Cross did not list the species from this state in his "Butterflies of Colorado" (*Proc. Colo. Mus. Nat. Hist.*, 16: 3-28, 1937).—F. MARTIN BROWN, Colorado Springs, Colorado.

Notes on Johnson's South Dakota Chrysomelid Paper (Coleoptera).

This article by Johnson appeared in Entomological News for January, 1941 (pp. 9-14) and presented data of a desirable nature. Such distributional information as this is undoubtedly of more than passing interest to a large number of workers and should therefore be encouraged. However, the paper contained certain irregularities that would seem to merit attention in order to preclude their perpetuation by less experienced entomologists. The present writer offers these suggestions with the reservation that they be accepted as simple scientific form, entirely divorced from any personal antipathy.

The name Chrysomelinae refers to a taxonomic category of subfamily proportions—not a tribe as stated by Johnson.

Employment of the old generic name *Chrysomela* for *Chrysolina auripennis* (*Say*) and its related species is to be discouraged, particularly since our American authorities (Van Dyke, Brown) in their recent revisional studies follow the rules germane to this situation (See Maulik, 1925, Anns. and Mag. Nat. Hist. (19) XV, pp. 95-96). Likewise, the use of *Lina* by a coleopterologist is surprising for it was correctly discontinued long ago by no less authorities than Schaeffer, Fall, Van Dyke et al.

Zygogramma suturalis (nec *sutoralis* Johnson, 1941) is the correct spelling for this Fabrician species.

With the abundant availability of literature, errors of this nature are difficult to justify; the more so when they are perpetrated by an authority in the field. Although seemingly of little consequence, these errors contribute to a lack of confidence in the determinations and other included data, thus detracting considerably from the probable true value of the paper

B. E. WHITE, Merced, California.

A New Species of Phyllomyza from Virginia (Diptera: Milichiidae).

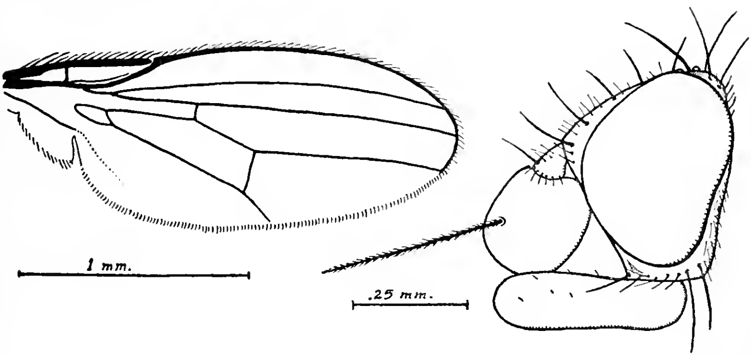
By Geo. Steyskal, Detroit, Michigan.

Phyllomyza milnei new species.

♂. Length, body and wings, each 2 mm.

Color black, slightly gray pruinose, more polished on pleura and abdomen. The knees, tibiae (brownish medially) and tarsi yellow.

Head profile as in figure, the front .45 total width of head, slightly wider anteriorly. Parafrontals and ocellar triangle lightly pruinose but contrasting with the matt black interfrontal stripe. Three outwardly curved upper parafrontal bristles and two incurved lower parafrontals. The upper and lower parafrontal stripes are nearly disjunct and bear a few hairs. Two rows of about four small incurved hairs each in middle of interfrontal stripe (cruciate bristles). Antennae with short pubescence only, the arista distinctly pubescent. Palpi with short pubescence and a few scattered short hairs. Proboscis geniculate but very short and hidden between the palpi. Ommatidia in about 35 rows from front top to rear bottom of eye.



Thorax with two dorsocentral bristles, the anterior pair half as long as the posterior. A small but distinct pair of prescutellars. Hair of thorax long, erect, in five or six irregular rows between the anterior dorsocentrals. Apical scutellar bristles about twice as long as scutellum, converging to meet at their tips. Metanotum polished. Halteres yellow. Calypters whitish with a white fringe. Wings as figured, hyaline, the veins yellow. Spur of middle tibiae half as long as metatarsus.

Abdomen with intermediate segments subequal in length, with sparse coarse hairs and marginal bristly hairs.

Holotype male, Mountain Lake, VIRGINIA, June 30, 1940, yl. no. 3 (L. J. and M. J. Milne), no. 55829 in United States National Museum. *Paratypes*, males, same locality; two, July 18, 1938, in U. S. N. M.; four, July 18, 1938, and one, July 23, 1940, in the author's collection; one, June 30, 1940, one, July 1, 1940, and one, July 8, 1940, returned to Prof. L. J. Milne, Randolph-Macon Woman's College, Lynchburg, Virginia.

Melander separated his genus *Neophyllomyza* principally on the reduced number of dorsocentral bristles. Both *Phyllomyza* and *Neophyllomyza* are well represented in the palaearctic region and Hendel has followed Melander in referring the majority of the species (with 2-3 dorsocentrals) to *Neophyllomyza*, but Duda, followed by Hennig (1937), has shown that a better grouping is based on the number (2 or 3) of upper parafrontal bristles. At any rate the genera are very similar. The only North American species definitely referable to *Neophyllomyza* is the genotype, *quadricornis* Melander. The present species has affinities with *P. hirtipalpis* Malloch (Maryland) and *P. tetragona* Hendel (Central Europe).

There are also two females in the author's collection which may be conspecific, but there seem to be no characters whereby they might be separated from *approximata* Malloch. Moreover, a male of *P. hirtipalpis* Malloch was taken at Mountain Lake, Virginia, on July 9, 1938. *P. approximata* may be the female of either *hirtipalpis* (as was considered likely by Malloch) or of *milnei*, in which latter case it would have priority.

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HENNIG, W. 1937. Milichiidae et Carnidae, in Erwin Lindner's Fliegen der paläarktischen Region, vol. 6_1, fasc. 60a, pp.1-91.

Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF.

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. — Bach & Smith. — The effect of host density on the rate of reproduction of entomophagous parasites. [12] 34: 741-745. **Genest, M. E.** — L'utilite des places d'etude permanentes en entomologie. [98] 68: 261-271, ill. **Hayward, K. J.**—Insectos de importancia economica en la region de Concordia (Entre Rios). [104] 11: 68-109. **Hoffman, C. H.**—Annotated list of elm insects in the United States. [U. S. Dept. Agric.] Misc. Publ. 466: 20 pp. **Muesebeck, C. F. W.**—Common names. [12] 34: 862-863. **Palmer, E. L.** — Holes in the ground. Our soil. [Cornell Rural School Leaflet] 35: 31 pp., ill. **Park, T.**—The laboratory population as a test of a comprehensive ecological system. [Q. Rev. Biol.] 16: 440-461. **Salomon, H.** — La proteccion de las Mariposas. [104] 11: 110-112. **de Soriano, A. M.**—Contralor de la presencia de fragmentos de insectos y particulas extranas en diversos tipos de quesos. [Agronomia] 33: 299-303, ill. **de Soriano & Garassini.**—Contralor de la presencia de excrementos de insectos en harinas. [Agronomia] 33: 304-307, ill. **Stejneger, L.**—Department of Biology. [Rep. U. S. Nat. Mus.] 1941: 39-42. **Swenk, M. H.** — Obituary by H. D. Tate. [12] 34: 863-864, ill. **Thornthwaite, C. W.**—Atlas of climatic types in the United States 1900-1939. [U. S. Dept. Agric.] Misc. Publ. 421: 7 pp., ill. **Wickard, C. R.**—War on insects has military importance. [Rep. Sec. Agric.] 1941: 233-245. **Wimpenny,**

R. S. — Organic polarity: some ecological and physiological aspects. [Q. Rev. Biol.] 16: 389-425, ill.

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62 (3-4): 169-176, ill.

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SPECIAL NOTICES. — A New Entomological Periodical. Boletin de Entomologia Venezolana I No. 1. Editorial pp. 1-2, and List of colaborators 19-24.

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—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

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., Birmngham, 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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

Arctic Lepidoptera especially **Noctuidae**—Wanted to hear from collectors who desire the Arctic Species. Have large collection. R. J. Fitch. Lloydminster, Saskatchewan, Canada.

Wanted—Tropical Lepidoptera and Insects. Also domestic species. Will exchange or buy specimens. M. A. Zappalorti, 253 Senator Street, Brooklyn, N. Y.

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CONTENTS

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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.

ILLUSTRATIONS will be published only when the author bears all or part of the costs as follows:

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Further information on the above may be obtained from the editor.

Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1942, 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 separates 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. LIII APRIL, 1942 No 4

Unorthodox and Abnormal Structures of Lepidoptera.

By Joseph L. Williams, Lincoln University, Pennsylvania.

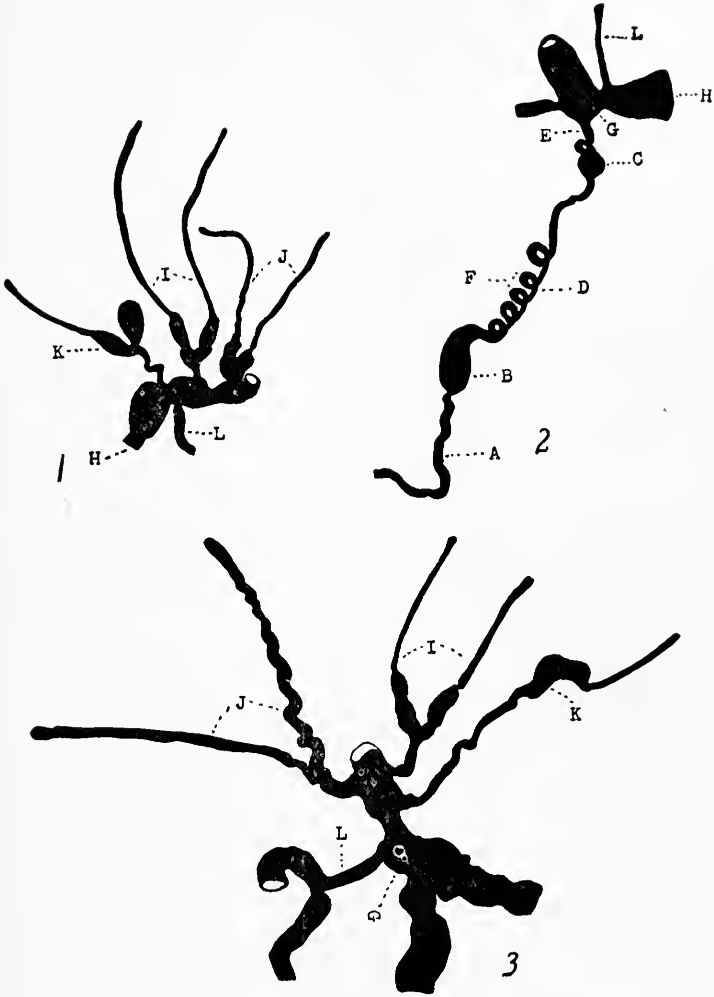
During the season of 1941, while studying the internal genitalia of female Lepidoptera, a number of unorthodox and abnormal structures were encountered. The abdomens of fresh females were cut from the thorax, dissected in salt solution and the reproductive organs removed for study. The peculiar structures were an undeveloped reproductive system of *Plathypena scabra* Fabr., double posterior wings of *Sparganothis sulfureana* Clem., one ovary consisting of four egg-tubes and the other three of *Agrotis ypsilon* Rott., an unorthodox spermatheca of *Drepanulatrix liberaria* Wlk. and two pairs of colleterial glands of *Utetheisa bella* L. and *Synchlora aerata* Fabr.

The female of *P. scabra* was captured while flying, apparently normal, around a light in the house. When dissected the reproductive organs appeared as follows: the egg-tubes contained eggs, which were scarcely larger at the pedicels than those at the base of the terminal filaments. The specimen was virgin, since no spermatophore was in the bursal sac. She, therefore, was probably unable to attract males in spite of her great activity. The volume of the bursa appeared smaller than that of a normal virgin. The volume of the spermathecal chamber was apparently smaller than that of a normal female. Other characters of the spermatheca were normal. The accessory or colleterial gland vesicles were completely devoid of secretion, which is normally found in these structures if the female is virgin or has laid only a few eggs. No abdominal parasites, which would give reason for this condition, were found.

Two metathoracic wings were observed on the left side and the normal one on the right side of *S. Sulfureana.* Unfortunately this abnormality was destroyed when the abdomen was removed from the thorax. An examination of the internal genitalia revealed them to be normal.

Four egg-tubes normally compose the ovary of *A. ypsilon.* The eggs in the tubes of both ovaries were normal in size. No evidence of the fourth tube of the three-tubed ovary was indicated. Other structures of the genitalia were normal. A spermatophore was present in the U-shaped bursa copulatrix. This abnormality, therefore, did not prevent the female from attracting males.

There are two types of spermathecae commonly found in Lepidoptera. The first type consists of a chamber with the spermathecal gland extending from it. A sac joins the lower part of the chamber by means of a duct. These structures are connected to the vagina by means of the spermathecal duct (fig. 1). The second type is similar to the first except for the lack of the sac (fig. 3). A third type is found in *Drepanulatrix liberaria.* This differs from the others as follows: the gland (fig. 2, A) extends from the chamber (fig. 2, B), which is connected to another chamber (fig. 2, C) by means of a duct. This duct (fig. 2, D) is similar to the duct of other Lepidoptera. Another duct (fig. 2, E) opens into the vestibulum on the vagina. This character differs from the general condition, since the duct extending from the first chamber opens into a second instead of the vagina. The second chamber may be a specialized part of the spermathecal duct. If this be so the length of the duct, considering variations, in this species is longer than that of other species. Inside of the second chamber, which is somewhat semi-transparent, a six-coiled structure appears to be continuous with the ducts leading to and from it. It may be suggested that these coils are similar to those generally found below the first chamber. This could hardly be true, since similar coils are present below the first chamber (fig. 2, F). This type of spermatheca apparently is not confined to this species. Petersen demonstrates a similar type in *Bembecia hylaciformis* Lasp. and *Nepticula* sp., ?, but makes



Female Genitalia of: 1. *Synchlora aerata*, 2. *Drepanulatrix liberaria*, 3. *Utetheisa bella*.

A, Spermathecal gland; B, Spermathecal chamber; C, Second chamber; D, Spermathecal duct; E, Second duct; F, Coils of Spermathecal duct; G. Vagina; H, Median oviduct; I, Accessory or colleterial glands; J, Second pair of colleterial glands; K, Spermatheca; L, Seminal duct.

no comment concerning them.

The last and most interesting structures are colleterial glands behind the usual pair in *Utetheisa bella* and *Synchlora aerata*. These glands do not open into the egg-duct through a common duct. They open separately into the egg-duct on its dorsal side. This differs from the common colleterial glands, since they open into the egg-duct by means of a common duct. The ventral position of these glands shown in figure three of *U. bella* is because the egg-duct is lying on top of them. Those of *S. aerata* have vesicles at their bases (fig. 1). Similar structures were in other species, but the unorthodox structures were removed without my being aware of their significance. Some were extensively branched. All of the branches led to the duct opening into the posterior part of the egg-duct. No explanation as to their function can be suggested.

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A List of the Dragonflies (Odonata) taken near Brevard, North Carolina.

By Minter J. Westfall, Jr., Cornell University.

For the past four summers I have been a counsellor at Camp Carolina, about 1½ miles from Brevard, North Carolina, which has an elevation of about 2,300 feet. During the summer of 1938 very little collecting of Odonata was done, but during the past three summers I have taken quite a large number of specimens. Some of these were sent to Dr. J. G. Needham for the Cornell collection, others are in the collections at Ohio State University, the University of Michigan, and Rollins College, while still others are in my personal collection and the collections of various students of this group of insects.

The check list of the insects of North Carolina which was published by Dr. C. S. Brimley in 1938 with additional species added recently includes 135 species without the further species treated in this paper. Dr. Brimley's list has been very helpful and we understand that a list of corrections and additions is being compiled and may be published prior to this paper.

After carefully checking my records of North Carolina Odonata I find that I have taken seven species there which were not listed in Dr. Brimley's card catalog, although I have now sent him these records. Each of these seven species is indicated in the following list by an asterisk. Also in checking my records further species appeared which might make an interesting addition to the literature for the state. Therefore I have decided to publish an annotated list of the species collected, with comments where they seem advisable. Definite dates are given where they seem important.

Considering the limited area and time of collecting covered by this paper it seems remarkable that such a large number of species should be taken. As a counsellor at camp, my activities were restricted during July and August of each summer to the camp property for the most part. On the grounds of Camp Carolina there is an artificial lake of eight acres which is fed by three small mountain streams and several small springs near the lake. At one corner of the lake there is a cove with a grassy edge and shallow water, into which flows the water from several small springs and a larger stream. Here we do most of our collecting at camp. About the middle of September the lake is drained and then is not filled again until the next Spring. This lake will be referred to as the camp lake.

The boys at camp have taken a great interest in the dragonflies and a contest among them to see who could collect the largest number of species has been very popular. The lists of species collected are placed on the front porch of the nature shop in the form of a chart, and each boy proudly points to the list of scientific names accredited to his collection. One of the boys, Bill Thomson, in 1941 was successful in netting 49 species. It is surprising how well the boys learn the scientific names and identify the specimens with the aid of a named collection on display, as well as the keys and books which are available. This plan might be adopted with success by other nature counsellors and more information would be furnished on request.

Besides the collecting on the camp lake, several trips were made each summer to other lakes near Hendersonville and also to a few rivers. It is hoped that with more of these trips still other species may be added.

Four of these collecting localities deserve special mention to make the annotated list better understood. Lake Osceola is located about two miles southwest of Hendersonville. It is about three-fourths to a mile in length and about one-fourth of a mile wide. At one end there are several shallow coves with lily pads and reeds growing there. It is around the upper end where several streams enter that one finds the best collecting.

Lake Kanuga is a medium sized lake, somewhat larger than the camp lake, and is artificially made as are most of the small lakes of this region. It is about six miles southwest of Hendersonville. The upper end is quite marshy and is an ideal collecting spot if one doesn't mind wading in mud and water.

On the French Broad River from Pisgah Forest to Long Shoals, a distance of about forty miles, I have seen a large number of dragonflies, but have collected few of them since we were on the camp canoe trip almost every time and could not stop. Various strange Gomphines, quite a few Macromias, and others have been seen there. The river varies in width from perhaps fifty feet to three-fourths of a mile near Long Shoals. In some places it is quite shallow and rocky, while again it is deeper and fallen trees and brush are piled up here and there.

The Davidson River in Pisgah National Forest is a shallow, rocky stream in which the water is usually clear and cold. While the dragonfly population along the part of the stream studied was not so large, it contained a few interesting species. A similar river, but one which is usually deeper, narrower, and which runs through slightly lower country, is the Little

River which is also near Brevard. I collected some there also in 1941.

The Odonata in general seemed more abundant during the summer of 1941 than during any of the preceding three summers. Unusually common were *Tachopteryx thoreyi, Anax junius, Tramea lacerata, Chromagrion conditum,* and *Enallagma civile.* Other insects including gnats, mosquitos, and sweat bees were unusually abundant. It has been postulated that the exceptionally warm weather might have had some bearing on this situation.

The annotated list of eighty species collected to date follows. Specimens about which there was any doubt as to the identity have been checked carefully by Mrs. Leonora K. Gloyd, and Dr. J. G. Needham. Dr. P. P. Calvert has also kindly checked several species for me. At various times sight records have been made of Odonata not in this list, but they are omitted until specimens are obtained. All collections mentioned were of adults unless otherwise stated.

1. TACHOPTERYX THOREYI (Hagen). Not uncommon around camp lake and in Pisgah Forest from June to August. This has been one of the most interesting of the Odonata at camp. I shall never forget the first specimen collected. One had previously been seen in Pisgah Forest but was not collected. Then on one occasion while I was walking around the camp lake, something suddenly lit on my shirt. To see such a large dragonfly as *Tachopteryx* there was really a surprise, but before anything could be done about it he was gone. Some time later when he had been given up as lost, I happened to notice him perched on the rim of my net. Of course he was soon in the cyanide bottle. We have also caught them from the trunk of a tree by first touching the abdomen so the net may be slipped under it as has been described by Williamson. Also we have picked them from such places by hand, first pinning the wings to the tree or post with the fingers. Once a specimen flew down into the net, and again when one lit on the outside a quick stroke inverted the net before the big fellow had time to leave. We have watched the boys at

camp go through similar experiences as our own and occasionally they come running in to tell of a large dragonfly which was so friendly. One boy when I told him a *Tachopteryx* was on his head, hesitated for a second or two and then suddenly threw his net over his head, trapping the dragonfly. At least 35 specimens were taken and many more seen from June 14 to August 18, 1941.

2. PROGOMPHUS OBSCURUS (Rambur). One male was taken on the sandy shore of a small stream leading into Lake Osceola on June 15, 1941. Another was taken on the sandy shore of Lake Kanuga on June 17, 1941, while one seen on the Little River, June 20, 1941, was too alert to catch.

3. HAGENIUS BREVISTYLUS Selys. Occasional on the French Broad and Davidson Rivers, and at camp lake from June to August.

*4. GOMPHUS (ARIGOMPHUS) VILLOSIPES Selys. The one common Gomphine on the lakes in June, although only one female has been taken. At each of the lakes mentioned males of this species were often found alighting on floating vegetation and were easy to collect. In June of 1941 only a few were seen.

5. GOMPHUS LIVIDUS Selys. Occasional specimens taken near camp lake in June. One male collected on small stream leading into Lake Osceola, June 15, 1941.

6. G. PARVIDENS Currie. The males of this species were found commonly along the French Broad River, June 18, 1941, when 14 were collected. 11 males were taken on the Little River, nearby, on June 20. This species, unlike most Gomphines I have collected, was almost always seen perched several feet above the water on the leaves of some shrub. Especially were they found commonly near where there were rapids and it was the hardest to manipulate the canoe in catching them. They were not particularly wary and could be closely approached without too much caution. Sometimes they alighted on logs or stones near the shore, and almost always spent more time at rest than in flight.

*7. G. (STYLURUS) LAURAE Williamson. Five specimens taken; others seen several times on the French Broad River. A female was taken at the camp lake, July 16, 1939. A male from the same place, August 9, was identified by Dr. Needham. Another male was taken on the French Broad River, September 7, 1940, and was identified by Dr. Calvert. One female, French Broad River, July 28, 1941, and another from the Little River, August 4, 1941.

8 G. (STYLURUS) PLAGIATUS Selys. One male was taken on French Broad River, August 29, 1941, and others were seen at that time.

9. G. (STYLURUS) SPINICEPS Walsh. A male was taken on the French Broad River, August 27, 1941, and two more males were collected there on August 29. A mature nymph was taken on the same river, July 29, 1941.

10. DROMOGOMPHUS SPINOSUS Selys. One male of this species was taken at Lake Osceola on June 18, 1940.

11. LANTHUS ALBISTYLUS (Hagen). About six males were taken on the Davidson River, June 20, 1939, as they lit on rocks in the center of the stream. One female was found just emerging on the sandy bank of the river and was collected with the cast skin. Two males were taken and others seen at the same place on August 3, 1941, while a female was collected on August 17.

12. L. PARVULUS (Selys). A single male was taken along a spring-fed ditch near camp lake on June 12, 1941. Many nymphs were found there the last of August.

13. BOYERIA VINOSA (Say). Quite common on the rivers and a few taken on streams near camp lake during July and August.

14. ANAX LONGIPES Hagen. A few specimens taken at camp lake in July. I now note one male and one female collected July 12, 1931. A specimen was also seen at Lake Kanuga June 13, 1940.

15. A. JUNIUS (Drury). Quite common. Abundant in 1941. Many nymphs taken in camp lake.

16. EPIAESCHNA HEROS (Fabricius). Rare. One dead specimen picked up at camp lake, June 30, 1939.

*17. AESCHNA VERTICALIS Hagen. Four males collected in marsh at Lake Kanuga on August 28, 1939. Quite a few others were seen.

18. AE. UMBROSA Walker. About eight specimens taken during August and September of 1940 at the camp lake. Flying both during the day and at dusk. None of this species was collected in other years.

19. CORDULEGASTER DIASTATOPS (Selys). Occasional at camp lake during June and early July. One female was taken while ovipositing in a very small stream near the camp lake on June 12, 1941, at about 7:15 P. M.

20. C. ERRONEUS Hagen. Quite common for about two weeks in August near the camp lake. They are easily collected as they slowly fly up and down a couple of ditches leading into the lake. This definite habit of patrolling the ditches has not been noticed as much with *C. diastatops*. On August 15, 1941, a female was seen flying slowly along a small spring-fed ditch about 75 yds. from the lake. She hovered here and there to deposit her eggs by dipping her abdomen into the shallow water. We began to dig around in the sand and debris of the bottom and soon found several nymphs of *Cordulegaster*. With further sifting the smaller ones were found to be common almost all the way to the lake.

21. MACROMIA GEORGINA (Selys). One male collected at camp lake, August 4, 1939, and verified by Dr. Needham. Another taken at the same place on August 18, 1940, was at first thought by Mrs. Gloyd to be *M. alleghaniensis*, but after direct comparison with specimens in the Williamson collection she decided it was this species.

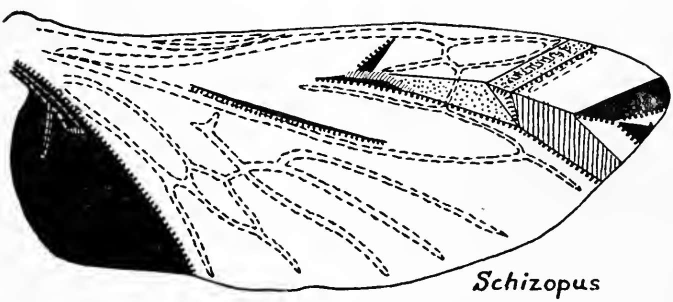
22. M. ALLEGHANIENSIS Williamson. Nine males and one female taken on the Little River near Brevard, June 20, 1941, seem to combine some of what were thought to be the distinguishing characteristics of this and the following species into one. There is therefore some doubt as to the identity, but since more of the characters according to Williamson's paper of 1908 seem to point to this species I am for the present placing them here. With more study there will probably be some changes made in specimens referred to these three species.

(To be continued)

The Wing of the Schizopini (Coleoptera: Dascillidae).

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

Schizopus, with its closely related genera, *Dystaxia* and *Glyptoscelimorpha,* has been generally placed in the Buprestidae, as a mere tribe, though Good in 1925 (Ann. Ent. Soc. Am. 18: 271) rejected them from the family, and published the venations of all three genera in comparison with that of *Dascillus* (figs. 42, 43, 48, vs. 41). More recently I have examined the wing folding of *Schizopus* (figure) and find that it, like the venation, is of a different type from any of the Buprestidae, and like that of *Dascillus* (Jour. N. Y. Ent. Soc. 34, fig. 61, 1926). In particular both *Dascillus* and *Schizopus* have a normal hinge system at the end of the "cell", which is lacking in even the most complexly folded Buprestidae (Good, figs. 36, 44).



Wing-venation and folding of *Schizopus laetus.* The symbols and conventions are as in my major paper on the wing-folding—Jour. N. Y. Ent. Soc. 34: 42-139 with pls. 7-18.

On the more conventional characters,—the fusion of the first two ventral segments of the abdomen and the spherical fore coxae, *Schizopus* goes correctly enough with the Buprestidae, but there are several other external points of likeness between *Schizopus* and *Dascillus*: the cleft last membranous lobe of the tarsi and the very wide side piece of the metasternum which are the traditional tribal characters of the Schizopini are both shared by *Dascillus* and by no other Buprestidae examined. And another character is the dorsum of the abdomen; in all true Buprestidae examined it is heavily chitinized and punctate, like any proper external surface of the body;—in *Dascillus* and *Schizopus* it is smooth, glossy and lightly chitinized, though heavier than in most beetles, and the setigerous punctures are confined to a narrow posterior band on each segment. This last is, I believe, an important character, for it separates the Buprestidae from practically all the rest of the Coleoptera.

As to the ventral process of the prosternum, used by Bradley for his key character, it is present in *Dascillus* as well as *Schizopus* and the Buprestidae, though not quite as well fitted into the mesosternum; in *Anorus*, the only other Dascillid at hand which is really closely related, the spine is still looser.

Another group with the same venation and folding is the true Rhipiceridae (with *Sandalus* as well as *Rhipicera*[1]). The connection with *Dascillus* is close, the main difference being the presence of an empodium; the prosternal spine is reduced, more like *Anorus* than even *Dascillus,* but the lateral piece of the metasternum is enormous, even wider than in *Schizopus*.

In sum I propose to transfer the *Schizopini* from the Buprestidae to the Dascillidae, where they will be tribally distinguished by the ankylosed first two ventral segments and much narrower prosternum, the latter character carrying with it a practically spherical fore coxa.

Postscript: Since this article was sent to the NEWS, Bryant E. Rees has published the first stage larva in Proc. Ent. Soc. Wash. xliii, 210-222, 1941. His conclusion is that the Schizopini form a distinct family,—Schizopodidae of Leconte, 1859.

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[1] Craighead has slipped up in forming the family Sandalidae, as I believe, for *Sandalus* is certainly very close to *Rhipicera*, even having the same striking sexual dimorphism. The aberrant form which should have had a family name, was *Callirhipis*, though if one defines families very broadly it could perhaps enter the Elateridae along with *Zenoa*.

Notes on some North American Hesperiidae with the Description of a New Race of Polites verna (Edwards) (Lepidoptera, Rhopalocera).

By H. A. Freeman, White Deer, Texas.

All the localities mentioned below are in Texas unless otherwise stated.

Erynnis burgessi (Skinner). 1 ♂, March 3, 1938, Dallas; 1 ♂, April 7, 1940, and 2 ♀ ♀, March 31, 1941, Cedar Hill, Dallas County. These four specimens appear to be the first of this species taken in Texas; previously the known range of this species was Utah, Mexico, Arizona, New Mexico and Colorado. The determination of these specimens was made by a study of the genitalia of the males.

Erynnis baptisiae (Forbes). 2 ♀ ♀, April 19, 1941, 1 ♀, April 20, 1941, 2 ♂ ♂, 1 ♀, May 31, 1941, Lancaster; 2 ♀ ♀, August 22, 1940, Vickery; 1 ♀, March 15, 1938, Dallas.

As far as I am able to gather the above records are the only ones for this species in Texas. Mr. E. L. Bell examined the genitalia and informed me that the details appear to be those of this species. It was interesting to note that there were no species of *Baptisia* growing in any of the localities where these specimens were taken.

Hesperia uncas Edwards. 3 ♂ ♂, August 18, 1941, 3 ♂ ♂, and 1 ♀, August 21, 1941, 20 miles north of White Deer, Carson County; 2 ♂ ♂, August 30, 1941, 1 ♀, September 4, 1941, White Deer.

As far as I am able to ascertain this species has never been recorded from Texas previously. In addition to the ten specimens caught several others were seen, so this species must be native to this part of the Panhandle.

Hesperia meskei (Edwards). 1 ♀, June 30, 1930, North Little Rock, Arkansas. 1 ♀, August 22, 1933, Hope Hill Farm, Faulkner County, Arkansas. Arkansas can now be included in the range of this rather rare species. From the dates of the two specimens this species must be double brooded there.

Polites verna sequoyah n. ssp.

This new race differs from typical *verna* (Edwards) in the following particulars: smaller in size, mounted males average 26 mm., females 27 mm., whereas typical *verna* males average 29 mm. and the females 33 mm. The spot at the end of the cell of the primaries of *verna* is usually prominent, while in *sequoyah* it is absent or else very faintly indicated. All the other spots present in *verna* are smaller in proportion in *sequoyah*. On the under side the coloration is a warmer brown than *verna* and there are fewer fulvous hairs toward the base of the secondaries. These hairs in *verna* give the specimen a yellowish cast, while in *sequoyah* the coloration of that part of the wings is darker. On the under side of the primaries of *sequoyah* there is less fulvous overscaling and the general coloration is darker. On the under side of the secondaries the violet reflection present in some specimens of *verna* is more pronounced in *sequoyah* and the general coloration is a warmer brown, produced by a number of reddish, metallic scales. The faint indication of spots present in *verna* is slightly better defined in *sequoyah*, especially toward the lower part of the wings.

Specimens of this new southern race were compared with typical *verna* from Rhode Island, Ohio, and New York. Following the example of previous authors in this genus, this new race is named in honor of Sequoyah, the Cherokee Indian Chief.

Described from sixteen specimens, eleven males and five females, collected at Hope Hill Farm, Faulkner County, ARKANSAS and Little Rock, Arkansas by the author during May and July of 1933, 1940, and 1941.

Holotype ♂ and *allotype* ♀ are in the collection of the author. *Paratypes*, ten ♂♂ and four ♀♀, will be disposed as follows: one pair to the American Museum of Natural History, New York, New York; one pair to the Academy of Natural Sciences, Philadelphia, Pennsylvania; one pair to the United States National Museum, Washington, D. C.; one ♂ to the collection of Mr. Cyril F. dos Passos, Mendham, New Jersey; one ♂ to the collection of Mr. Otto Buchholz, Roselle Park, New Jersey; one ♂ to the collection of Mr. Don B. Stallings and Dr. J. E. Turner, Caldwell, Kansas; and one ♂ to the collection of Mr. Lowell Hulbirt, Glendora, California. The other four *paratypes* will remain for the present in the collection of the author.

ATRYTONE DION race ALABAMAE Lindsey. 1 ♀, June 10, 1941, Lancaster.

Since recording the occurrence of this race in Arkansas in "Field and Laboratory, January, 1941, Vol. IX, No. 1, P. 29" a female of this race was taken by the author on thistles near Lancaster, Texas. This is the first time this race or the species has been seen in Texas.

ATRYTONE DUKESI Lindsey. 1 ♂, July 10, 1940, Sylvania, Ohio (Donald Eff, Coll.).

The above specimen, sent to me by Mr. Donald Eff, is the only record of this species having been taken in Ohio.

AMBLYSCIRTES BELLI Freeman. 1 ♂, July 25, 1941, Checatoh, Oklahoma. 1 ♂, July 5, 1941, North Little Rock, Arkansas (Dr. J. E. Turner, coll.). 11 ♂ ♂, and 8 ♀ ♀, July 20-23, 1941, Little Rock Arkansas. 1 ♂, July 25, 1929, Willard, Missouri (Dr. A. E. Brower, coll.).

Dr. A. E. Brower recorded the capture of a specimen of *Amblyscirtes celia* Skinner at Willard, Missouri "Entomological News, xli, '30, P. 289". After collecting *belli* in Arkansas and Oklahoma I wrote Dr. Brower asking about the specimen he recorded as *celia*. He very kindly sent the specimen to me for examination and it turned out to be a ♂ *belli*. Until 1941 I had seen *belli* only from the type localities of Lancaster and Vickery, Dallas County, Texas, so from the above data this species has a much more extensive range than was previously thought.

LERODEA TRIPUNCTUS (Herrich-Schaeffer). 1 ♂, August 18, 1939, Brickell Hammock, Miami, Florida; 1 ♀, September 6, 1939, Miami, Florida; 1 ♂, June 20, 1937, Miami, Florida (in the collection of A. C. Frederick, Albany, New York); all three specimens collected by F. N. Young.

Dr. J. McDunnough in his "Check List of the Lepidoptera of Canada and the United States of America" (1938, Memoirs Southern California Academy of Sciences, 1, p. 35) preceded this species by an asterisk indicating that it is of doubtful North American occurrence. From the data contained on the three specimens above, two of which were sent to me by Mr. A. C. Frederick, Albany, New York, and the third contained in his collection, any doubt as to the occurrence of this species within the limits of the United States should now be removed.

A New Species of Oedematocera with Notes and key (Tachinidae, Diptera)[1].

By H. J. Reinhard, College Station, Texas.

The relationships of this genus were discussed by Aldrich in 1928 (Ent. News, 39: 301-4). In this reference it is pointed out that Townsend's *Schistocercophaga,* proposed for *Oedematocera dampfi* Ald., is characterized largely in the form of a comparison with *Hypophorinia.* Aldrich cited at least five important characters which show that these genera differ widely from each other and are not members of even the same tribe. Subsequently Townsend placed *Schistocercophaga* in the tribe Hyperecteinini, along with *Oedematocera,* far removed from *Hypophorinia* in the tribe Phorinini. In the latest key to Hyperecteinini (Townsend, Manual of Myiology, Part IV: 162) the two supposed genera trace to the same couplet and are separated on the difference of one frontal bristle beneath the base of the antennae and some variation in the length of the third antennal segment in the male sex. Neither these characters nor any listed in the recent generic diagnoses (loc. cit., Part X: 310, 313-14) show outstanding differences common to both sexes and apparently *Schistocercophaga* is superfluous, as Aldrich has already pointed out. The following key will assist in distinguishing the species of *Oedematocera,* including one new, described below.

[1] Contribution No. 707, Division of Entomology, Texas Agricutural Experiment Station.

KEY TO SPECIES OF OEDEMATOCERA.

1. Abdomen black or at least with distinct dark markings 2.
   Abdomen wholly yellow; pleura pale pilose; prosternum bare; antennae and aristae very long; male without orbitals and with facial ridges strongly bulged or convex in profile (Ohio, North Carolina to New England) ..*flavcola* Coq.
2. Prosternum setose or bristled .... 3.
   Prosternum bare .... 4.
3. Scutellum and abdomen wholly black; third antennal segment 3 to 4 times longer than second; arista thickened hardly to middle (Texas and Georgia to New England) ....*gilvipes* Coq.
   Scutellum and abdomen largely reddish yellow; third antennal segment 5 to 6 times longer than second; arista thickened on proximal three-fifths (New York) ....*optata*, n. sp.
4. Thorax with two broad well defined blackish stripes; cheek about one-eighth eye height; first abdominal segment without median marginals, female only (Panama) ....*striata* Ald.
   Thorax with four narrow indistinct brownish stripes; cheek nearly one-third eye height; first abdominal segment with a pair of median marginals (Mexico) ....*dampfi* Ald.

Oedematocera optata n. sp.

♂. Front at vertex 0.32 of head width, widening gradually downward to antennal base; parafrontal gray pollinose, wider than the reddish brown middle stripe; verticals two pairs but the outer much smaller than inner ones; frontals in a single row which hardly diverges anteriorly, two lowermost bristles beneath base of antennae; orbitals two proclinate pairs; ocellars proclinate and divaricate; face very deeply impressed, its lateral ridges nearly vertical and weakly bristled on lowest fourth; parafacial subsilvery, bare, narrowed downward to less than one-half width of third antennal segment; vibrissae strong, decussate, on oral margin; epistoma nearly as wide as clypeus and in plane of same; antennae as long as face, reddish yellow with third segment slightly darker, latter five or six times longer than second segment; arista finely pubescent, thickened on basal three-fifths which is reddish yellow, proximal segments short but distinct; cheek gray pollinose, nearly bare or with a few pale hairs along lower edge, about one-fifth eye-height; eyes bare; proboscis short, labella large, pale yellow; palpi slightly thickened apically, yellow; back of head flattened, gray pollinose, sparsely clothed with short pale hairs.

Thorax blackish, gray pollinose, with four dark dorsal stripes, outer ones broadly interrupted at suture and reduced to a triangular spot in front; scutellum reddish yellow in ground color beyond basal margin above. Chaetotaxy: acrostichal 2, 3; dorsocentral 3, 3; intraalar 3; supraalar 3; presutural 2; notopleural 2; posthumeral 2; humeral 3; postalar 2; pteropleural 1 (small); sternopleural 3 (lower front one small); scutellum with 3 lateral, 1 small divergent apical and 1 depressed subdiscal pair; sides of postnotum beneath calypters bare; prosternum with a single minute hair at each side; propleura bare; calypters opaque, whitish with a faint tawny tinge.

Abdomen reddish yellow with a black median vitta above which widens behind to include posterior margin of third segment and all of fourth, entire upper surface lightly dusted with pale yellowish gray patternless pollen; basal segments each with one pair of median marginal bristles; intermediate segments with a pair of discal bristles besides a marginal row on third; anal segment with a discal and a marginal row; genitalia reddish yellow, retracted; inner forceps moderately stout, divided and slightly divergent apically; outer forceps finger-like, narrower in profile than inner ones but nearly as long; fifth sternite wholly reddish yellow, with a rather shallow U-shaped apical incision, lobes sparsely beset with fine black hairs.

Legs reddish yellow with tarsi dark brown to blackish; hind tibiae not ciliated; claws and pulvilli short.

Wings gray hyaline with a faint tawny tinge near base and on costal margin; first vein bare, third with two hairs near base; fourth vein with a broad, even, stumpless bend; first posterior cell narrowly open shortly before exact wing tip; hind cross vein a trifle nearer bend than small cross vein; last section of fifth vein hardly two-fifths length of preceding section; costal spine vestigial.

♀.—Front at vertex 0.36 of head-width in one specimen; third antennal segment narrower and paler than in male; two sternopleurals; abdomen largely blackish above; genitalia retracted, not adapted for piercing; otherwise very similar to male.

Length: 6-7 mm.

Holotype: Male, "New York, July 8, 1935". *Allotype,* female, Cold Spring Harbor, Long Island, New York, August 20, 1927 (H. C. Hallock). The latter specimen, donated by H. C. Hallock, bears an Aldrich determination label, "*Oedematocera flaveola* Coq." There appears little doubt that this is the opposite sex of the male described above. The presence of orbitals in the latter and the setose prosternum indicate a closer relationship with *gilvipes* than with *flaveola.*

A Dehydration and Embedding Schedule for Insects.

By L. M. Bartlett.[1]

In the course of work on a thesis on insect histology, the author had occasion to use a technique for dehydration which has been modified from one given by Smith (1940)[2] for sectioning insect eggs which are rich in yolk and thus very friable. The chitinous insectan exoskeleton is also brittle, and thus presents the same difficulties as those encountered in the sectioning of eggs heavily laden with yolk. The method of dehydration given below has been used with considerable success for aquatic stages of mayflies, and a few German cockroaches have also been successfully sectioned by use of the method. The following sequence of steps was followed:

1. Drop the insect into lightly-boiling water for ¼-½ minute.
2. Transfer to Syracuse watch glass containing the fixative; cut slits in the thorax and abdomen, and inject a small quantity of fixative into the body cavity through these slits by means of a capillary pipette. Now place the insect in a vial of the fixative for the proper length of time, depending on which fixative is employed.
3. Transfer to 35% ethyl alcohol for from 2 hours to overnight (after the proper treatment required by the type of fixative used), or, in the event that alcohols of 70% or higher strengths have been employed in the treatment after fixation, proceed directly to step 4.
4. Transfer to a mixture of N-butyl and 50% ethyl alcohols in a ratio of 1:2 for 2-4 hours.
5. Transfer to a mixture of N-butyl and 50% ethyl alcohols in a ratio of 2:1, to each 150 cc. of which has been added 4½ pipettes full of phenol (melted by placing a bottle of phenol crystals in warm water) for 24-48 hours.
6. Transfer to N-butyl alcohol, C.P., for 4-8 hours.
7. Transfer to N-butyl alcohol, C.P., to each 150 cc. of

[1] Contribution from the Department of Entomology and Zoology, Massachusetts State College.

[2] Smith, S. G., 1940, A new embedding schedule for insect cytology. Stain Technology 15: 175-176.

which has been added 4½ pipettes full of phenol, for 12-24 hours.

8. Transfer to N-butyl alcohol and 50°-52° paraffin, in a ratio of about 1:1 by volume for 1-2 hours.

9. Transfer to 50°-52° paraffin for 1-2 hours.

10. Transfer to 56°-58° paraffin for 1½-3 hours.

11. Imbed in 58°-60° paraffin.

To date some 200 slides representing 42 specimens in 8 genera of mayflies have been sectioned after various types of fixation and dehydration methods. While this may not be enough work on which to base any definite conclusions, the following generalizations seem to be in order. Those fixatives which contain formalin (*e.g.*, Bouin's) do not give as good results as others; those fixatives containing nitric acid (*e.g.*, Gilson's) give the best results. For insects which are at least as heavily sclerotized as the German cockroach the dehydration method given above is superior to dehydration by dioxan or a graded series of ethyl alcohols.

The author wishes to express his thanks to Dr. J. R. Traver and Mr. H. Laudani for reading the manuscript and making suggestions thereon.

The Types and Status of Chrysops ceras (Diptera, Tabanidae).

By Cornelius B. Philip, Hamilton, Montana.

Although in Hines' last published opinion (1925), this species from New Mexico and Northern Mexico was considered a synonym of *C. megaceras* Bellardi, he again suggested their separateness in manuscript notes made during a visit to the British Museum. Through courtesy of Mr. H. Oldroyd of that institution, distinctness of the two has been amply verified through loan of a cotype of *ceras* and a well preserved specimen of *megaceras* in the Bigot collection. The latter is a much more brownish, and larger insect, the two basal antennal segments not as swollen, the wing picture more dense, some fumosity evident even in the basal cells, the dorsal, abdominal incisures not pallid, and venter not uniformly gray pollinose.

As four of the six cotypes of *ceras* are in hopelessly damaged condition, the relatively intact specimen studied by the writer is here designated as lectotype. It bears the original, handwritten label "W. F. Gila, N.M., 7-10, 5 miles," and printed "Coll. Townsend," and the British Museum label "Purchased from E. Brünetti 1902." The specimen has had the head glued to the thorax thus resulting in partially obscuring the dorsal thoractic pattern by infiltration, and it lacks the two terminal joints of the right antenna, the joints from the tibia outward of the left fore-leg, and the stigmal portion of the costal margin of the right wing. It is in otherwise good condition and its characters closely agree with the original description with the following additional comments:

Front taller than broad; the callosity could be considered, (as described by Townsend) "roughly diamond shaped" with horizontal axis, the lateral points truncated, (*i.e.*, it is sharply subrectangulate above and below, but rounded on either side, a little broader than tall), the disc finely wrinkled as in other species of the group; the clypeus above the mouth more or less denuded; palpi brownish black, only the posterior margin "pale brownish," about three-fifths the length of the stylets. Distribution of brownish infuscation on legs and wings as indicated by Townsend, except lacking on apex of middle tibiae. The fumosity of the wings is irregular, indefinite and difficult to describe, but margins most of the outer veins, and is particularly dense about the short transverse veins. Length, 9mm.

A specimen from Sierre Madre, Chihuahua, Mexico, is in close agreement, except for paler palpi, and less dilute wing markings, so that there appears a more definite, irregular, apical costal spot joining that at the furcation and widely separated from the stigmal area by a hyaline interval. Eyes (relaxed) with fine "punctate" purple spots and no evidence of the usual *Chrysops* pattern. Thorax with prominent dark and grayish lines as described, but a narrow gray middorsal line splitting the median of the three heavy brown vittae mentioned by Townsend.

Because of dissimilarity to *Chrysops* of the antennae, distribution of facial pollinosity, "punctate" type of eye pattern, and peculiarly shaped, finely wrinkled frontal callosities, the related Neotropical species *tanycerus* O. S., *megaceras* Bell., and *melanoptera* Hine have been included with *ceras* Towns. in a new genus *Assipala* (Philip, 1941, named for the "ace-of-spades-like" frontal callosity of the genotype species, *tanycerus;* it is a coincidence that the callosity in *ceras* should roughly resemble the ace of diamonds). Hine's (1917) key to the four species is in error on the antennal characters, and the characters of the last couplet separating *ceras* and *megaceras* are reversed although followed by Kröber (1926, p. 220).

Ceras is another of the peculiar Neotropical tabanid elements that has crossed the southern boundaries of the United States, and was overlooked in Brennan's review of the Pangoniinae of this region.

References.

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Kröber, O. 1925. Die Chrysops-Arten Sud. und Mittelamerikas nebst den Arten der Inselwelt und Mexikos. Konowia, 4 (3/4): 210-256.

Philip, C. B. 1941. Un neuvo genero de moscas, *Assipala* (Diptera, Tabanidae). Revista de Ent. (in press, Dec. no.).

Some Grass Aphid Host Records (Homoptera).[1]

By G. F. Knowlton and W. Don Fronk,
Utah Agricultural Experiment Station, Logan.

The following report includes a number of host records for grass aphids, not included in the Patch, Food-plant catalogue of the aphids of the world (Maine Agr. Exp. Sta. Bul. 393, 1938, 430 p.). One apparently undescribed *Amphorophora* is here described as new. All collections were made in Utah.

Aphis maidis Fitch. In the experimental greenhouse at Logan, Utah, March 22, 1939, infesting *Poa nevadensis* (K.-M.

[1] Authorized for publication by the director, January 9, 1942. Report on project 51-A Hatch.

W. Allen); on *Dactylis glomerata* at Logan, Sept. 5, 1936.

A. MEDICAGINIS Koch. On grass at Morgan, May 21, 1938; alates on corn at Providence, July 23, 1935 (C. F. Smith); alate on wheat at Springville, June 15, 1938 (K.-L. L. Hansen).

A. MIDDLETONI Thos. On roots of a "yellow grass" at Garland, July 14, 1939.

A. SETARIAE (Thos.). On wheat at Ephraim, Aug. 5, 1938 (K.-L. L. Hansen).

RHOPALOSIPHUM NYMPHEAE (L.). On foxtail grass, American Fork, July 19, 1936.

R. PRUNIFOLIAE (Fitch). Collected in greenhouse at Logan, February and March of 1937, on *Agropyron pauciflorum*, *Bouteluoa gracilis* and *B. marginatus*, *Bromus marginatus* and *B. inermis*, *Elymus virginicus* and *E. triticoides*, *Festuca elatior* (K.-M. W. Allen); on tall bunchgrass at Tremonton.

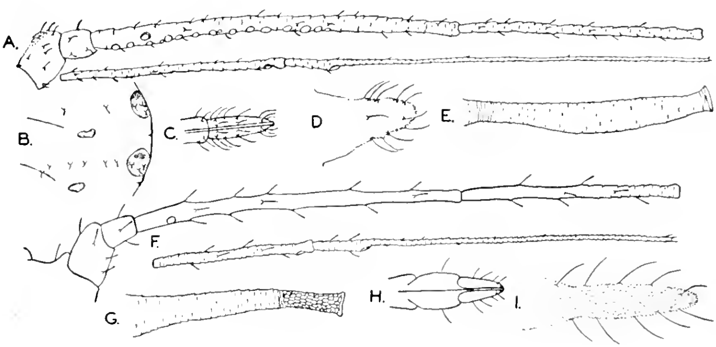

Fig. 1. *Amphorophora alleni* n. sp. Alate, A.-E. *Macrosiphum granarium* (Kirby). Apterous, F.-I.

Amphorophora alleni n. sp.

Alate vivipara: body 3.1 mm. long; antennae 3.53 mm. long, dusky; antennal III, 0.96 with 15 to 18 sensoria; IV, 0.64 to 0.72; V, 0.576; VI, 0.16 + 0.96; rostrum reaches hind coxae; rostral IV + V, 0.192 mm. long, slenderly obtuse at tip, armed with conspicuous hairs; hind tibiae 2.43; hind tarsi 0.144; abdomen with 6 conspicuous blackish lateral spots on each side, each containing several blunt to capitate, short hairs (fig. B.)

which form part of the row extending across the abdominal segment; also 3 or 4 pairs of smaller dorso-lateral dark patches; cornicles dusky, 0.68, lightly imbricated; cauda dusky, 0.29 mm. long with 4 to 6 lateral hairs on each side.

Collection: Taken on grass at Lincoln, Tooele County, UTAH, June 2, 1938 (G. F. Knowlton and L. L. Hansen). *Type* in the writer's collection.

Taxonomy: This does not readily key out in Mason's key (U. S. Nat. Mus. Proc. 69 [Art. 20]: 5-6, 1925). It runs to *A. ribiella* (Davis) in Gillette and Palmer's key (Ent. Soc. Amer. Ann. 27: 134, 1934) from which it differs in possessing: Fewer antennal sensoria; also longer hind tibiae, rostral IV + V, cornicles, and antennals III, IV and V.

MACROSIPHUM DIRHODUM (Walk.). On *Bromus tectorum* at Moab, June, 1935.

M. GRANARIUM (Kirby). In greenhouse at Logan, Utah, Feb. 26, 1937, on *Agropyron curlependula, A. gracilis, A. marginatus, Bromus inermis, B. marginatus, Elymus triticoides, E. virginicus, Festuca elatior;* also on foxtail grass at American Fork and oats at Aurora and Mendon.

M. SOLANIFOLII (Ashm.). On *Graminum* at Santa Clara, May 1, 1934.

M. PISI (Kalt.). Numerous winged specimens collected upon various grasses and wheat, but probably all were accidentals.

MYZUS PERSICAE (Sulzer). On *Agropyron elongatum* in Logan greenhouse, Dec. 15, 1939 and *Bromus,* Sept. 11, 1937 (K.-M. W. Allen); *Zea mays,* Farmington.

TETRANEURA GRAMINIS Monell. On woolly orchard grass and rice cut grass at Hooper and Ogden, Sept. 15, 1936.

GEOICA PHASEOLI Pass. and G. SQUAMOSA Hart. were collected on grass roots and in ant nests in Logan Canyon, March 24, 1933 (Det. A. C. Maxson).

FORDA OLIVACEA Rohwer. Collected on roots of Bermuda grass at Sunset, Oct. 11, 1936, tall bunchgrass roots at Salt Lake City (Det. A. C. Maxson).

Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF.

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.—Augustson, G. F.—Ectoparasite-host records from the Sierran Region of east-central California. [38] 40: 147-157, ill. **Blackwelder, R. E.**—The entomological work of Adalbert Fenyes. [55] 18: 17-22. **Brues, C. T.**—Insects as carriers of poliomyelitis virus. [68] 95: 169-170. **Cannon, H. G.**—On chlorazol Black E and some other new stains. [J. Roy. Micr. Soc.] 61: 88-94. **Eltringham, H.**—Obituary. By G. D. H. Carpenter. [31] 149: 72. Obituary by R. W. L. [8] 78: 16. **Emerson, A. E.**—Biological sociology. [Denison Univ. Bull.] 41: 146-155. **Fraser, F. C.**—The date of publication of the Monographie des Gomphines de Selys. [8] 78: 42. **Gillette, C. P.**—In Memoriam. By F. B. Paddock. [Proc. Iowa Acad. Sci.] 48: 35-39, ill. **Goodliffe, F. D.**—Studies on insects bred from barley, wheat, maize and oats. [22] 32: 309-325, ill. **Hamilton, H. L.**—The biological action of rotenone on freshwater animals. [Proc. Iowa Acad. Sci.] 48: 467-479, ill. **Hope, J. G.**—Insect associates of Cakile edentula, the American sea rocket. [Bull. Wagner Free Inst. Sci.] 17: 5 pp. **Hopping, R.**—Obituary by Blaisdell & Van Dyke. [55] 18: 1-3, ill. **Mayo, N.**—Entomological services of the State Department of Agriculture. [39] 24: 71-75. **McCracken, I.**—Gall Insects. [55] 18: 22. **O'Kane, Glover & Blickle**—An insect toximeter. Penetration of certain liquids through the pronotum of the American roach. [Univ. N. Ham. Tech. Bull.] 74: 16 pp., ill. 76: 8 pp., ill. **Robertson, W. R. B.**—In

Memoriam. By A. E. Lambert. [Proc. Iowa Acad. Sci.] 48: 46-47, ill. **Ross, H. H.**—Distribution of Illinois insects. [Trans. Illinois State Acad. Sci.] 34: 236-237, ill. **Taylor, E.**—The use of methacrylate resin in the preservation of insect specimens. [8] 78: 15. **Uvarov & Kalmus**—Properties of cuticle and insect ecology. [31] 149: 109-110. **Vazquez & Villasenor**—Estudios acerca del sistema nervioso de los Insectos. [112] 12: 773-779, ill. **Weiss, Soraci & McCoy**—The behavior of certain insects to various wave-lengths of light. [6] 50: 1-34, ill. **Wood, S. F.**—Reactions of man to the feeding of Reduviid bugs. [J. Parasit.] 28: 43-49.

ANATOMY, PHYSIOLOGY, ETC.—Darlington, C. D.—Chromosome chemistry and gene action. [31] 149: 66-69. **Darlington & Dobzhansky**—Temperature and "sex-ratio" in Drosophila pseudobscura. [Proc. Nat. Acad. Sci.] 28: 45-48. **Stanley, John**—A mathematical theory of the growth of populations of the flour beetle Tribolium confusum Duv. V. The relation between the limiting value of egg population in the absence of hatching and the sex ratio of the group of adult beetles used in a culture. [84] 23: 24-31.

ARACHNIDA AND MYRIOPODA.—Barrows, W. M. and Ivie, W.—Some new spiders from Ohio. [Ohio J. Sci.] 42: 20-23, ill. (*). **Chamberlin, R. V.**—On a collection of Myriopods from Iowa. [4] 74: 15-17. **Fonseca, F. da**—Notas de acareologia. Posicao do genero Liponissus em face das esp. trop; seu desdobramento em nov. gen. [121] 2: 262-65, ill. (S). **Gregson, J. D.**—The coast tick (Ixodes californicus) problem in British Columbia. [4] 74: 3-5. **McGregor, E. A.**—The taxonomic status of the so-called "Common red spider". [10] 44: 26-29, ill. **Watson, J. R.**—A new Stephanothrips from Texas. [39] 24: 65-66.

THE SMALLER ORDER OF INSECTS.—Augustson, G. F.—A new flea from the Mojave Desert (California). [38] 40: 138-139, ill. Some new California Siphonaptera. [38] 40: 140-146, ill. The allotype of Geusibia ashcrafti. [38] 40: 157-159, ill. **Deevey & Bishop**—A fishery survey of important Connecticut lakes. Procedures in a limnological survey. [Conn. Sta. Geol. & Nat. Hist. Surv.] Bull. 63, pp. 92-98, ill. **Frison, T. H.**—Descriptions, records and systematic notes concerning western North American stoneflies. [55] 18: 9-16, ill. **Good, N. E.**—Megabothris abantis description of the female. [103] 15: 7-9, ill. **Hopkins, G. H. E.**—The Mallophaga as an aid to the classification of birds. [Ibis] 6: 94-106. **Pendleton, R. L.**—Some results of termite activity in Thailand soil. [Thai Sci. Bull.] 3: 30-53, ill. **Pierce, W. D.**—The phylogenetic position of the Strepsiptera as determined by the first larva. [38] 40: 121-125. See Fraser under General.

ORTHOPTERA.—da Costa-Lima, A.—Um novo grilo cavernicola de Minas Gerais. (Phalangopsitidae). [Pap. Avul Dept. Zool. Secret. Agric. S. Paulo] (1940) 1: 43-49, ill. **Klostermeyer, E. C.**—The life history and habits of the ringlegged earwig, Euborellia annulipes. [103] 15: 13-18. **Pruthi, H. S.**—A fresh cycle of the desert locust in India. [Current Science] 10: 479-483, ill. **Slaughter, Evans & Goodrich**—Changes in susceptibility to x-rays of certain embryonic cells of the grasshopper. [Proc. Iowa, Acad. Sci.] 48: 482-483. **Uvarov, B. P.**—New and less known southern Palaearctic Orthoptera. [1] 67: 303-361, ill. **Zeuner, F. E.**—The Locustopsidae and the phylogeny of the Acridodea. [107] 11: 18 pp., ill.

HEMIPTERA.—Comstock, J. A.—Notes on Loxophora dammersi. [38] 40: 160, ill. **Hardy, D. E.**—A note on leafhopper abundance. [103] 15: 34. **Rice, L. A.**—Notes on the biology and species of the three genera of Notonectidae found at Reelfoot Lake, Tennessee. [Jour. Tenn. Acad. Sci.] 17: 55-67, ill. **Sailer, R. I.**—Host record and distributional note for Deraeocoris rufiventris 1921. [103] 15: 18. **Stanger, N. W.**—New species of Lygus from California (Miridae). [67] 7: 161-168, ill.

LEPIDOPTERA.—Beall, G.—The Monarch butterfly, Danaus archippus Fab. I General observations in southern Ontario. [Canad. Field Nat.] 55: 123-129. II The movement in southern Ontario. Ib. 133-137. **Brown & McGuffin**—New descriptions of larvae of forest insects. Introduction: Panthea (Phalaenid.). [4] 74: 8-12, ill. **Burdick, W. N.**—A new race of Coenonympha ampelos from the Mono Basin of California. [4] 74: 2-3, ill. **Clarke, J. F. G.**—A synopsis of the genus Anoncia with one new species (Cosmopterygid.). [4] 74: 17-19, ill. (k). **Comstock & Henne**—The larva and pupa of Trichoclea edwardsi. [38] 40: 165-166. **Dethier, V. G.**—The larva and pupa of Herculia intermedialis (Pyralidae). [4] 74: 6-7, ill. **Donisthorpe, H.**—Butterflies protected on both sides when in flight. [21] 54: 4.

Field, W. D.—Racial variation in Hemiargus isola. [103] 15: 36. **Forbes, W. T. M.**—On border-line Dircenna (Ithomiinae). [6] 50: 37-44, ill. (k). **McDunnough, J.**—A new Canadian Strymon (Lycaenid.). [4] 74: 1. **de Martin, M.**—La coleccion de Lepidopteros del Museo. [Bol. Mus. Hist. Nat. "Javier Prado"] 5: 447-457, cont. **Sailer, R. I.**—Distributional record for Notonecta hoffmanni. [103] 15: 6. **Saunders, L. G.**—The raspberry root-borer in Saskatchewan. [4] 74: 19. **Stallings & Turner**—Butterfly records for Kansas. [103] 15: 12. A note on Adelocephala bicolor. [103] 15: 35-36. **Tilden, J. W.**—Erynnis lacustra from near the type locality. (Nymphalid.). [55] 18: 8. An unusual record of Ochlodes yuma (Hesperiid.). [55] 18: 29. **Tilden & Mansfield**—A capture of Lerodea eufala at light. [55] 18: 26. **Watson, J. R.**—Some Florida Lepidoptera records. [39] 24: 75-76, ill. **Zikan, J. F.**—Elementos exoticos na lepidopterofauna do Brasil. [Arq. Serv. Florestal, Rio de Janeiro] 1: 9-17, ill.

DIPTERA.—Bequaert, J. C.—The Hippoboscidae of Oceania. [Occas. Pap. B. P. Bishop Mus.] 16: 247-292, ill. **Beyer, J. C.**—Iowa non-biting midges (Chironomidae). [Proc. Iowa Acad. Sci.] 48: 481. **Blair, K. G.**—How does a housefly alight on the ceiling? [8] 78: 40-41. **Breland, O. P.**—Dipterous parasites of adult mantids (Sarcophagid.). [10] 44: 19-22. **Brooks & Jaques**—A preliminary list of Pipunculidae of Iowa. [Proc. Iowa Acad. Sci.] 48: 437-439, ill. **da Costa Lima, A.**—Um novo "Flebotomus" da Amazonia e consideracoes relativas as especies afins (Psychodid.). [Acta Medica] 7: 3-19, ill. (k). **Dalmat, H. T.**—A new parasitic fly (Cuterebrid.) from the northern white-footed mouse. [6] 50: 45-58, ill. **Harmston & Knowlton**—Three new Syntormon (Dolichopodid.) from western United States. [10] 44: 22-26, ill. **Harriot, S. C.**—New species of Otitidae from California. [55] 18: 23-26, ill. **Hinman & Hurlbut**—A collection of Anopheline mosquitoes from southern Ontario. [4] 74: 20. **Hinshaw, M. B.**—The effects of formalin upon development in the bar-eyed race of Drosophila melanogaster. [Trans. Illinois State Acad. Sci.] 34: 223-224. **Hull, F. M.**—Some new species of Syrphidae. [103] 15: 10-12. **Jones, D. T.**—The histology of the digestive tract of the cluster fly, Pollenia rudis. [Proc. Iowa Acad. Sci.] 48: 407-415, ill. **Kalmus, Martin & Potter**—Difference in resistance to toxic substances of mutants of Drosophila of different body colour. [31] 149: 110. **Kennedy, J. S.**—On water-finding and oviposition by captive mosquitoes. [22] 32: 279-301, ill. **Pritchard, A. E.**—A revision of the genus Cerotainiops (Asilid.). [103] 15: 19-24. (*k). **Reinhard, H. J.**—A new parasitic muscoid fly from Texas. [10] 44: 17-18. **Scott & Snead**—Warbles in Peromyscus leucopus noveboracensis. [Jour. Mammalogy] 23: 94-95.

COLEOPTERA.—Curran, C. H.—Erotylidae of Kartabo, Bartica district, British Guiana. [Zoologica] 26: 281-287. **Donisthorpe, H.**—Colours in Melasoma (Chrysomelid.) and Byctiscus (Curculionid.). [8] 78: 48. **Griswold & Greenwald**—Studies on the biology of four common carpet beetles. [Cornell Univ. Agric. Exp. Sta.] Mem. 240: 75 pp., ill. **Linsley & MacSwain**—The bionomics of Ptinus californicus, a depredator in the nests of bees. [38] 40: 126-137, ill. **Riegel, G. T.**—Relative abundance of Cyclocephala immaculata and C. borealis at Urbana. [Trans. Illinois State Acad. Sci.] 34: 234-235. **Tanner, V. M.**—A new Elaphrus (Carabidae). [Gt. Basin Nat.] 2: 137-138, ill.

HYMENOPTERA.—Bohart, G. E.—Notes on some feeding and hibernation habits of California Polistes. (Vespid). [55] 18: 30. **Flanders, S.**—The sex ratio in Hymenoptera,—a function of the environment. [84] 23: 120-121. **LaRivers, I.**—Notes on the bembicid, Stictiella pulla. [55] 18: 4-8. **Linsley & Michener**—Notes on some Hymenoptera from the vicinity of Mt. Lassen, California. [55] 18: 27-29. **Pickles, W.**—Mound building by the ant Lasius flavus. [8] 78: 38-39.

A Lot of Insects, Entomology in a Suburban Garden. By Frank E. Lutz, Curator, American Museum of Natural History, Author of "Field Book of Insects." G. P. Putnam's Sons, New York, 1941. Pp. (8) + 304. Illustrated. $3.00.—Many kinds of insects are discussed or merely mentioned in this volume, beginning with a tropical bee that made its way to suburban New York, then migrating butterflies and migratory locusts, blister and lady beetles, ant- and aphis-lions, aphids and other Homoptera, English and other crickets, mantids and walking sticks, honey and bumble bees, ants, wasps and other Hymenoptera, termites, tiger beetles, tent caterpillars, more butterflies, moths, the rest of the beetles, the truly aquatic insects especially the caddis-flies, true flies and a summary of the insects in that suburban garden to the total of 1402 species. If one inquires as to why the order in which these insects are treated, the answer appears to be given in the introduction and to be that of a lady partner of the author in a game of bridge, "when she has good cards she plays them in the order that she happens to think of them." The reader may be assured that he will not miss the lack of taxonomic order in reading this book.

The insects of which the author has most to say are those on which he has worked and experimented most: the wings and sounds of crickets, the color vision of bees, the materials used on the cases of caddis-worms, the genetics, color vision and resistance to varying atmospheric pressure of *Drosophila*. These discussions summarize much of Dr. Lutz's researches and in the last chapter, "In Addition," references are given to his papers in which these researches were published. But interesting work by other authors is also quoted. No. 22, "In Addition" (pp. 265-268, which should be supplemented by pp. 90-91), would be more interesting to a certain Mr. Pope of long ago, as it tells something of the early life of the author; it is appreciated by those who admire Dr. Lutz's work.

There are also many glimpses of the author's biological philosophy scattered throughout the book, some of which may be summarized thus: Needs do not induce structures. Structures are acquired, how, we often do not know, but if those structures permit an insect to live in a certain place it adopts that place and is not adapted to it (Nymphalid butterflies, p. 180 and p. 138). The same structures may equally, or nearly, as well enable the insect to live in a different kind of place (experiment with water-striders, pp. 224-225). Social insects (honey bee, ants, pp.123, 135) are no more successful (producing fertile individuals over a large area) than non-social insects (aphids, p. 135) and besides waste (from the success point of view as just defined) an immense amount of energy. Perhaps some things in nature (floral colors *in re* insects, p. 108, trash-carrying habits of aphis-lions, p. 43, some sounds made by insects, p. 74, mimicry, p. 182) are not useful to their possessors. If the reader does not believe in this philosophy, let him read this book to learn why he should or shouldn't.

We shall not quote the untaken bet which had something to do with the origin of this book, but we shall observe that the Century Dictionary (the one which happens to form a part of our environment) gives nine meanings for the word "lot." The author of this attractive volume is holding his sides, watching to see how many of his reviewers and readers will take it in that the title is a pun.—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—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

I want to collect Rothschildia, agapema, gulfina and io moths and Texas butterflies for interested persons. Eula Frizzell, R 4 San Benito, Texas.

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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

Arctic Lepidoptera especially **Noctuidae**—Wanted to hear from collectors who desire the Arctic Species. Have large collection. R. J. Fitch. Lloydminster, Saskatchewan, Canada.

Wanted—Tropical Lepidoptera and Insects. Also domestic species. Will exchange or buy specimens. M. A. Zappalorti, 253 Senator Street, Brooklyn, N. Y.

Wanted—Specimens of the genus Calendra (Sphenophorus) from North America. Will exchange Eastern U. S. Calendra or other Coleoptera for desired species. R. C. Casselberry, 302 Lincoln Avenue, Lansdowne, Penna.

ENTOMOLOGICAL NEWS

MAY, 1942

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CONTENTS

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ENTOMOLOGICAL NEWS

Vol. LIII MAY, 1942 No 5

Clouds of Butterflies in Mexico: A Study in Butterfly Aggregations (Lepid.: Rhopalocera).

By Phil Rau, Kirkwood, Missouri.

Tourist guide-books to Mexico often refer to the clouds of butterflies to be seen in certain seasons and places along the Pan-American Highway. One book says that the country between Valles and Tamazunchale for 65 miles is pure tropics; the scenery is lovely, "and the last time we went over the road we drove nearly the entire distance through clouds of butterflies of every conceivable hue." This is no exaggeration, for I experienced exactly the same thing there during the month of July, 1940. This however, does not tell half the story, for they were not only moving in clouds, but the various species were assembled in groups, here and there in the roadside ditches, and each species had its own peculiarities of behavior. Entranced, I lingered for several hours to enjoy a spectacle so extraordinary and colorful, and finally I could not help asking myself what the butterflies were doing—and why they assembled and moved in species-groups as well as in certain color combinations. This phenomenon extended along the highway from Santa Engracia to Valles, and in a lesser degree to Tamazunchale, for a distance of 235 miles.

The clouds pulsating with life and energy appeared only after resting groups had been alarmed into flight by passing traffic. There is a marked difference between the erratic movements of a group when disturbed and the motion of butterflies that glide or flit normally over the countryside.

While some butterflies were on the wing everywhere at all times, the large masses of them were resting in clusters in moist places in the dirt roads or in the roadside ditches, under bridges near streams and in damp culverts. They arose in wild, agitated clouds only when a passing donkey forced them to move, or when a truck, going at high speed along the highway would create a hurricane of wind that swept them off their feet. They fluttered for some minutes above the spot from which they arose before settling down again to rest, and a few were likely to drift away indifferently until they mingled and settled with another group of the same kind. On the dirt side-road, where the many mud puddles attracted these insects, an automobile plowing through an aggregation of several thousand would create in the bright sunlight a veritable fairyland of motion and color. At first glance the myriads of individuals, the numberless swarms and the many varicolored species of butterflies that festooned the roadside seemed to defy all analysis. Soon, however, the spectator recovers from his bewilderment and begins to discern very definite attitudes and behavior-patterns in the assemblages, as well as certain combinations of color and of species.[1]

The following desultory notes were gathered in the course of an early July day over a stretch of road between Santa Engracia near Rio Purificacion, and Tamazunchale. While the problems involved would require weeks of study, all that could be done in my few hours en route was to observe aggregations here and there and record outstanding features of their behavior in sample groups. The present observations therefore are only an outline for future observational and experimental studies.

I am deeply indebted to Mr. Harold I. O'Byrne for identifying all of the species discussed in this paper.

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[1] Belt (Naturalist in Nicaragua) saw large aggregations of butterflies on wet sandy banks "looking like a bouquet; when rising, like a fountain of flowers." He found in groups by themselves 5 or 6 specimens of Papilios greedily sucking up moisture, and "Hesperidae too abounded; and in a favorable afternoon more than 20 different species of butterflies might be taken at these spots" and Bates (Naturalist on the Amazons) observed the sulphur-yellows and orange *Callidryas statira*, *C. eubule*, *C. trite* and *C. argante* congregating on the wet sand. "They assembled in densely packed masses, sometimes two or three yards in circumference, their wings all held in an upright position, so that the beach looked as though variegated with beds of crocuses."

PHOEBIS AGARITHE MAXIMA Neum. and
ANTEOS CLORINDE Godt.

Hundreds of aggregations of these two species were seen in moist places along the dirt road for 11 miles to the Hacienda Santa Engracia at Santa Engracia, Tamaulipas. Often the entire group was composed of the first species alone and sometimes a smaller number of the second kind mingled with them; but the latter were never found making up entire clusters by themselves. *P. agarithe maxima* is a large yellow butterfly whose underwings are satiny pale-green in the sunlight, although pinned, dead specimens appear only yellow and seem to have lost the pale-green shimmer that is so conspicuous in the tropical sun. *A. clorinde* is a white butterfly of approximately the same size, with a large yellow blotch on each upper wing, which is invisible when the wings are closed in repose; there is only a slight greenish tint on the under wings. The yellow ones, *P. agarithe maxima*, were by far the most abundant, and when *A. clorinde* appeared at all, it constituted only from 5 to 10% of the group. Just why the whites never appeared by themselves or why they should be attracted to the yellow groups is hard to decipher; but both species have a greenish sheen on the underside of the wings and when these are exposed to view the color might be the attracting feature. Or since both species belong to the family Pieridae, there may have been sufficient family resemblances or odor similarities to bring them together.

Although these two kinds occurred in aggregations of vast numbers and in many places beside the highway and in the dirt road, they invariably selected a moist area in the bright tropical sun. Coming upon the phenomenon unexpectedly as I did, I soon lost all notion of the enormous number of aggregations seen, but the number of individuals in each cluster varied from 50 upwards (to the best of my ability to estimate) to 2000 or more. And these groups were not far apart, either; often on the dirt road a half-dozen such clusters could be counted in a space of a hundred yards.

In these moist spots in the sunlight, all the individuals of a cluster would quietly rest close to one another, their bodies almost touching, and the wings tightly closed vertically in the air. Thus they would so remain for long periods of time until disturbed; then the mass would explode unto a swirling, fluttering cloud of yellow and white; after two or three minutes, the excitement would subside and they gradually settled again to the moist earth. We ourselves were compelled regretfully to plow through many such flocks on the narrow road, and we were astonished that they remained undisturbed by the approaching automobile until it was practically upon them; they would not budge from their places of rest until compelled to flee—and then they would dash in pandemonium from under the car in all directions. A few of them, of course, were killed under the wheels, and a few more by the impact of the car, but it was surprising how great a majority of them escaped to safety. One need not be astonished, however, that they do not react to an approaching car, because one may walk to the very outskirts of their ring, stoop down and close the fingers on three or four of them at one time without disturbing their neighbors.

It was interesting to watch the resettling process after a group had been alarmed into flight. When a swarm bursts into action, the butterflies do not fly away but rise in a body and hover wildly over their roosting place. After a few minutes of agitation, several would settle on the ground, sometimes in the identical place and sometimes in a similar moist spot near by. Others would follow flying lower and nearer to this nucleus on the ground, apparently seeking a spot on which to land. These seemed unwilling to drop anywhere and then walk to the desired spot, but were always bent upon alighting in the center of the group, where they would at once come to rest and close their wings. As more and more crowded into the center of the flock, there was much jostling and readjustment of positions of those already there. Thus the circle gradually enlarged as if by the slow flow of the molten gold from the center outward. Often a new arrival would try to alight in the heart of the group where space simply did not exist for him; so he would drop down on the "shoulders" of the others and wedge his way down between them by wiggling from side to side until his feet too touched the ground.

At two places near Antiguò Morelos, we saw hundreds of *P. agarithe maxima* coming out of the woods, against the wind and flying over the highway; from time to time some of them would drop low and join the groups already formed.

As stated above, the congregations were composed solidly of the large yellows, *P. agarithe maxima,* or of this species with a sprinkling of the large white *Anteos clorinde* butterflies, or again—but very rarely with the smaller yellow butterfly, *Eurema neda nelphe*.[2]

It is unfortunate that a large collection was not taken by which to determine the proportion of sexes on a large scale; those taken for identification were, according to Mr. O'Byrne, all males.

PAPILIO CRESPHONTES Cram. and P. THOAS AUTOCLES R. & J.

These two species of brilliant yellow and black butterflies so much resembled one another that I was surprised to learn that there were actually two species in the clusters. The aggregations were not nearly so abundant as were those of *P. agarithe maxima* and *A. clorinde*, but they occurred frequently. Possibly the proportion would be about 50 to 1. Neither were the individuals in each mass so numerous; they usually varied from 12 to 50, but in the muddy road to Hacienda Santa Engracia several clusters must have contained from 100 to 300 individuals. With their large size and brilliant hues, they made a dazzling bouquet of color. They never mingled with their neighbors, but kept as a unit to themselves, regardless of how near they were to others.

All of the individuals in a group faced in one direction, and that was against the wind. Their wings were closed and held sail-like high in the air. It was easy to learn just how they acquired the uniform position in relation to the wind. When alarmed to flight, they would presently re-settle on the ground, haphazardly facing any direction, and at once close the wings. These would make a perfect weather-vane, which would slowly

[2] See later page.

and gently swing the insect around. So gradual was the change that it was almost imperceptible, until presto! the entire group was facing one way.[3]

Unlike the dense crowding in the yellow-and-white aggregations previously described, the members of these *Papilio* units were always from one to two inches apart. This might be due to the fact that often while at rest they had spells of opening and closing the wings, and they could not have done this without sufficient space. The stately wing movements of these gorgeous butterflies when at rest is a pleasing spectacle to see, for it is done in unison, and with rhythmic motion. The wings are spread about one-quarter open and then closed again with a slow, quivering motion. All move together as if in measured time, for long periods. One wonders if this behavior may be a courtship performance, or merely play to break the monotony of a mid-summer tropical day. These groups were also always in moist places in the sunlight.

All of the material taken for naming proved to be males.

Papilio philolaus Bdv.

This is a very beautiful butterfly of black, decorated with greenish blue bands on all the wings, and with blotches of red on the margin of the hind wings. It was rarely seen in groups, and the few clusters discovered consisted of only 6 to 12 individuals, excepting one group of 25. They too, always kept aloof from other species. The groups were always in bright sunlight, beside the mudholes at the end of the culverts. They were wary, alert and hard to capture; however, late in the day when it became very cloudy, they were easily taken. This suggests that sight may have been the sense that warned them of approaching danger. In these groups they huddled so close to one another, that (when the sky was darkened) by closing two fingers about them, I picked up eight of them at once. These were of both sexes.

Despite the fact that *P. philolaus* did not mingle with other butterflies, they were found only in places where other species also had congregated.

(To be continued.)

[3] In the beautifully colored plate in "Butterflly Travelers" by C. B. Williams (Nat. Geo. Mag. May, 1937, p. 577) a group of *P. marcellus* is shown with "hoisted sails" on a muddy bank all facing one way and Hargitt (Jour. An. Behav., 5: 255, 1915, has observed *Papilio asterios* orient itself in respect to the direction of the wind when coming to rest. He says this behavior "was not merely incidental but definite and purposeful."

A List of the Dragonflies (Odonata) taken near Brevard, North Carolina.

By MINTER J. WESTFALL, JR., Cornell University.

(Continued from page 100.)

23. M. ILLINOIENSIS Walsh. Two males taken on the French Broad River near Long Shoals July 31, 1940, were identified by Mrs. Gloyd. Another specimen from the same locality was collected July 29, 1941.

24. EPICORDULIA PRINCEPS (Hagen). A dozen males were taken on Lake Osceola June 18, 1940, all of which were shot with a gun. Two males were taken at Lake Kanuga on June 13, 1940, with the sling shot. On June 17, 1939, one male was taken with a net and at least one other was seen at Lake Osceola. The dark areas of the wings are quite variable in extent, and often the variations don't seem normal. The specimens when compared with material from Massachusetts seem darker, and the proportions of the male abdominal appendages seem different, but further study of this species and its variations is needed.

25. TETRAGONEURIA CYNOSURA (Say). Common in June and early July on lakes. The variety, *T. c. simulans* Muttkowski has also been taken in the lot of specimens.

26. SOMATOCHLORA TENEBROSA (Say). Fairly common in August and September around camp lake.

27. PERITHEMIS TENERA (Say). Common at Lake Osceola. Also collected at camp lake in August.

28. CELITHEMIS ELISA (Hagen). Abundant at lakes all the summer.

29. C. FASCIATA Kirby. Taken on all the lakes. According to Williamson's key of 1922 the specimens belong to this species and Dr. Calvert has checked them, but none of these specimens has the brownish or yellowish enclosed area on the basal half of the hind wings so characteristic of the Florida specimens; instead this area is clear.

*30. C. VERNA Pritchard. Two specimens were taken on Lake Kanuga in June of 1939. On June 13, 1940, they were quite common in the marsh at this same lake but very difficult to capture as one had to wade in mud and water to reach them, and they were very alert. Only mating pairs could be taken with a net. A sling shot was used successfully with the single males.

31. Erythrodiplax minuscula (Rambur). Common almost everywhere around the lakes.

32. Libellula luctuosa Burmeister. Common on the lakes in June and July and quite easily captured in some places. Also seen occasionally until the middle of September.

33. L. auripennis Burmeister. Only one specimen taken on camp lake in June, 1939, and checked by Dr. Needham. This record is included with some doubt as there has been so much confusion between this species and the following even by experts. The one specimen can't be located to check again on the identification, and all the specimens taken since then have been *L. jesseana*.

*34. *L.* jesseana Williamson. I had just completed an extensive study of this species and *L. auripennis* in Florida and could easily recognize this species in the field when it was first seen. About seven specimens were taken on the camp lake and at Lake Kanuga in June, 1940. On June 13, 1940, at Lake Kanuga I noted a male flying in tandem with a female of *L. cyanea* for some time, but several attempts to collect them failed. During 1941 two males and a female were taken at the camp lake on July 18, 27, and August 1, while one was seen on June 12.

35. L. cyanea Fabricius. Very common on lakes and taken from June 12 to August 11.

36. L. flavida Rambur. Taken quite commonly on the camp lake from June 19 to August 22. Also collected at Lake Osceola.

37. L. semifasciata Burmeister. The first male was taken on the camp lake, June 19, 1941, while another male was collected July 15. Still another was seen at the same place July 20.

38. L. pulchella Drury. Not uncommon on lakes.

39. L. incesta Hagen. Common on lakes. Taken from June 17 to August 17.

40. L. vibrans Fabricius. Only one male has as yet been taken and this was collected at the camp lake on July 9, 1941.

41. Plathemis lydia (Drury). Common on lakes and small streams or ditches leading into them. These dragonflies are found patrolling beats on the streams, flying back and forth, or they may be found far back up in the fields.

42. Sympetrum vicinum (Hagen). Abundant on camp lake in August and September. Many reared from nymphs at camp lake.

43. Pachydiplax longipennis (Burmeister). Abundant on lakes. Nymphs quite common in camp lake.

44. Erythemis simplicicollis (Say). Not uncommon on lakes.

45. Pantala hymenea (Say). Rare. One male taken July 26, 1938, although I believe a few others have been seen in flight.

46. P. flavescens (Fabricius). Abundant in 1939 on camp lake and elsewhere, but less common since then.

47. Tramea lacerata Hagen. About a dozen specimens taken on the camp lake from June to August of 1939, but none seen in 1940. 25 were collected in 1941 from July 11 to August 2, and many more were seen.

48. T. carolina (Linneaus). Common, especially at camp lake.

*49. Calopteryx (Agrion) angustipenne (Selys). Rare. Two or three specimens taken and sent for the Cornell collection to Dr. Needham who has identified them as this species. One female collected on Davidson River, June 20, 1939, was checked by Mrs. Gloyd.

50. C. amatum Hagen. One male taken on the Davidson River, August 3, 1941, has the apical fourth of the hind wing dark so is quite distinctly this species. A female taken at the same time would probably be this species also. There is some doubt as to the distinctness of this and the former species by some writers. It may be found that they intergrade into each other.

51. C. apicale Burmeister. There has been some discussion as to whether this is a good species or not. It is common on

the French Broad River, and has been collected from June to September. Many of these damselflies were also found on the Little River and a few were taken on a small stream leading into Lake Osceola. The specimens have been referred to this species by Dr. Needham.

52. C. MACULATUM (Beauvois). Abundant, especially on small streams. Along tributaries of the Davidson River in June many of them were found, while fewer were seen on the river itself.

53. HETAERINA TITIA (Drury). One male was taken on a small stream leading from Lake Osceola, August 24, 1941, while another male was taken on the French Broad River, August 27.

54. LESTES FORCIPATUS Rambur. Uncommon. Few taken near Brevard, June 16, 1939, and also found at Lake Kanuga.

55. L. RECTANGULARIS Say. Abundant, especially at camp lake, beginning to appear about July 1. Many were reared from nymphs at this lake.

56. L. VIGILAX Hagen. Common at Lake Osceola on August 29, 1939, when about one hundred specimens were collected in a few minutes. Also taken at other lakes, but less commonly.

57. ARGIA APICALIS (Say). Common on French Broad River. A few specimens have been taken each summer at camp lake.

58. A. BIPUNCTULATA (Hagen). Uncommon in the grass of the marshy edges of the lakes.

59. A. MOESTA PUTRIDA (Hagen). This damselfly was for the first time found commonly on the French Broad River near Long Shoals on July 30, 1941. About four males were taken but large numbers were seen. They were especially found at rest on dead brush extending a considerable distance out into the river where it was sunny. Many mating pairs were noted. This species was also found on the Davidson River, August 3 and 17.

60. A. TIBIALIS (Rambur). Common on river banks.

61. A. TRANSLATA Hagen. Four males were taken on the

French Broad River, July 30, 1941, near Long Shoals. Many others were seen.

62. A. VIOLACEA (Hagen). Abundant at Lake Kanuga in June and taken also at other lakes in fewer numbers, and also along the French Broad River.

63. AMPHIAGRION SAUCIUM (Burmeister). Not taken in such large numbers but found at Lake Kanuga, June 13, 1939, and camp lake in June and July.

64. CHROMAGRION CONDITUM (Hagen). Fairly common in June on lakes. Abundant at Lake Kanuga on June 17, 1941, when 30 or 40 males were taken during the morning while collecting other species, and many more were seen. Mating pairs began to appear in the afternoon.

65. TELEALLAGMA (ENALLAGMA) DAECKII (Calvert). One male taken at camp lake August 10, 1939.

66. NEHALENNIA GRACILIS Morse. Abundant at Lake Kanuga in June. A hundred specimens collected in a few minutes by sweeping back and forth through the grass.

67. ENALLAGMA DIVAGANS Selys. Occasional on camp lake.

68. E. HAGENI (Walsh). Found on camp lake and elsewhere in June and July.

69. E. GEMINATUM Kellicott. One female taken at camp lake, June 14, 1941. Five males were collected from lily pads at Lake Osceola on August 11, 1941.

70. E. SIGNATUM (Hagen). Not uncommon on lakes.

71. E. EXSULANS (Hagen). Occasional on lakes, and common at Lake Kanuga in June, 1941.

72. E. DOUBLEDAYI (Selys). Abundant on lakes.

73. E. CIVILE (Hagen). A number taken on lakes, especially in June, also in July. Unusually common in June, 1941, at camp lake, being collected until August 11.

74. E. ASPERSUM (Hagen). Abundant on lakes.

*75. E. BASIDENS Calvert. One mating pair taken at camp lake, June 12, 1940, and identified by Mrs. Gloyd. Dr. B. Elwood Montgomery lists this species from South Carolina, but certainly there are very few published records for this species east of the Mississippi River. In 1941, one male was taken on

June 14 at camp lake. The next day three males were collected at Lake Osceola and on June 17 another was found. On August 11 over fifty specimens were taken, a few females in the lot. Then again on August 24 about thirty were taken at the same lake. Many more were seen.

76. E. TRAVIATUM Selys. Abundant at Lake Osceola on June 13, 1940. A hundred or more were easily taken with a few sweeps of a net. Comparatively rare in 1941.

77. ISCHNURA POSITA (Hagen). Quite common on lakes.

78. I. KELLICOTTI Williamson. Several taken on lily pads in Lake Osceola in September, 1939.

79. I. VERTICALIS (Say). Abundant at Lake Kanuga in June, and several found on other lakes.

80. ANOMALAGRION HASTATUM (Say). Abundant on lakes.

The Mating Habits of Robberflies (Diptera: Asilidae).

The courtship of *Promachus bastardi* Macquart—A female of this species was observed about 4:00 P. M. to alight upon some dense alder bushes about four feet from the ground. While watching it, a male was seen to dart towards it to within about six or eight inches of the resting female. It hung poised before it at this distance and on a level with it, for about two or three seconds whereupon it backed away in a straight line with a speed and facility equal to its onward rush. It poised here perhaps a second, perhaps two, then with a straight rush flew to and pounced upon the female; the male engaged the terminal apparatus of the female with its own, flexed the female's abdomen upward a number of times and all the while was humming, its wings vibrating vigorously; in other respects the female was quiet. After a short period on the shrub as described, about eight to ten seconds, the two flew away in copula and were netted. The female was found to be feeding upon an individual of the common honey bee.

The mating of *Erax interruptus* Macquart.—An individual was found in copula with a female upon the ground, and creeping quite close to it the pair was observed. The male clasped the head of the female, especially the eyes, and for some time tilted the female's head back and forth sidewise.

These observations were made at Oxford, Mississippi; those upon *Promachus* on June 23, 1941, those upon *Erax* several years ago.—FRANK M. HULL, University of Mississippi.

Effect of Reduced Food Supply upon the Stature of Camponotus Ants (Hymen.: Formicidae).[1]

By Falconer Smith.[2]

Underfeeding is considered an important factor in the production of minima in colonies of ants. Wheeler (1926) cites observations which show that insufficient food results in the diminution of stature among ant progeny. Ezhikov (1934) suggests that the stases or castes in polymorphic ants develop under conditions similar to those found in a controlled experiment in which experimental groups (minima) feed below optimum. Wesson (1940) shows that underfeeding in a laboratory colony of *Leptothorax* inhibits the production of queens. It is true also among other insects that insufficient larval nourishment produces nanism among imagines, and Herms (1928) finds that smaller adults of species of *Theobaldia* and *Lucilia* follow from larval underfeeding.

It has been possible to explain the occurrence of minima in incipient colonies of *Camponotus* in which the food supply is assumed to be below optimum. It is, however, necessary to seek some other explanation for the production of minima in large and flourishing *Camponotus* colonies where the numbers of foraging ants are great and a correspondingly large amount of food is available to the growing larvae. Variation in the trophic behavior of the nurses towards the larvae may result in the overfeeding of certain larvae and the underfeeding of others, so that the well-fed individuals would become larger pupae. Another explanation for the occurrence of minima in large colonies of *Camponotus* may depend upon the seasonal fluctuations in the food supply received by the colony, but my own observations and those of Pricer (1908) show that the ratio of minima to maxima in colonies of *Camponotus* is nearly constant from season to season. It was thought worthwhile to conduct an experiment in which some of the larvae of a

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[1] This study is a portion of the dissertation presented to the Faculty of Harvard University in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

[2] Contribution no. 4, Department of Zoology, University of Tennessee, Knoxville.

large colony of *Camponotus* would be underfed, while other larvae from the same colony received an abundance of food.

A large colony of *Camponotus herculeanus* subspecies *pennsylvanicus* de Geer was taken at Weston, Massachusetts, with the larvae in February 1941. 120 nurse ants were selected at random and distributed among four artificial nests (Fielde type) as shown in the table. Each nest was provided with 100 larvae varying from 1.0 mm. to 1.5 mm. in length. The nests

Nest	No. Nurses	No. Larvae	No. Feedings	No. Pupae Produced	No. Heads Measured	Av. Head Width	Range of Head Widths Largest	Range of Head Widths Smallest	Standard Deviation of Head Widths
11	30	100	24	54	43	47.5	62	39	3.92
21	30	100	24	60	53	47.3	62	42	4.31
31	30	100	8	25	22	43.8	47	40	2.13
41	30	100	8	31	27	43.9	50	41	2.16

Table to show the effect of reduced food supply upon the stature, etc., of the progeny of a colony of *Camponotus herculeanus* subspecies *pennsylvanicus.*

were maintained for 77 days under as nearly identical conditions as possible except that nests 31 and 41 were given food only 8 times, while nests 11 and 21 were given food 24 times, during the course of the experiment. Experience showed that feeding every 3 to 4 days provided the ants with an abundance of fresh food at all times. A stock food composed of macerated calve's liver sweetened with molasses was used. Distilled water was constantly present in each nest for the ants to drink. Pupae were removed when they appeared in the nests. After the end of the pupation period (about 20 days) the imagines were removed from the pupal covering and the width of the head through the compound eyes was measured with an ocular micrometer. The measurements were tabulated in ocular units. The width of the head was employed as an index of the stature of the ants. See Palenitschko (1927).

It is evident from the table given above that fewer pupae were produced in colonies 31 and 41. This is due to cannibalism of the larvae by the nurses, and to the death of some of the larvae. The average stature of the ants produced in nests

31 and 41 was less than in nests 11 and 21, despite the greater amount of cannibalism noted in nests 31 and 41. The stature of the ants reared in nests 31 and 41 varied less than in nests 11 and 21, as can be seen in the last two columns of the above table. The larger ants produced in nests 11 and 21 were as large as media found in natural colonies, while the smaller ants were somewhat smaller in stature than the minima in natural colonies.

From the experiment just described it is clear that a reduced food supply results in a diminution of the average stature of progeny in colonies of *Camponotus herculeanus* subspecies *pennsylvanicus* and that larger forms with greater variation among themselves result when nutritional conditions for the larvae are more nearly optimum. From this it is seen that underfeeding is at least one factor involved in the production of minima in large colonies of *Camponotus.*

Cannibalism of the larvae increased when the food supply was reduced, but took place even when an abundance of food was provided for the nurses.

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Notes on a Collection of Siphonaptera, Mainly from Pennsylvania.

By H. S. Fuller.[1]

A collection of fleas belonging to the Carnegie Museum, Pittsburgh, was recently sent by Dr. G. E. Wallace for identification. With one exception (*Pulex irritans*), the specimens were collected in Pennsylvania. As this collection contains several interesting records, the data are presented herewith. The species are listed in the sequence used by Fox (1940) in his recent book.

Family Pulicidae.

Pulex irritans Linnaeus. Ferryland, Newfoundland, Summer 1937, no host data, 15 males and 46 females (B. W. Brooks).

The record of *Pulex irritans* taken at Ferryland, Newfoundland, is especially interesting. Dr. Wallace writes that the specimens were collected by Drs. B. W. and S. T. Brooks from a bed. The fleas were very abundant in Ferryland and very annoying, biting people during the daytime as well as at night. The inhabitants of the town, a small fishing village near St. Johns, referred to the fleas as dog fleas, and the common belief was that the fleas were acquired from dogs, or were picked up along the beach. Fleas were not noted by Drs. Brooks in nearby St. Johns, although this must not be taken to indicate their absence there.

Ewing (1931) has listed some authentic records of the occurrence of *Pulex irritans* in the United States, based on specimens seen by him. In his list, Fall River, Massachusetts, represents the northernmost point on the eastern seaboard from which this species has been recorded. Fox (1940) mentions no records from New Hampshire or Maine. Buxton (1941) has mapped the approximate recorded distribution of *P. irritans*. The map is based on data obtained from the literature to the end of 1938, and from an examination of tubes of specimens in Tring Museum. On this map, which is too small to show

[1] From the Department of Comparative Pathology and Tropical Medicine, Medical School of Harvard University, Boston, Mass.

exact detail, the distribution of *P. irritans,* as shown by blackened areas, appears to extend up the eastern coast of North America, at least as far north as Massachusetts. There is also an area in the region of Montreal; but New Brunswick, Nova Scotia, and Newfoundland are not indicated on the map as localities from which it has been recorded. Thus the present series of *Pulex irritans,* from Ferryland, provides a new northeastern locality record for this species.

CEDIOPSYLLA SIMPLEX (Baker). Coraopolis, October 13, 1937, off Gray Fox, one female (R. L. Fricke). Clearfield, October 13, 1941, off Rabbit, one male (M. Clement).

CTENOCEPHALIDES FELIS (Bouché). Ligonier, October 3, 1941, no host data, one male (C. D. Ambrose). Pittsburgh, October 21, 1941, off Opossum, one female (G. E. Wallace).

Family DOLICHOPSYLLIDAE.

CTENOPHTHALMUS PSEUDAGYRTES Baker. Linesville, May 25, 1940, off Star-nosed Mole, 9 males and 14 females (R. L. Fricke).

CONORHINOPSYLLA STANFORDI Stewart. Sheakleyville, Mercer County, November 1, 1940, off Fox Squirrel, two females (James Kosinki).

Conorhinopsylla stanfordi, although apparently not common in collections, has been recorded previously from the Red Squirrel (type host), Gray Squirrel, and Flying Squirrel. Thus the Fox Squirrel, *Sciurus niger,* represents an additional host record, and Pennsylvania is a new locality for this species.

OROPSYLLA ARCTOMYS (Baker). Pymatuning Swamp, Linesville, April 14, 1932, off *Marmota* sp., 14 males and 16 females (W. L. Black).

ODONTOPSYLLUS MULTISPINOSUS Baker. Pymatuning Swamp, March, 1933, off Rabbit, 1 male and 2 females (J. K. Doutt). Coraopolis, October 13, 1937, off Gray Fox, one female (R. L. Fricke).

ORCHOPEAS WICKHAMI (Baker). Pittsburgh, November 23, 1940, off Gray Squirrel, 17 males and 41 females (James Kosinki). Pymatuning Swamp, March, 1933, off *Sciurus hudsonicus,* 5 females (J. K. Doutt); March 11, 1933, in arboreal mouse nest, one male (J. K. Doutt); March 1933, off Flying Squirrel, 4 males and 8 females (J. K. Doutt). Upper Talley-cavey, south of Bakerstown, Allegheny County, June 14, 1937, off Fox Squirrel in captivity, 22 males and 27 females (R. L. Fricke).

O. LEUCOPUS (Baker). Dorseyville, February 2, 1940, off *Peromyscus* sp., 3 males and 2 females (O. Brown). Pymatuning Swamp, March, 1941 off *Peromyscus* sp., 5 males and 27 females (J. K. Doutt); March, 1941, off *Microtus* sp., one female (J. K. Doutt); March, 1933, off *Zapus* sp., one female (J. K. Doutt).

Family HYSTRICHOPSYLLIDAE.

HYSTRICHOPSYLLA GIGAS TAHAVUANA Jordan. Linesville, May 25, 1940, off Star-nosed Mole, one female (R. L. Fricke).

Hystrichopsylla gigas tahavuana is likewise an uncommon flea in collections, and it is remarkable for its large size. The present specimen represents a new host and the first record for Pennsylvania.

EPITEDIA FACETA (Rothschild). Pymatuning Swamp, March, 1933, off *Sciurus hudsonicus*, one female (J. K. Doutt).

Epitedia faceta was described by Rothschild (1915) from male and female collected at Wilbraham, Mass., off *Sciurus hudsonicus*. No further records are known to the writer and he has not examined the types. The present specimen is somewhat damaged, the head and foreleg having separated from the body, although they are mounted on the same slide. The specimen is differentiated from *E. wenmanni* and *E. testor*, on the basis of characters of the genitalia and the seventh sternite. The receptaculum seminis possesses a long sausage-shaped head which is much longer than the tail, in agreement with *E. faceta*, and differing from the other two species. Furthermore, the seventh sternite is divided by a wide shallow sinus into two lobes of about the same size and shape. The upper lobe is not acuminate, and it does not extend further distad than the lower one. These points of distinction seem to justify the determination of this specimen as *Epitedia faceta*. It is to be hoped that further material from the same source will be collected in the future.

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The Eastern Ant Cricket (Myrmecophila pergandei Brun., Orthoptera, Gryllidae) in Illinois.*

By WM. P. HAYES, Department of Entomology, University of Illinois.

Six species of ant crickets of the genus *Myrmecophila* have been described from the United States but only four are now regarded as valid (Hebard, 1920, Trans. Amer. Ent. Soc., 46:91). Comstock (1924, Intro. to Ent., 1st ed., p. 249) called these small gryllids, "ant-loving crickets" but in Europe they are generally known as "ant-crickets." These insects are commonly found in the nests of ants but have been taken alone in or under logs where no ants were found. Their food is supposed to be the secretions from the bodies of ants which are said to be "licked" up by the crickets, with their hypopharynx.

Of our four American species, three (*M. nebrascensis* Lugger, *M. oregonensis* Bruner and *M. manni* Schimmer) occur only west of the Mississippi, while *M. pergandei* Brun. is the only species found in the eastern states. The range of *M. pergandei* extends westward to Nebraska and southward to Florida. Hebard (*l.c.* 1920) has cited the northward distribution as Maryland, District of Columbia and Virginia. Indiana

* Contribution No. 224 from the Entomological Laboratories of the University of Illinois, Urbana, Illinois.

specimens have been found only in the southern half of the state. In Hebard's revision of the genus no records of distribution were known for Illinois. His more recent work (1934, Orth. and Derm. of Ill., Ill. State Nat. Hist. Surv., Bul. Vol. 20, p. 257) records the finding of *M. pergandei* in three places in southern Illinois. In this work he stated, "Though Murphysboro is a northern limit this inhabitant probably occurs throughout southern Illinois, as it is known from Indiana as far north as Mitchell." According to Hebard (*l.c.* 1934), Illinois records of this species are from Shawneetown, Murphysboro and Olive Branch. The Shawneetown specimens were collected in April, those at Murphysboro in May and those at Olive Branch in September. The latter collection included six young.

During the summer and autumn of 1941 three collectors have found this species in ant nests in the vicinity of Champaign and Urbana, Illinois, which is about 175 miles farther north in Illinois than the Murphysboro record. Mr. James Slater found specimens in an undetermined ant nest within the City of Urbana on August 13, 1941. Mr. Bernard Berger found one female in an ant nest at Urbana on August 12 and 1 male in another nest on October 6 in Champaign. The writer took one specimen on April 17 at Urbana in the nest of the cornfield ant, *Lasius niger americana*.

Mr. Berger's specimens are deposited in the Illinois State Natural History Survey collection and also in this collection are one male, one adult female and two female nymphs collected in the nest of the acrobat ant, *Cremastogaster lineolata*, by Mr. Floyd G. Werner in LaSalle County, Feb. 12, 1938, much farther north than Urbana. The Field Museum collection at Chicago has specimens from Summit, Illinois, near Chicago, 300 miles north of Murphysboro and from Olive Branch so that it is probable that the species is distributed all over the state. The specimens from Olive Branch were collected in September and October, 1909, while the Summit specimens were taken by H. Dybas, April 11, 1941. Mr. Rupert Wenzel, of the Field Museum, recently stated (unpublished) that these ant crickets are taken commonly at Summit, Argo, Justice and other points along the Illinois drainage canal in the spring and that they occur with ant hosts of different genera.

The Western species, *M. nebrascensis*, is thought by Hebard (1920, *l.c.* p. 111) to be the species referred to by Lugger (1898, Orth. of Minn., Third Ann. Rept. State Ent. Minn.) in his reference to an undetermined species from Minnesota. Since the known northern range of *M. nebrascensis* is Nebraska, it is possible, since *M. pergandei* is known from so far north in Illinois, that Lugger's reference may have been to *M. pergandei*. Lugger figured a dorsal and side view of a species which he called *M. nebrascensis* and which Comstock (1924, Intro. to Ent., 1st Ed., p. 249) has used under the name of *M. pergandei*. Hebard (1920, *l.c.* p. 92) pointed out that all the four American species "are very closely related and may eventually prove to be geographic races of one species."

The following ants have been cited by Hebard (1920, *l.c.* p. 95) as hosts of *M. pergandei*: *Cremastogaster lineolata*, *Aphaenogaster treatae*, *Lasius umbratus*, *Formica fusca*, *Formica pallidefulva*, *Formica truncicola*, *Camponotus herculeanus*, and *Camponotus castaneus*. The observation recorded above of its occurrence in the nest of *Lasius niger americana* is new, although the western species, *M. manni* Sch. has been recorded with "*Lasius niger*."

The life histories of American species have not been studied. Wheeler (1900, Psyche, 9:111), Schimmer (1909, Zeits. Wiss. Zool., 93:409) and Hebard (1920, Tr. Amer. Ent. Soc., 46:91) have made observations on their biology. Schimmer has studied in detail the external and internal morphology of the European *M. acervorum*. He figured the egg and has noted that egg-laying in this species occurs from May to October (6 months). Both nymphs and adults hibernate in ant nests and at least two and probably three years are required to complete their life history in Europe. The finding of nymphs and adults of *M. pergandei* on February 12, 1938, in LaSalle County by Mr. Werner suggests a similar life history for our American species. Schimmer (*l.c.* 1909) has included an extensive bibliography in his paper.

Herbert Morrison in Mexico.

By the late Eugene Murray-Aaron, Field Museum, Chicago.*

In the almost endless task of solving bibliographic puzzles in Rhopaloceran taxonomy I seem to have overlooked an item of collecting history that I could have set at rest long since. On page 27, of their list of Diurnal Lepidoptera, Barnes and Benjamin, questioning the right of *Megathymus drucei* Skinner to membership in our boreal fauna, say:

"This name * * * is credited to our fauna by Skinner and Williams, 1924, Trans. Am. Ent. Soc. L, 208, on the strength of a statement by Schwarz, 1897, Proc. Ent. Soc. Wash., IV, 209, that Morrison's material came from near Fort Grant in the Graham Mts., Arizona. This refers to Coleoptera. At least some of Morrison's Lepidoptera appear to have been collected in the Huachuca Mts., and it is not unlikely that Morrison did get into Mexico."

It seems strange that Schwarz, writing barely a decade after the event, should have been at all uncertain on the Morrisonian wanderings. I knew Herbert Morrison quite intimately, visited him at his home, Morganton, North Carolina, 1878, where he first went to escape the inevitable, lurking for him in New England winters. In search of a land where t.b. victims could

* This article was submitted by its author in November, 1939, for publication in Entomological News. On acknowledging its receipt, it was suggested to him that he add the dates, as detailed as possible, of Morrison's collecting trips in Arizona and Sonora, from his correspondence. A reply "for Dr. Murray-Aaron," of January 8, 1940, stated that he had a very serious cold but that as soon as possible he would reply to the inquiry for data regarding the Herbert Morrison collecting trips. Waiting for this information, nothing further was done in the matter until September, 1941, when assistance was sought of Mr. William J. Gerhard, of the Field Museum. Mr. Gerhard answered October 4, 1941: "I fear that the dates of Morrison's collecting trips in Arizona and Sonora will prove unattainable, for Dr. Eugene Murray-Aaron died on Friday, September 20, 1940, at the age of 86, and he was buried on the following Monday afternoon. I do not know how well he kept his notes and correspondence, but I doubt that his wife would be able to supply the desired information." As it does not appear that anything will be obtained by further waiting, the article is now published in the form in which Dr. Murray-Aaron sent it to the News. Those versed in ancient history will recall that he was the first editor of Entomological News, January and February, 1890.—Editor.

live and be fairly active, he later went to Arizona. Later I joined him in the Graham mountain region for a short visit. From there we crossed into the state of Sonora, Mexico, collecting somewhat around Nogales and finally going for a brief trip south to Hermosillo. Judging from correspondence of that far off day, now more than a half century past, Morrison later collected as far south as Guaymas, on the Gulf of California. Of one thing I am positive, I have data of Hesperids, on labels in his unmistakable handwriting, collected at Hermosillo. And of another thing; there never went forth from this land a more carefully exact collector than Herbert Morrison. He was as conscientious regarding data, as he was careful in handling specimens or bravely optimistic to the very last of an all-too-short, but worthwhile life. If his label said "Arizona," that state it was; if "Mexico," then the specimen was caught south of the boundary.

The Butterflies of Roanoke and Montgomery Counties, Virginia (Lepid.: Rhopalocera).

By Carroll E. Wood, Jr. and Carl W. Gottschalk.

After six years of rambling over the Virginia hills catching butterflies, while being thought crazy, feeble-minded or merely peculiar; after being chased out of fields, accosted for a fishing license, and called upon for lengthy explanations of their actions, the writers feel they have accumulated enough material to attempt at least a partial account of the butterflies of the Roanoke area.

Although scattered papers have appeared from time to time concerning the butterflies of western Virginia, the only lists of them from this region that have been published are an incomplete list of the species occurring in Rockbridge County, northeast of Roanoke County, by the Rev. Ellison A. Smyth, IV[1], and a list of the species found in two week's collecting on Apple Orchard Mountain in Bedford County, adjoining Roanoke County on the east, by Dr. Austin H. Clark[2]. Col. Wirt Rob-

[1] The Raven, 9: 56-58, July, 1938.
[2] Proc. Biol. Soc. Wash., 47: 177-180.

inson, U. S. Army, sent many specimens from Nelson County to the Hon. Walter (later Lord) Rothschild and some of these are listed in Rothschild and Jordan's revision of the American swallowtails.

In the course of 34 years of collecting, from 1891 to 1925, while Professor of Biology and Dean of the Faculty (1902-06) of the Virginia Polytechnic Institute, the late Dr. Ellison A. Smyth, Jr., found 92 species and subspecies of butterflies in Montgomery County, mostly from the area around Blacksburg. He was so kind as to allow us free access to his large collection and the use of his records. The Montgomery County records, with the exception of that of *Erynnis zarucco* which was taken by Dr. Clark, are accordingly taken from Dr. Smyth's collection which remains at his home in Salem.

Several of the Roanoke County records are also the result of Dr. Smyth's collecting which he carried on in Salem after his retirement.

During the past six years, the authors have taken 92 species within Roanoke County. An additional species, *Phoebis philea*, was taken by Dr. Smyth, and is the only record of this butterfly for Virginia.[3] Of these 93 species, 12 are not known from Montgomery County, while 12 of those from Montgomery are unknown from Roanoke County, thus making a total of 105 species and subspecies from both counties. It is more than probable that many of the twenty-four known from only one county or the other occur in both, but have simply evaded the collectors' nets.

Location and Topography of the Area.

Roanoke and Montgomery Counties are situated in southwestern Virginia near the southern end of the Shenandoah Valley, the main valley highway, Route 11, crossing both counties more or less in the central portion. Roanoke County with the county seat at Salem, eight miles west of the city of Roanoke, has an area of 305 square miles, while adjoining Montgomery County, with the county seat at Christiansburg, has an area of 401 square miles.

[3] Clark, Proc. Biol. Soc. Wash. 51: 1-6.

Both counties have a very diversified terrain ranging from the gently rolling, intensively cultivated valley floor which rises westward from an altitude of 1,006 feet at Salem to 2,007 feet at Christiansburg, to the crests of the Alleghenies at an altitude of about 4,000 feet. The mountains are now clothed with second growth woods, none of the original forest cover having been preserved in either county.

The drainage of all of Roanoke County and the eastern portion of Montgomery County is toward the Atlantic. The Roanoke River, rising in the latter county and draining most of the area, cuts through the Blue Ridge at the eastern line of Roanoke County and then flows southeastward into Albemarle Sound in North Carolina. The western section drains into the New River which, forming the greater part of the western boundary of Montgomery County, flows across West Virginia and, becoming the Great Kanawha, joins the Ohio at Point Pleasant. The New River is of particular interest here because it pierces the high mountains along and beyond the northwestern borders of Montgomery and Roanoke Counties which form more or less of a barrier to the entry of species from the region of the Mississippi Valley. Before the settlement of this region, the buffalo migrated along this river valley to and from Virginia, and it is possible that certain butterflies may also have entered by this route.

Faunal Zones and Components.

The valley floor in Roanoke County lies in the *Upper Austral* or *Carolinian Life Zone.* Above the valley floor most of the area of both counties belongs primarily to the *Transition* or *Alleghenian Zone,* the predominant life zone in the mountainous western portion of Virginia. Presumably before the mountains were deforested, the higher altitudes were inhabited by faunal elements of the southern extension of the *Canadian Zone,* but these have almost wholly disappeared from both counties, the Transition Zone fauna, intermixed with various Austral elements, being dominant to the mountain tops. However, the most characteristic butterfly of the southern extension of the Canadian Zone, *Polygonia faunus smythi,* is known from Montgomery County and is common on the high mountains not far away in Giles County. Also known from the area are *Incisalia polios* and *Pyrgus centaureae* which should probably be regarded as Canadian.

In the area covered, a large part of the butterfly fauna cannot be regarded as belonging typically to the Transition Zone. However, a number of species *are* more or less confined to this zone. Among the more characteristic of these seem to be:

Satyrodes eurydice	Rhabdoides cellus
Polygonia progne	Erynnis brizo
Euphydryas phaëton	Erynnis icelus
Phyciodes nycteis	Hesperia metea
Argynnis bellona	Hesperia leonardus
Argynnis idalia	Hesperia sassacus
Argynnis diana	Polites mystic
Argynnis aphrodite	Poanes hobomok
Nymphidia borealis	Atrytonopsis hianna
Glaucopsyche lygdamas	Amblyscirtes hegon
Strymon liparops	

It will be noted that these are, for the most part, species which stay rather close to home and do not fly great distances.

In addition, several forms usually associated with the *Upper* or *Lower Austral Zone* have been taken in the area. Chief among these are:

Strymon m-album	Eurema nicippe
Atlides halesus	Polites brettus
Phoebis philea	Lerodea eufala
Eurema jucunda	Panoquina ocola

A. halesus, P. philea, P. brettus, as well as *E. jucunda,* are clearly summer or casual visitors; the first three are known from but a single example each, taken in late summer or fall. *E. jucunda* appears in July and flies until frost, apparently dying out during the winter. All specimens of *jucunda* that we have taken are apparently offspring of the earlier migrants to this region, as all have been practically "scale-perfect" specimens, indicating that they have not flown any appreciable distance. The complete absence of the earlier brood of *jucunda* indicates that this species does not successfully survive the winter months here. Perhaps *L. eufala* and *P. ocola* also become temporarily established in this region in summer, but it is doubtful that they overwinter. *Eurema nicippe,* however, has been found to overwinter successfully in Roanoke County, for unworn examples are frequently taken in early April. These vernal specimens, as well as those captured in late fall, are reddish below on the hind wings, instead of yellow as in the summer examples.

(To be continued.)

Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF.

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.**—Retirement of Dr. Arthur Gibson. [4] 74: 36. **Coyner, W. R.**—Insect distribution and seasonal succession in overgrazed and normal grasslands. [Univ. Oklahoma Bull.] No. 850: 105-106. **Knowlton, G. F.**—Insects in killdeer stomach. [19] 37: 23. **Lemmer, F.**—Obituary by G. P. Engelhardt. [19] 37: 4-5, ill. **McKeown, K. C.**—Strange insect meals. An entomological by-way. [Australian Mus. Mag.] 7: 397-398. **Nemeth, F. F.**—Insect galls of West Virginia. [Castanea] 7: 16-19, ill. **de la Torre-Bueno, J. R.**—A brutal way to clean insects. [19] 37: 19-20. On color characters as specific criteria. [19] 37: 9.

ANATOMY, PHYSIOLOGY, ETC.—**Butler, C. G. and D. J. Finney**—The influence of various physical and biological factors of the environment on honey bee activity. An examination of the relationship between activity and solar radiation. [Jour. Exp. Biol.] 18: 206-212. **Campbell, W. G.**—The relation between nitrogen metabolism and the duration of the larval stage of the death watch beetle (Xestobium rufovillosum) reared in wood decayed by fungi. [Biochem. Jour.] 35: 1200-1208. **Ewer, R. F.**—On the function of haemoglobin in Chironomus. [Jour. Exp. Biol.] 18: 197-205. **Gunn, D. L. and H. S. Hopf**—The biology and behavior of Ptinus tectus (Col. Ptinidae) a pest of stored products. II The amount of locomotor activity in relation to experimental and previous temperatures. [Jour. Exp. Biol.] 18: 279-289. III. The effect of temperature and humidity on oviposition, feeding and duration of life cycle. [Ib.] 290-305. **Pyle, R. W.**—The fiber tracts of the fused thoracic ganglia of the adult Ephestia kuehniella (Pyralid.). [5] 48: 123-128, ill. **Shull, A. F.**—The mechanism through which light and heat influence genetic factors for wing development in aphids. [42] 89: 183-196. **Trim, A. R.**—Studies on the chemistry of the insect cuticle. I. Some general observations on certain Arthropod cuticles with special reference to the characterization of the proteins. [Biochem. Jour.] 35: 1088-1098. **Vazques, L. y M. T. B. Villasenor**—Estudios acera del sistema nervioso de los insectos. I. La celulas neurosecretoras en il sistema nervioso del cucarachon de agua (Benacus griseus Say). [112] 12: 773-779.

ARACHNIDA AND MYRIOPODA.—Bryant, E. B.—Notes on the spider fauna of New England. [5] 48: 129-146, ill. **Petrunkevitch, A.**—A study of amber spiders. [Trans. Conn. Acad. Arts & Sci.] 34: 119-464 pp., ill.

THE SMALLER ORDERS OF INSECTS.—Breland, O. P.—See under Diptera. **Linduska, J. P.**—Bottom type as a factor influencing the local distribution of mayfly nymphs. [4] 74: 26-30.

ORTHOPTERA.—Adamson, A. M.—Mole-cricket parasites of the genus Larra in Trinidad. [Trop. Agric. Trinidad] 19: 43-45. **Gurney, A. B.**—The study and collecting of Zoraptera. [Ward's Nat. Sci. Bull.] 15: 69-71, ill. **Knowlton & Stains**—See under Diptera.

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Thysania zenobia at Woods Hole, Massachusetts (Lepid.: Noctuidae).

A *Thysania zenobia* Cramer was picked up on the lawn of the Marine Biological Laboratory, Woods Hole, Mass., Sept. 1, 1941. It was battered, appearing as if it had been crushed into the radiator of an automobile. Although dead, it was still fresh and limp. The identification made at the time by Dr. Eleanor Slifer has been subsequently confirmed by Mr. Sherman Moore of Detroit. This incidence of *T. zenobia* so far north is unusual, but not unique.—Ivor Cornman, Dept. Zoology, University of Michigan.

OBITUARY.

The death of Dr. C. Hart Merriam, founder in 1885 and and until 1910 Chief of the United States Bureau of Biological Survey (now known as the Fish and Wild Life Service), on March 19, 1942, at the age of eighty-six years, was announced in *Science* for March 27. His proposed life-zones for North America (1889) have had much influence in zoo-geographic work by entomologists and others. A discussion of them by Prof. R. F. Daubenmire, of the University of Idaho, with an accompanying bibliography, appeared in *The Quarterly Review of Biology* for September, 1938.

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—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

I want to collect Rothschildia, agapema, gulfina and io moths and Texas butterflies for interested persons. Eula Frizzell, R 4 San Benito, Texas.

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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

Arctic Lepidoptera especially **Noctuidae**—Wanted to hear from collectors who desire the Arctic Species. Have large collection. R. J. Fitch. Lloydminster, Saskatchewan, Canada.

Wanted—Tropical Lepidoptera and Insects. Also domestic species. Will exchange or buy specimens. M. A. Zappalorti, 253 Senator Street, Brooklyn, N. Y.

Wanted—Specimens of the genus Calendra (Sphenophorus) from North America. Will exchange Eastern U. S. Calendra or other Coleoptera for desired species. R. C. Casselberry, 302 Lincoln Avenue, Lansdowne, Penna.

Coccinellidae wanted from all parts of the world, especially South and Central America. Buy or exchange. G. H. Dieke, 1101 Argonne Drive, Baltimore, Md.

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1942, 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 separates of articles, without covers, over and above the twenty-five given free at the following rates: 1 or 2 pages, 25 copies, 65 cents; 3 or 4 pages, 25 copies, $1.05; 5 to 8 pages, 25 copies, $1.75; 9 to 12 pages, 25 copies, $2.35; each half-tone plate, 25 copies, 30 cents; each plate of line cuts, 25 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, P. C. Stockhausen, 53 North 7th St., Philadelphia, Penna. 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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Clouds of Butterflies in Mexico: A Study in Butterfly Aggregations (Lepid.: Rhopalocera).

By PHIL RAU, Kirkwood, Missouri.

(Continued from page 126.)

VICTORINA STELENES BIPLAGIATA Frühst.

This large black butterfly is beautifully decorated in green, and according to Holland is quite common throughout tropical America. It is an individualist, and does not often congregate, but many individuals are often seen at rest singly in culverts and under bridges. However, one group of 11 was seen at high noon near the Canyon de Galeana, resting on the moist ground near groups of other species. These were all very close together, with wings erect, and during the hour that I watched them they never moved except when at long intervals one or another of them would partly open and slowly close the wings. There was no regularity about the motion, and rarely did two of them move at the same time. This particular spot was rich in groups of butterflies of various species but there was no intermingling. Again all of the samples taken for identification were males.

COLAENIS JULIA Fabr.

This is a brick-red butterfly, delicately marked in black. Many of them rested, singly or in twos and threes, on the shaded walls, floors, and entrances of large culverts under the highway. Although many groups of other kinds of butterflies were nearby, these remained by themselves. Further down the highway, three other small groups of 4 to 6 each were seen under exactly the same conditions. They rested 1 to 3 inches apart, and only occasionally one or another would gently open and close its wings.

ACHLYODES THRASO Hbn.

This dark brown butterfly has a purple tinge on the wings. The dull colors of pinned specimens in a cabinet give a very false idea of the rich coloring of the living wings in the dazzling tropical light.

These were seen in aggregations only a few times. They were found as neighboring groups of *Coleanis julia.* The clusters comprised from 12 to 20 individuals, resting precisely at wings-length from one another, and this because the wings were always spread three-fourths open. A dozen butterflies in this position made a striking shimmering mosaic, indeed.

The behavior of a new member entering the group was entertaining to see. The newcomer would drop to the ground on the outskirts of the circle and slowly make its way into the group, walking in a hobbling manner, and occasionally flipping the wings to measure its distance from the others. Not until its wings touched others, did it stop, open its wings and languidly relax. When a flock was disturbed into flight, they all soon returned, each one following the routine just described, until all rested again in a precisely spaced group.

ANAEA AIDEA Guer.

Several thousand of these reddish-brown butterflies were resting on two stone walls of a bridge near Valles; they were not in groups, and showed no tendency to gregariousness. They were merely at rest in the same shelter where they took positions on the walls without any systematic order. All of the samples collected were males.

THREE SPECIES OF EUREMA BUTTERFLIES

All along the highway many aggregations of small, yellow butterflies of one or more species were seen. So many groups were observed and their behavior was so much the same that it is only necessary to give the details of one such group.

This cluster, near Rio Tampaon, contained approximately 150 yellow butterflies of three species, all of which look much alike to the layman. They were: *Eurema gratiosa ingrata* Felder, *E. mexicana* Bdv. and *E. neda nelphe* Felder. Also several solid clusters of *Eurema neda nelphe* Felder of 10 to 25 butterflies each were seen in moist places between Rio Purificacion and Villa Juarez. Although the aggregations were near other groups, the yellows kept to themselves. About two dozen specimens of these three species were taken, and all were males.

On rare occasions a large cluster of these small yellows would contain a few of the large yellow ones, *Phoebis agarithe maxima,* and in one instance a group of 50 yellow *Eurema* sp. had among them 12 blue skippers of unknown name.

Mottled Black, Brown, Red and Salt-and-Pepper Butterflies.

An aggregation of about 75 butterflies which appeared to be of three species but proved to be of five, was observed at a moist place near the highway ten miles north of Victoria. Color was no barrier in this group, since among them were black and red mottled ones; black ones with white spots on the upper wings and red on the lower wings; black, white and red mottled ones, and black and red banded ones. The various colors harmonized well together since all were of somber hue and all were of about the same size.

The five species identified among this aggregation were: *Phyciodes vesta* Edw., form *boucardi* Godm. and Salv.; *Anthanassa texana* Edw.; *Chlosyne* sp. near *lacinia* Gey.; *C. lacinia adjutrix* Scud.; and *C. janais* Drury. It is interesting to note that all five species belong to the family Nymphalidae.

Several thousand *Chlosyne lacinia adjutrix* Scud. were seen also on the walls and ceiling of a culvert under the highway during the hottest and dryest part of the day near Edinburg, Texas, in the Rio Grande Valley. These were gregariously close together in ten groups, and when disturbed would soon resettle in the same place. Out of 16 specimens brought home, only two were females. Among the five species all were males except for a few females of *A. texana.*

Chiomara asychis Cram.

Among many clusters of various species in a moist area under a bridge 15 miles south of Rio Purificacion was one lone group of this gray and white butterfly, *Chiomara asychis* Cram. There were 20 in this lot, all quietly at rest, 2 to 3 inches apart, but they kept as a unit and did not mingle with the others all around them. Half of the lot was taken, and all were males.

PRECIS LAVINIA ZONALIS Felder.

Under the same bridge were two aggregations of about a dozen butterflies each of *Precis lavinia zonalis* Felder., the brown butterfly that is dappled in red and has eye-spots on the wings. Both sexes were present.

ATHENA CHIRON Fabr.

Again under the same bridge were clusters of this butterfly, a dark brown insect with delicate bands of a lighter brown on the wings. The two groups of 10 and 15 individuals each were in moist places and kept aloof from other aggregations. The random sample proved to be males.

ATHENA PETREUS Cram.

These bright red butterflies with slight, black margins on all four wings were found in several localities from Villa Juarez to Valles, congregating in moist places in groups of 6 to 12. They rested quietly, about an inch apart. The specimens taken were all males.

CHIOIDES ZILPA Butl.

This is a black butterfly with a few white blotches on the upper wings; the hind wings taper to form a short tail, which in living specimens is somewhat twisted. This species was often seen between Valles and Tamazunchale, on cool, wet ground or on walls of culverts. They were non-social and each individual kept strictly to himself. The few specimens taken were males.

CHLOSYME JANAIS Drury and MICROTIA ELVA Bates.

Here are two species of butterflies often intermingling, and belonging to different genera of the family, Nymphalidae. Both are similarly colored in black and orange. The former species is large, has black front wings with occasional white blotches, and orange hind wings bordered in black; the latter species is smaller and is marked in black and orange on all four wings.

About twenty solid aggregations of one or the other of these species and about ten in which both species were together, were seen along the road from Valles to Tamazunchale. They were in groups of from 6 to 15 individuals. All that were taken were males.

PHOEBIS SENNAE EUBULE Linn. and ASCIA MONUSTE MONUSTE Linn.

These observations were made at a considerable distance from the preceding ones, and at a higher altitude, 15 miles north of Jalapa, Vera Cruz. These two species were of different colors, the first orange-and-yellow, the second white. Three aggregations were seen on July 18, at a damp place under a bridge. The first and second groups, comprising 110 and 100 individuals respectively, were all the orange and yellow *P. sennae eubule;* the third lot contained 75 of these and 5 of the white *A. monuste monuste.* Since both species belong to the family Pieridae, we need not be wholly surprised at the combination, even though their colors are different. All the samples were males.

It is interesting to note in passing that many of the white butterflies *A. monuste* were seen on pellets of donkey dung at Tamazunchale, and apparently feeding upon it.

(To be continued.)

Changes at the Ohio State University.

Dr. Laurence H. Snyder, professor of zoology, will become chairman of the department of zoology and entomology on July 1, succeeding Dr. Raymond C. Osburn, who is retiring with the title emeritus. He has been chairman since 1917. During eighteen years of this period, 1918 to 1936, Dr. Osburn was director of the Franz Theodore Stone Laboratory on Gibraltar Island in Lake Erie.—*Science*, April 24, 1942.

Memorial Tablet to Dr. Levi W. Mengel.

The Board of School Directors and the Management of the Museum announced the unveiling of a memorial tablet to Dr. Mengel at the Reading Public Museum and Art Gallery on Saturday afternoon, May 9th, 1942.

Stittocapsus new genus and Calocoris texanus new species from the United States (Hemiptera, Miridae).

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

STITTOCAPSUS, new genus.

Allied to *Adelphocoris* Reuter but with females brachypterous; lateral margins of pronotum rounded gradually to the propleura, anterior angles very narrow, not prominent, the lateral margins of calli almost meeting with top of coxal cleft. Arolia erect, parallel, divergent on apical half, less widely separated than in *Adelphocoris*, but typical of the Capsinae. Hind femora slender, not tapered as in *Phytocoris*. Head inclined, tylus prominent, strongly convex except on apex; rostrum reaching to apex of middle coxae. Antennae slender, first segment short, not equal to width of head, clothed with short recumbent pubescence. Dorsum and body beneath sparsely clothed with short, recumbent pubescence; impunctate, moderately shining. Male macropterous, the female brachypterous. Genital claspers rather similar in type to Adelphocoris but left clasper with a small, right angled hook on apex.

Genotype: *Stittocapsus franseriae* n. sp.

Stittocapsus franseriae new species.

♂. Length 7.5 mm., width 2.5 mm. Head: width 1.14 mm., vertex .43 mm., ecarinate, smooth and shining, vertex and frons convex, tylus strongly convex except on apical one-third; eyes vertical in position, moderately sinuate about base of antenna, reddish brown. Rostrum, length 2.03 mm., reaching to near apex of middle coxae, pallid, apex blackish. Antennae: segment I, length .82 mm., thickness .13 mm., cylindrical, clothed with short, recumbent black pubescence, pallid, base and ventral aspect with fuscous spots; II, 2.51 mm., slender, slightly more slender at base, pale to yellowish, clothed with fine, short pale and dark pubescence intermixed; III, 1.73 mm., dusky yellow; IV, .90 mm., dusky.

Pronotum: length 1.21 mm., width at base 2.2 mm.; lateral margins not distinct, but rounded over to the propleura, anterior angles narrowed, indistinct, calli impressed on margins, lateral margins extending almost to coxal cleft which is visible from above; collar distinct, stricture joined by coxal cleft behind middle of eye. Pronotal disk evenly convex, moderately shining, obsoletely transversely rugulose, impunctate or with micropunctures only at origin of the fine, pale pubescent hairs; margins of calli infuscated.

Scutellum moderately convex, transversely rugulose, but not distinctly punctate; pallid to yellowish, fuscous on basal impression. Mesoscutum prominent, sloping down to base of scutellum, pale to fuscous and brown.

Hemelytra elongate, embolar margins nearly straight, cuneus elongate (length 1.51 mm., width at base .60 mm.); membrane fully developed, fuscous, veins pallid, a calloused line bordering the brachium; color pallid to white, basal half of clavus except the prominent claval vein, narrow base and apical area of corium and embolium, and apical half of cuneus fuscous to dark brown; clothed with fine, recumbent, pale to dusky pubescence. Thorax and venter pallid to yellowish green, sternum fuscous.

Legs pallid, femora with rows of fuscous dots, two rows on anterior face but more irregularly placed on apical half of posterior aspect; tibial spines black but without spots at base; tips of tarsi and the claws blackish. Genital segment of a form related to *Adelphocoris,* but left clasper with a small yet distinct right angled hook on apex.

♀. Brachypterous, length 5.6 mm., width across abdomen 2.9 mm.; membrane absent, cuneus reduced to a small incurved flap, leaving three or four abdomenal segments exposed. Head: width 1.17 mm., vertex .56 mm.; frons more strongly convex than in the male, smooth, shining, very finely pubescent. Rostrum, length 2.12 mm., attaining apices of middle coxae. Antennae: segment I, length .74 mm., cylindrical; II, 2.29 mm., slender; III, 1.6 mm.; IV, .73 mm.

Pronotum: length .90 mm., width at base 1.8 mm.; central area of disk suddenly and strongly convex beginning just behind the calli. Scutellum strongly convex, smooth, obsoletely rugulose, yellowish; mesoscutum nearly flat and on a level with base of scutellum. General coloration pallid to greenish yellow, fuscous areas of the hemelytra rather similar to those of the male; legs pallid to yellowish, fuscous dots nearly obsolete.

Holotype: ♂ April 1, 1941, Mohawk, Arizona (Loyd L. Stitt); author's collection. *Allotype:* same data as the type. *Paratypes:* 5 ♂ 7 ♀, taken with the types on *Franseria dumosa* (Loyd L. Stitt). 6 ♂ 6 ♀ April 6, 1937, Mohawk, Arizona (Loyd L. Stitt), on *Franseria dumosa.* ♂ ♀ April 16, 1937, Quartzsite, Arizona (Loyd L. Stitt). California—♀, San Gorgonio Pass (P. H. Timberlake); this specimen recognized by Mr. Stitt in a collection box carried by Dr. R. L. Usinger.

UTAH—♂, St. George (A. M. Woodbury); received from Dr. Elden Beck about seven years ago.

The genus *Stittocapsus* is named in honor of Mr. Loyd L. Stitt who is doing some good ecological work on Miridae in Arizona. When the first specimen was received from Dr. Beck the writer recognized this Mirid as something new but set it aside to await the appearance of more material.

Calocoris texanus new species.

Distinguished by the orange coloration, with antennae, tibiae, and tips of femora black. The slender third and fourth antennal segments place this species in *Calocoris* rather than *Adelphocoris*.

♀. Length 6.9 mm., width 2.85 mm. Head: width 1.17 mm., vertex .476 mm.; frons smooth, convex, without trace of transverse striae; orange colored, tip of tylus slightly infuscated. Rostrum, length 3 mm., just attaining apex of hind coxae, orange colored, apex black. Antennae: segment I, length 1.01 mm., thickness .146 mm.; II, 3.14 mm., thickness .086 mm.; III, 2.81 mm., thickness .061 mm.; IV, 1.55 mm., thickness .043 mm.; black, clothed with fine pale pubescence.

Pronotum: length 1.34 mm., width at base 2.20 mm.; disk rather evenly, moderately convex, impunctate, but finely transversely rugulose; calli smooth, moderately shining, posterior margins delimited by a smooth impression; color uniformly orange, without spots. Scutellum rugulose, mesoscutum moderately exposed. Hemelytra with embolar margins slightly arcuate, cuneus normally dark fuscous. Dorsum and body beneath clothed with recumbent, fine yellowish pubescence. Legs orange colored, tibiae, tarsi, and tips of femora black. Venter uniformly orange colored.

Holotype: ♀ June 18, 1936, Uvalde, TEXAS (S. E. Jones); author's collection.

Calocoris palmeri Uhler (1872) was described from Arizona. The writer has recently recognized this as identical with *Calocoris fasciativentris* Stal (1862). Specimens at hand were taken Sept. 4, Sept. 26, 1925, Santa Rita Mts., Arizona (A. A. Nichol).

The Butterflies of Roanoke and Montgomery Counties, Virginia (Lepid.: Rhopalocera).

By CARROLL E. WOOD, JR. and CARL W. GOTTSCHALK.

(Continued from page 146.)

In both counties as everywhere else occur a number of butterflies which seem to show a total disregard for faunal zones, and in this state, at least, proceed to distribute themselves from the Lower Austral to the Canadian. Many of our commonest species take this unethical attitude. Typical of these ubiquitous insects are:

Megisto cymela
Polygonia interrogationis
Polygonia comma
Nymphalis antiopa creta
Vanessa atalanta
Vanessa virginiensis
*Vanessa cardui
*Precis coenia
Basilarchia arthemis astyanax
Basilarchia archippus
Phyciodes tharos
Euptoieta claudia
*Danaus plexippus
Feniseca tarquinius
Lycaena hypophlaeas
Everes comyntas
Lycaenopsis pseudargiolus
Strymon melinus
Pieris rapae
Anthocharis genutia
*Phoebis eubule
Colias philodice
Colias p. eurytheme
*Terias lisa
Papilio philenor
Papilio asterias
Papilio glaucus
Papilio troilus
Papilio marcellus
Proteides clarus
Achalarus lyciades
Thorybes bathyllus
Thorybes pylades
Pyrgus communis
Pholisora catullus
Erynnis martialis
Erynnis juvenalis
Erynnis horatius
Ancyloxypha numitor
Polites themistocles
Polites manataaqua
Polites peckius
Poanes zabulon
Atrytone ruricola

In addition to the summer visitors already mentioned, those species here marked by an asterisk (*) are known to be or are suspected of being visitors who take up more or less permanent residency in our area. *Vanessa cardui* is of irregular occurrence, sometimes common, but in some years absent.

LOCALITIES.

In Montgomery County the area around Blackburg has been most intensively worked, while in Roanoke County the Salem area is best known. Consequently, many of the records are from these two sections. However, collections have also been made in many other parts of both counties.

The localities represented by capital letters in the list of butterflies are as follows:

AB: Ash Bottom, Roanoke County, 1.6 mi. NW of Salem P. O., referring particularly to a clover field and an adjoining brushy hillside.

B: Blacksburg, Montgomery County.

BM: Bent Mountain, Roanoke County; part of the Floyd Plateau south of Roanoke. Numerous swampy areas. Altitude ca. 3,000 feet.

FL: Fort Lewis, 3 mi. W of Salem on Route 11. A marshy meadow.

FLM: Fort Lewis Mountain north of Salem and extending westward, referring to the southern slope near Salem. Oak-heath associations.

M: Montgomery County.

MC: Mason Creek, north of Hanging Rock, 2.6 mi. NNE of Salem P. O.

MF: Martin's Farm, a damp meadow 0.8 mi. N of Salem P. O.

KH: Katz Hill, a brushy hillside 0.9 mi. of N of Salem P. O. Dry scrub woods.

OF: Orphanage Falls, second growth woods with oak, pine, *Vaccinium*, 1.8 mi. NNW Salem P. O. at the foot of Fort Lewis Mountain. Clearings and trails numerous. Altitude ca. 1,500 feet.

PC: Poverty Creek, flowing eastward into Craig Creek which drains Poverty Hollow. Swampy areas.

PH: Poverty Hollow, an intermontane valley between Gap and Brush Mountains in Montgomery and Craig Counties, referring particularly to the Montgomery County end.

PM: Poor Mountain, SW of Salem, lying in both counties. Altitude 3,960 feet. Collections along fire roads.

R: Roanoke County.

RC: Roanoke College Campus, Salem.

RR: Roanoke River, south of Salem.

SC: Scout Cabin, Fort Lewis Mt., 3 mi. NW of Salem P. O. Cool, wooded ravine.

VPI: Virginia Polytechnic Institute, Blacksburg.

WM: Whitethorn Meadows, south of VPI campus.

List of Species.

There follows a list of the species and subspecies of butterflies known from Roanoke and Montgomery Counties. The earliest and latest dates of capture, as well as other dates where possible, of each species are noted, and although this may give a somewhat exaggerated idea of the period of flight of certain species, dates being in many instances from different years, a general idea of the time of flight in this part of Virginia is afforded. Localities are in most cases noted by the capital letters given above. All identifications have been kindly checked by Dr. A. H. Clark or Dr. E. A. Smyth, Jr., or by both.

Family Nymphalidae; Subfamily Satyrinae.

Megisto cymela (Cramer). FLM, vi 24, '38; vii 1, '37. KH, v 6-21, '38. M, v 25, vi 2, '99.

Satyrodes eurydice (Linné). M, viii 20, '98 (dark).

Minois pegala alope (Fabricius). FL, viii 20, '38. MF, viii 20, '37. M, no date.

M. pegala maritima (W. H. Edwards). FL, vi 24, '38; vii 21, '36; viii 14, '37. BM, viii 5, '38; viii 23, '40. SC, vi 24, '38. M, no date.

Subfamily Nymphalinae.

Polygonia interrogationis (Fabricius). S, viii 26, '37; ix 28, '39; ix 30, '38 (bred). MF, v 21, '38. FL. v 27, '38 (*umbrosa*); vii 31, '37 (*umbrosa*); viii 19, '38. M, iv 2, '99.

P. comma (Harris). S, x 3, 10, '38. FL, vii 31, '37. KH, iii 23, '39; iv 15, '38; iv 24, '39. M, no date.

P. progne (Cramer). B, vii '02 (from larvae on gooseberry).

P. faunus smythi A. H. Clark. B, vii 30, vi 30, '96 (from larvae on gooseberry).

Nymphalis antiopa creta (Verity). S, iii 21, '38; KH, iv 13, '38. B, many larvae on willows on V. P. I. campus.

Vanessa atalanta (Linné). S, viii 11, '37. KH, iii 30, '38; ix 18, '39. FL, viii 6, '35; ix 8, '38. M, no date.

V. virginiensis (Drury). S, iv 6, '38; ix 16, '39; ix 29, '37. KH, v 29, '38. FL, vii 25, '39; viii 31, '38. M, no date.

V. CARDUI (Linné). S, ix 17, '39. FL, viii 10, '38; viii 28, '35. M, no date.

PRECIS COENIA Hübner. S, vii 26, '38; ix 8, '37 (wet form); x 31, '37; xi '37 (wet form). KH, x 31, '37. M, no date.

ASTEROCAMPA CELTIS (Boisduval and LeConte). RC, viii 27, '40. RR, ix 10, '40. FL, vi 26, viii 27, '38; viii 20, '36.

A. CLYTON (Boisduval and LeConte). VPI, vi 15, 23, 28, 30, '00.

BASILARCHIA ARTHEMIS ASTYANAX (Fabricius). KH, v 6, 9, ix 11, '38; vi 6, '39. FL, viii 27, '37. FLM, vii 5, '37. M, no date.

B. ARCHIPPUS (Cramer). MF, v 21, '38; ix 11, '38. FL, vii 20, '36; vii 20, '36; viii 23, '39; viii 29, '38. M, no date.

EUPHYDRYAS PHAETON (Drury). S, vi '37. AB, vi 5, '38. MC, vi 16, '38. WM, vi 1, '14; vii 1, '99. Tinker Mt., Botetourt Co., vi 17, '31.

PHYCIODES NYCTEIS (Doubleday and Hewitson). FLM, vi 25, '37. MC, viii 7, '40. Near Singer, on the Roanoke River, v 19, '40. M, v 16, '00; viii 5, '99.

P. THAROS (Drury). S, iv 18, '39; viii 12, '38. KH, iii 28, '38; iv 29, v 7, 21, '38. FLM, v 31, vi 14, '38. FL, ix 4, '39. M, vii 25, '99.

ARGYNNIS BELLONA (Fabricius). BM, viii 23, '40 (common). WM, vii 25, '99; viii '95.

A. IDALIA (Drury). S, vii 10, '38. KH, vi 8, '38. FL, viii 19, '38. WM, viii 19, '26.

A. DIANA (Cramer). FLM, vi 25, '36; viii 11, '37; vi 22, viii 27, 29, '38. PM, viii 23, '40. PC, viii 16, '02. PH, vi 24, viii 29, '96.

A. CYBELE (Fabricius). S, v 29, '38. CH, vi 7, '39; vi 22, '38. FL, v 25, '36; ix 5, '38. AB, vi 13, '37. M, v '96; vi 12, '00; viii '95.

A. APHRODITE (Fabricius). KH, vi 15, '38. FL, viii 22, '39. FLM, vi 25, '36. AB, vi 5, '38. R, vi 14, '37. M, no date.

EUPTOIETA CLAUDIA (Cramer). S, vi 6, '38; vii 27, '31; ix 7, '39. AB, vi 5, '37.

Subfamily Danaiinae.

DANAUS PLEXIPPUS (Linné). S, vi 6, ix 27, '38; ix 26, x 3, '39. FL, viii 28, '35. M, viii '99.

Subfamily Libytheinae.

LIBYTHEA BACHMANII Kirtland. CH, iv 13, v 6, '38. M, no date. Mt. Lake, Giles Co., viii 8, '39.

Family RIODINIDAE.

NYMPHIDIA BOREALIS (Grote and Robinson). PH, vii. Palmer Hill, east of Blacksburg, vi 26, '39; vii 2, '00. Tinker Mt., Botetourt Co., vi 30, '40 (Van Gelder).

Family LYCAENIDAE; Subfamily Spalginae.

FENISECA TARQUINIUS (Fabricius). S, vi 13, '38; vii 2, '39. FLM, v 7, '38. M, iv 2, 4, 26, v 16, '00.

Subfamily Lycaeninae.

LYCAENA PHLAEAS HYPOPHLAEAS (Boisduval). S, iv 11, '38. KH, iv 9, 25, ix 23, '38. FL, vi 7, 12, viii 4, '38. M, v '95.

LYCAENOPSIS ARGIOLUS PSEUDARGIOLUS (Boisduval and LeConte). S, v 20 (*neglecta*), viii 6, '38. KH, iii 18, '38 (*violacea*); iii 23, '39. OF, iv 25, '40 (*neglecta*). FL, viii 27, '38. M, iv '96 (*neglecta*); viii '98.

GLAUCOPSYCHE LYGDAMUS (Doubleday). S, iv 24, 27, v 3, '31; v 19, '32. KH, v 17, '40. FLM, iv 5, '39. SC, iv 8, '39. MF, iv 13, '38. B, iv 10, 18, '03. VPI, v 2, '00. Near Palmer Hill, iv 18, '98. Near Christiansburg, v 10, '40. Camp Powhatan, Rockbridge Co., v 1, '38.

EVERES COMYNTAS (Godart). S, iv 12, v 12, '38. KH, iv 11, '39; iv 4, '40. FL, vi 18, viii 14, '38. FLM, v 9, '37. OF, iv 25, '40. M, iv 17, v 27, '98. Sunset Village, Montgomery Co., viii 17, '38.

Subfamily Theclinae.

ATLIDES HALESUS (Cramer). M, ix 10 (caught by a student, presumably near Blacksburg).

STRYMON TITUS MOPSUS (Hübner). East side of Roanoke River, near Blacksburg, vi 19, '99; vi 26, '00.

S. M-ALBUM (Boisduval and LeConte). S, ix 15, '37; ix 15, '38. North of Salem, ix 6, '39. B, ix 15, '22. Bent Mt., Floyd Co., vi 23, '38.

S. LIPAROPS (Boisduval and LeConte). FLM, vii 3, '37.

Palmer Hill, vi 15, '96. M, vi 24, '02.

S. FALACER (Godart). FLM, vi 17, '37; vi 22, '38. M, vi 13, '00; vii 2, '02; viii 1, '99.

S. CECROPS (Fabricius). KH, iv 23, 25, 26, 28, v 7, '38. FL, vii 23, '36; ix 2, '38. FLM, v 7, '38; viii 16, '38. SC, viii 11, '37 (type, ab. *gottschalki* A. H. Clark)[4]. M, vii 21, '02; viii 7.

S. MELINUS Hübner. KH, iii 31, '39; viii 26, '37. FL, viii 5, '37; viii 15, '36. M, viii 28, '00.

MITOURA GRYNEUS (Hübner). KH, iv 16, '38. FL, vi 28, '38. M, iv 5, '02; iv 23, '95; '99.

INCISALIA AUGUSTINUS (Westwood). KH, iii 26, iv 13, 24, '38. FLM, v 2, '37. SC, iii 19, 20, iv 15, '38. OF, iv 9, '38 (common).

I. IRUS (Godart). KH, iii 31, iv 13, 16, 28, v 7, '38. OF, iv 15, '38.

I. HENRICI (Grote and Robinson). KH, iii 25, iv 15, 19, 25, '38. Palmer Hill, Montgomery Co., v 9, '98.

I. POLIOS Cook and Watson. OF, iv 5, '38 (specimen in U. S. National Museum).

I. NIPHON (Hübner). KH, iv 14, '38. FLM, iv 8, '39; v 2, '37. AB, iv 23, '38. Foot of 12 o'Clock Knob, v 9, '37.

Family PAPILIONIDAE; Subfamily Pierinae.

PIERIS RAPAE (Linné). S, iii 30, '38; iv 1, x 16, '40.

P. PROTODICE Boisduval and LeConte. S, iv 6, '40 (*vernalis*). FL, vi 17, '37; vii 9, '36; vii 12, '35; vii 24, '38; viii 22, '38; ix 1, '39. M, iii 26, '98; x 19, '02.

ANTHOCHARIS GENUTIA (Fabricius). S, iv 10, '39; v 19, '40. KH, iv 14, 28, v 6, '38. AB, iv 12, '39; iv 23, '38 (large). Dixie Caverns, Roanoke Co., v 5, '40. M, iv 17, v 1, '98. Mill Creek, Montgomery Co., vi 1, '98.

PHOEBIS PHILEA (Linné). 12 o'Clock Knob, Salem, x 15, '28.

P. EUBULE (Linné). S, viii 6, '29; iv 12, '38. B, v 10, '21; x 6, '98; x 23, '31.

(To be continued.)

[4] Clark, Proc. Biol. Soc. Wash., 51: 1-6.

Six New Diplopods of the Family Xystodesmidae.*

By Nell Bevel Causey, Department of Zoology,
University of Arkansas.

The purpose of this paper is to describe new species of diplopods of the Family Xystodesmidae Cook 1904 occurring in North Carolina, Kentucky, and Tennessee. The holotypes are in the collection of the Academy of Natural Sciences of Philadelphia, and allotypes and paratypes are in the author's personal collection.

DELTOTARIA new genus.

Genotype: *D. brimleii* new species.

This genus resembles *Apheloria* in the curvature and the length of the principal blade of the telopodite of the male gonopods, but differs in having a thin subterminal process on the blade. It differs from other genera of this family in that the gonopods bear a large medial pointed coxal peg in addition to the characteristic sickle-like coxal spine.

Deltotaria brimleii new species (Figs. 1, 2).

Color in life unknown; dorsum, head, and antennae of dried specimens brown; keels, posterior margins of tergites, and margins of collum faded red-orange; legs and under parts pale yellow.

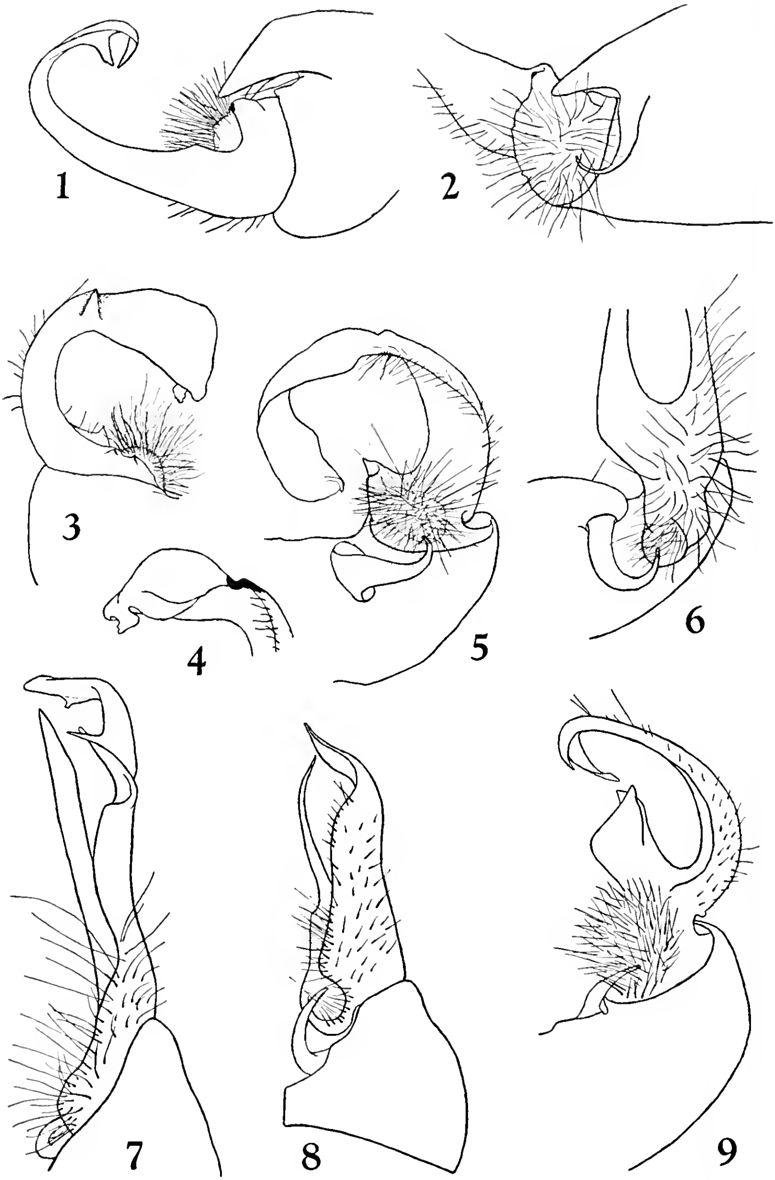
Repugnatorial pores on upper margin of posterior third of keels. Dorsum more arched than is usual in this family. Coxae posterior to gonopods spined. Sternites unarmed. Body parallel-sided over middle portion, gradually narrowed anteriorly, abruptly narrowed posteriorly.

In situ main blades of gonopods subparallel and perpendicular to longitudinal axis of body. Flattened apical third of main blade bent cephalad, ending in a thin subapical process and an attenuated apical hook (Fig. 1). Basal medial portion of blade thickly setose and proximal third sparsely setose. A large pointed peg on medial side of coxa and adjacent to the curved coxal spine of the gonopod (Fig. 2).

Length of male holotype, 31 mm.; width, 8.2 mm. Length of female allotype, 32 mm.; width, 29.3 mm.

Type.—♂ Swannanoa, North Carolina; May 26, 1923 (Dr. C. S. Brimley). *Allotype.*—1 ♀; same data.

* Research Paper No. 735, Journal Series, University of Arkansas.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Fontaria kentuckiana new species (Figs. 3, 4).

The general appearance of the gonopods *in situ* is similar to that shown by Gray for *virginiensis,* the type species of this genus; but in detail the gonopods are quite unlike the figure given by Williams and Hefner (1928) for *virginiensis.* The color of *virginiensis* was given by Gray as pale yellow; in *kentuckiana* the dorsum is shining dark brown; head and antennae brown; ends of collum, posterior angles of keels, roughly triangular areas on tergites or borders of tergites and collum red-orange; distal half of legs red-orange; under parts and proximal half of legs pale yellow. In alcohol dorsum fades to brown and keels and legs to yellow.

Repugnatorial pores on upper margin of posterior half of keels. Dorsum moderately arched. Body parallel-sided, gradually narrowed anteriorly, abruptly narrowed posteriorly. Anterior of female narrower than that of male. Coxae posterior to gonopods spined. Sternites unarmed. Six anterior pairs of legs of male shorter, thicker, and more setose than those of female.

Main blade of gonopod curves anterio-medially, crosses that of other gonopod, and ends in a large clavate structure that bears an inconspicuous curved apical process (Figs. 3, 4); proximal to clavate structure is a transverse ridge of chitin; telopodite densely setose at base and sparsely setose on caudal margin of blade from base to chitinous ridge; three small dentate processes on base of telopodite.

Length of male holotype, 47.5 mm.; width, 11.7 mm. Length of female allotype, 52 mm.; width, 12.4 mm.

Type.—♂; Cumberland Falls State Park, KENTUCKY; June 16, 1940. *Allotype.*—♀; same data. *Paratypes.*—1♂, 6♀, and several larvae of sixth and seventh stadia; same data.

Cleptoria splendida new species (Fig. 5).

Distinguishable from *macra* in having a medial row of bright yellow spots on the tergites. The main blade of the male gonopod is more regularly curved than in *macra* and the ter-

Explanation of Figures

Fig. 1. *Deltotaria brimleii,* right gonopod, subcephalad view (x 30).
Fig. 2. *Deltotaria brimleii,* right gonopod, caudo-medial view (x 30).
Fig. 3. *Fontaria kentuckiana,* right gonopod, subcephalad view (x 15).
Fig. 4. *Fontaria kentuckiana,* right gonopod, subcaudal view (x 15).
Fig. 5. *Cleptoria splendida,* left gonopod, medial view (x 15).
Fig. 6. *Nannaria scutellaria,* left gonopod, ventral view (x 30).
Fig. 7. *Nannaria scutellaria,* left gonopod, submedial view (x 30).
Fig. 8. *Aporiaria deturkiana,* left gonopod, subventral view (x 30).
Fig. 9. *Apheloria bidens,* left gonopod, submedial view (x 15).

minal part is less beak-like.

Dorsum, head, and antennae black; tergites trimaculate, all spots bright yellow; spots on latero-posterior corners of keels and ends of collum triangular; medial spots on tergites triangular to trapezoidal; medial spots on collum hourglass-shaped; legs yellow; underparts pale yellow.

Repugnatorial pores on posterior third of upper surface of margin of keels. Dorsum moderately arched. Coxae posterior to gonopods spined. Sternites of seventh to seventeenth segments bluntly spined. Body parallel-sided over middle portion, abruptly narrowed anteriorly, and gradually narrowed posteriorly. Six anterior pairs of legs shorter and thicker than any others.

Main blade of gonopod curves meso-cephalad, crosses blade of opposite gonopod, curves dorsad, and then caudad, almost forming a complete ellipse. About midway of the wide flattened blade there is a transverse furrow beyond which the blade is wider. A sharp peg arises from the large base on the cephalad surface of the telopodite (Fig. 5).

Length of male holotype, 49 mm.; width, 11 mm.

Type.—♂; Pine Mountain State Park, KENTUCKY; June 16, 1940.

Nannaria scutellaria new species (Figs. 6, 7).

Similar in size and coloring to *tennesseensis*. In *scutellaria* there is a definite terminal geniculation in the principal blade of the gonopod, while in *tennesseensis* this blade is "somewhat flattened and wavy, end slightly expanded." The shorter branch of the telopodite in both species is twisted near the base.

Dorsum dark brown; head and antennae light brown; keels red; legs and underparts pale yellow.

Repugnatorial pores on posterior third of margin of keels. Dorsum moderately arched. Sternite of fifth body segment of male bears a pair of conical processes between bases of fourth pair of walking legs. Sternites posterior to gonopods spined. Coxae unarmed. Shield-like sternite of third body somite of female compressed subvertically. Small nipple-like area near each gonopod of female. Setae on three proximal joints of legs continued across sternites in male but not in female. Body parallel-sided over middle portion, gradually narrowed anteriorly and posteriorly; anterior of female narrower than that of male.

Blades and processes of telopodites of gonopods subparallel with main axis of body. Main blade sharply bent so that its apex is but slightly anterior to apex of straight process (Fig. 7); proximal to the bend there is a constriction and a deflection of part of blade as two minute appressed spines directed medially; small tooth proximal to truncated apex.

Length of male holotype, 24 mm.; width, 4.2 mm. Length of female allotype, 26.4 mm.; width, 5 mm.

Type.—♂; Great Smoky Mountains National Park, near Chimneys, TENNESSEE; June 21, 1940. *Allotype.*—♀; same data.

Aporiaria deturkiana new species (Fig. 8).

Similar to *geniculata* in coloring. Gonopods similar to those of *carolina*. Can be distinguished from both *geniculata* and *carolina* by presence of spines on coxae posterior to gonopods.

Dorsum shining black with a green tinge; orange triangle on posterior corners of keels and ends of collum; thin orange line around collum and on posterior margins of most tergites; legs, underparts, and antennae pale yellow. In alcohol dorsum fades to brown and keels to pale yellow.

Repugnatorial pores on posterior third of upper margin of keels. Keels inconspicuous. Body parallel-sided over middle portion, gradually narrowed anteriorly, abruptly narrowed posteriorly. Dorsum more arched than is usual in this family. Coxae posterior to gonopods spined. Sternites unarmed.

Blades and processes of telopodites of gonopods subparallel with main axis of body. Thin apical portion of main blade curves mesad and ends in an acute point (Fig. 8). Apex of coxal spine lies in a cup-like pit on mesal surface of main blade. Coxae of gonopods closely appressed medially.

Length of male holotype, 32.5 mm.; width, 6.3 mm. Length of female allotype, 36.3 mm.; width, 7.8 mm.

Type.—♂; Highlands, NORTH CAROLINA; June 14, 1940 (Dr. William DeTurk). *Allotype.*—♀; same data. *Paratype.*—1 ♂; same data. *Other localities.*—Several males and gravid females, Great Smoky Mountains National Park, near Clingman's Dome, TENNESSEE; June 23, 1940; the length of the males was about 25 mm., and the gravid females were as long as 40 mm. Several larval and adult females; same data, but near Alum Cave.

Apheloria bidens new species (Fig. 9).

General appearance of male gonopods resembles *aspila*, but *bidens* can be distinguished by the larger basal process and the small subapical process of the main blade of the telopodite.

Dorsum dark brown; head and antennae lighter brown; lateral portions of keels and ends of collum bright red; distal half of legs red; under parts and proximal half of legs pale yellow.

Repugnatorial pores on posterior third of upper edge of keels. Dorsum more arched than usual in this family. Sternites unarmed. Coxae posterior to gonopods spined. Body parallel-sided over middle portion, abruptly narrowed anteriorly, gradually narrowed posteriorly.

Gonopods especially distinct in the large bluntly furcate basal process and the small lateral subapical process of the main blade of the telopodite (Fig. 9).

Length of male holotype, 43 mm.; width, 9.1 mm. Length of female allotype, 44.6 mm.; width, 10.7 mm.

Type.—♂; Great Smoky Mountains National Park, near Chimneys, TENNESSEE; June 21, 1940. *Allotype.*—♀; same data. *Paratypes.*—3 ♀; same data.

Again: Why does Gyrinus Circle? (Coleoptera; Gyrinidae). Abbott's stimulating paper, "Why Does Gyrinus Circle?" in *Entomological News,* Vol. LII, No. 10, December, 1941, pp. 287-290, describes how Gyrinidae perceive minute vibrations at the water's surface and are thereby led to the discovery of wounded prey. The vibration-perceptors are located in the antennae and are sensitive to vibrations within a radius of three or four centimeters.

No criticism of a minor point in Abbott's paper should be allowed to draw credit from the ingenious experiments by which the above physiological facts were discovered. It may be pointed out however, that the demonstration of vibration-perceptors in the antennae still fails to explain why *Gyrinus* circles. At the close of his paper Abbott states:

"By *circling, Gyrinus* greatly increases the area of surface which it covers in a given time, and hence, naturally increases its *chances* of encountering vibrations set up on the surface of the water."

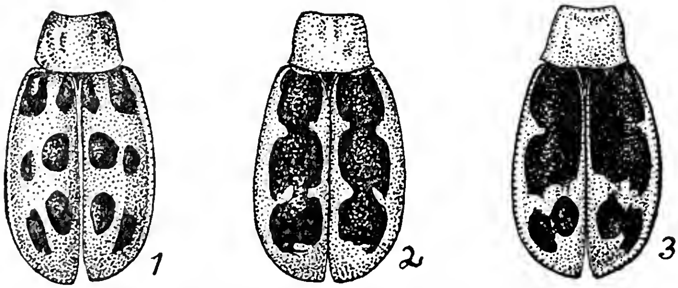
Not only is such a conclusion unrelated to the experimental evidence presented by Abbott, but it is also mathematically untrue. If the insect moved forward in a straight line, it would cover a greater surface in a given time than it would by circling, for each time it crossed a point where it had already been, it would cover a portion of territory already found sterile. Thus its intersections of an old track would *reduce* the "chances of encountering vibrations set up on the surface of the water."

I return the question to further consideration by scientists.—C. BROOKE WORTH, Edward Martin Biological Laboratory, Swarthmore College, Swarthmore, Pennsylvania.

Color Aberrance in Diabrotica 12-punctata Fab. (Col.: Chrysomelidae).

By W. V. Balduf.*

The purpose of this note is to describe two adult individuals of the above species of beetle that display a marked departure from the normal pattern of colors. One of these (fig. 2) was taken in a light trap at Urbana, Illinois, on August 24, 1938, by Garland T. Riegel, entomological assistant of the Illinois Natural History Survey, who generously consented to my present use of the specimen. The other (fig. 3) I obtained by sweeping vegetation along a railroad bank near Tolono, Illinois, on October 18, 1941. To facilitate appreciation of the nature and extent of the aberration, the normal color plan of this common species is pictured (fig. 1).



Close comparison of the abnormal specimens with the usual normal color type reveals that they are aberrant only in the design of the elytra. As all entomologists know, the species normally bears 12 black spots on a background of green or yellow, all the spots being limited to the elytra. Each elytrum possesses three pairs situated at about equal and distinct intervals of space.

In the abnormal individuals concerned here, not only are the spots of the anterior and middle pairs so greatly enlarged that they are confluent, but these pairs are themselves largely joined. However, the posterior pair of each wing remains wholly separate from the median pair in one specimen (fig. 3) and is only partly connected with it in the other (fig. 2). While the

* Contribution No. 225 from the Entomological Laboratories of the University of Illinois.

abnormality is therefore similar in general in the two individuals it is decidedly not identical; reference to the figures will show that several minor differences exist. Superficially, these beetles seem to have produced an extraordinary amount of black pigment, which consequently overflowed into adjacent areas beyond the normal limits and forms of the 12 spots.

This species is available in greater or lesser numbers here every year, and the beetle is large enough to permit notice readily of any unusual departures in dorsal color pattern. In my collecting experience, aberrations of this kind have not been noticed heretofore.

The environmental causes, if any, and the internal mechanics and chemistry of unusual insect color phenomena seem to require much more careful research before full understanding is reached. Basic investigations in this field obviously demand skill in microtechniques, a mastery of biological chemistry and inquiry into the minutiae of insect structure. Recent summaries of the subject matter on insect colors are available in Imms, A. D., *Recent Advances in Entomology*, 1931, and Folsom, J. W. and Wardle, R. A., *Entomology*, 1934.

The Malaria-carrying Anopheles gambiae (Diptera: Culicidae).

The News for May, 1941, page 125, quoted the Rockefeller Foundation Review for 1940 that "No evidence of gambiae in Brazil was found during the last 47 days of 1940." The same Review for 1941, referring to this statement says (p. 17): "It will be remembered that this was the mosquito which, imported from Africa by airplanes or fast navy destroyers, had been responsible for a widespread and devastating malaria epidemic. As a malaria vector this mosquito was more efficient than any anopheline indigenous to America, and its further spread was greatly feared . . . It is a satisfaction to report tha no infested areas were discovered during the entire year 1941. Commercial planes are now carefully fumigated, both after they leave Africa and again before their passengers are discharged in Brazil. A dead female gambiae was discovered after fumigation in a plane arriving in Brazil in October, 1941, and two more in January, 1942."

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

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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.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bolletino 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.
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.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington. D. C.
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.
55. Pan-Pacific Entomologist. San Francisco, Cal.
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.**
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
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.
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.
82. **Bulletin, Division of the Natural History Survey. Urbana, Illinois.**
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
87. Archiv für Entwicklungsmechanik 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.
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.
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.
117. Microentomology, Stanford University.
118. Ward's Ent. & Nat. Sci. Bull., Rochester, N. Y.
119. American Midland Naturalist, Notre Dame, Ind.
120. The Great Basin Naturalist, Provo, Utah.
121. Ciencia, Mexico City.
122. Revista Museo de la Plata, Buenos Aires.
123. Indian Journal of Entomology, New Delhi.

Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF.

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.**—Conservation of scholarly journals. [7] 35: 1. **Busvine, J. R.**—Domestic entomology in wartime [31] 149: 295-296. **Cockerell, T. D. A.**—Entomology and warfare. [68] 95: 302. **Davis, A. C.**—Obituary by Weigel, Bottimer & Buchanan. [10] 44: 33-36, ill. **Denier, P. C. L.**—Obituary by E. del Ponte. [104] 11: 179-184. **Farrar, M. D.**—Small insect cage. [12] 35: 76, ill. **Fraenkel & Blewett.**—Boitin as a possible growth factor for insects. [31] 149: 301. **Frost, S. W.**—Entomological Society of Pennsylvania. [12] 35:64. **Kloet, G. S.**—An improved breeding cage. [8] 78: 58-60, ill. Improvements to Burke's trap for wood-boring insects. [8] 78: 61-63, ill. **Lindsay & Craig.**—The distribution of radio-phosphorus in wax moth, mealworm, cockroach and firebrat. [7] 35: 50-56, ill. **Lochhead, J. H.**—Control of swimming position by mechanical factors and proprioception. [Q. Rev. Biol.] 17: 12-30, ill. **Matthews, H. D.**—On the stridulations of insects. [68] 95: 324-325. ill. **Michelbacher & Ross.**—Contributions toward a knowledge of the insect fauna of Lower California. [61] 24: 19pp., ill. **Muesebeck, C. F. W.**—Common names of insects approved by the American Association of Economic Entomologists. [12] 35: 83-101. **Sabin & Ward.**—Insects and epidemiology of poliomyelitis. [68] 95: 300-301. **Teale, E. W.**—The story of an insect garden. [Nature Mag.] 35: 245-248, 273, ill. **Urquhart, F. A.**—An insect collection. [Canadian Nature]

4: 92, ill.

ANATOMY, PHYSIOLOGY, ETC.—Clare & Tauber—Circulation of hemolymph in the wings of the cockroach, Blattella germanica. [Iowa State Coll. Jour. Sci.] 16: 349-356, ill. Also [7] 35: 57-67, ill. **Harnly, M. H.**—Wing form and gene function in nine genotypes of Drosophila melanogaster. [92] 92: 215-232. **Tiegs, O. W.**—The 'dorsal organ' of collembolan embryos. [53] 83: 153-170, ill. **Waddington, C. H.**—Growth and determination in the development of Drosophila. [31] 149: 264-265, ill. **Wigglesworth, V. B.**—The significance of 'chromatic droplets' in the growth of insects. [53] 83: 141-152, ill. **Yeager, McGovran, Munson & Mayer.**—Effect of blocking Hemocytes with Chinese ink and staining Nephrocytes wioh Trypan blue upon the resistance of the cockroach Periplaneta americana to sodium arsenite and nicotine. [7] 35: 23-40, ill. **Yeager & Munson.**—Changes induced in the blood cells of the southern armyworm (Prodenia eridania) by the administration of poisons. [47] 64: 307-332, ill.

ARACHNIDA AND MYRIOPODA—Archer, A. F.—Alabama spiders of the family Mimetidae. [Pap. Michigan Acad. Sci. Arts & Letters] 27: 183-193, ill. **Bryant, E. B.**—Notes on the spiders of the Virgin Islands. [Bull. Mus. Comp Zool.] 99: 317-363, ill. **Chamberlin, R. V.**—New southern millipeds. [Bull. Univ. Utah] 32: 19pp., ill. **Glennie, E. A.**—Supposed cannibalism among spiders in high altitudes. [Jour. Bombay Nat. Hist. Soc.] 42: 667: **Goodnight, C. J. & M. L.**—New and little known Phalangida from Mexico. [40] No. 1163: 16pp., ill. New American Phalangida. [40] No. 1164: 4pp., ill. **Lowrie, D. C.**—The ecology of the spiders of the Xeric dunelands in the Chicago area. [Bull. Chicago Acad. Sci.] 6: 161-189, ill. **Michelbacher, A. E.**—Contributions toward a knowledge of the insect fauna of Lower California. No. 5. Symphyla. [61] 24: 153-160, ill. (*). **Smith, C. N.**—Gynandromorphism in Ixodes dentatus. [10] 44: 52-53, ill.

THE SMALLER ORDERS OF INSECTS—Agrell, I.—Zur okologie der Collembolen untersuchungen im schwedischen Lappland. [Opuscula Ent.] 3 (Suppl.): 236pp., ill. **Banks, N.**—Contributions toward a knowledge of the insect fauna of Lower California. No. 4. Myrmelionidae. [61] 24: 133-152, ill. (*K). **Borror & Epstein.**—New records of

Ohio dragonflies. [43] 42: 81-83. **Denning, D. G.**—Description of new Trichoptera from the United States. [4] 74: 46-51, ill. **Good, N. E.**—Carteretta carteri clavata, a new subspecies from Nevada, and notes on synonymy. [7] 35: 110-113, ill. **Kennedy, C. H.**—Palaemnema lorena and P. melanocauda, new species of dragonflies from northwestern Ecuador (Platystictidae). [7] 35: 97-104, ill. **Putman, W. L.**—Notes on the predaceous thrips Haplothrips subtilissimus and Aeolothrips melaleucus. [4] 74: 37-43. **Simmons, et al.**—Caddisfly larvae fouling a water tunnel. [12] 35: 77, ill. **Vishniac, R.**—Insects of ancient lineage. [Nature Mag.] 35: 252-253, ill.

ORTHOPTERA—Fay, R. W.—Distribution of arsenic in the body of the American roach.]12] 35: 45-47. **Piran, A. A.**—Catalogo sistematico y zoogeografico de Tettigonioideos Argentinos. [104] 11: 240-281. **Wilbur & Fritz.**—An epizootic among the thistle hoppers. Aeoloplus turnbulli bruneri in Kansas. [12] 35: 109.

HEMIPTERA—Beamer, R. H.—Four new species of Mesamia (Cicadellid.). [4] 74: 44-45. **Beard, R. L.**—On the formation of the tracheal funnel in Anasa tristis induced by the parasite Trichopoda pennipes. [7] 35: 68-72, ill. **Cook, W. C.**—The beet leafhopper. [U. S. Dept. Agric.] Farmers' Bull. No. 1886: 21 pp., ill. **Davidson & DeLong.**—Studies of the genus Empoasca (Cicadellid.). [7] 35: 105-109, ill. **da Costa Lima, A.**—Spiniger mazzai n. sp. (Reduviid.). [Mem. Inst. Oswaldo Cruz] 36: 387-389, ill. Consideracoes sobre alguns Reduviideos da subfamilia "Stenopodinae". [Rev. Brasil. Biol.] 1: 337-342, ill. (*). **de Carlo, J. A.**—Descripcion de una especie nueva dell genero Belostoma. [104] 11: 212-213, ill. **deLong & Caldwell.**—The genotype of Forcipata. (Cicadellid.). [7] 35: 49. **Essig, E. O.**—New species of the genus Amphorophora (Aphidid.). [7] 35: 2-16, ill. **Lizer y Trelles, C. A.**—Cochinillas halladas por primera vez en la Argentina. [104] 11: 230-236 . **Tuthill, L. D.**—Leurolophus, a new genus of the family Psyllidae. [7] 35: 92-93, ill.

LEPIDOPTERA—Beirne, B. P.—The morphology of the male genitalia of the lepidoptera. [21] 54: 17-22, cont., ill. **Bourquin, F.**—Metamorfosis de Eurota hermione. (Amatid.). [104] 11: 214-220, ill. **Brown & McGuffin.**—New descriptions of larvae of forest insects, Zanclognatha, Palthis, and Autographa (Phalaenid.). [4] 74: 52-56, ill. **Burkill, H. J.**—Butterflies drinking. [9] 75: 71. **Cockayne, E. A.**—Spiral and other abnormalities of segmentation in Lepidoptera. [9] 75: 49-54. **Fennah, R. G.**—The "Orange Moth" of Dominica, B. W. I.]Trop. Agric.] 19: 73-78, ill. **Heinrich, C.**—A new Psychophora from the Hudson Bay Region (Geometrid.). [10] 44: 50-51, ill. **Schaefer & Breyer.**—Lista de lepidopteros de Catamarca y algunas observaciones. [104] 11: 221-229, ill. **Siegler, Gertler & Haller.**—Toxicity of some semicarbazones to codling moth larvae. [12] 35: 74-76, ill. **Urquhart, F. A.**—Swallowtail butterflies. (Canadian Nature] 4: 102, ill.

DIPTERA—Alexander, C. P.—New or little-known Tipulidae. Neotropical species. [75] 9: 219-245, ill. **Beard, R. L.**—(See under Hemiptera). **Deonier, C. C.**—Seasonal abundance and distribution of certain blowflies in southern Arizona and their economic importance. [12] 35: 65-70. **Fairchild, G. B.** The seasonal distribution of some Tabanidae in Panama. [7] 35: 85-91, ill. **Fosdick, R. B.**—The death of the Gambiae. [Rockefeller Foundation Review] 1941: 17-19, ill. **Goodey, T.**—On the morphology of Mermithonema entomophilum n. g., n. sp., a nematode parasite of the fly, Sepsis cynipsea. [Jour. Helminthology] 19: 105-122, ill. **Griswold, G. H.**—An unusual experience with Lucilia sericata. [12] 35: 73. **Harmston & Knowlton.**—New Dolichopodidae of western North America. [7] 35: 17-22, ill. **Hull, F. M.**—Some new species of Baccha and Mesogramma. [43] 42: 73-74. (s). **James, M. T.**—New species and records of Mexican Stratiomyidae. [An. Esc. Nac. Cien. Biol., Mexico] 2: 241-249. (k). **Mangrum, J. F.**—The parasitic fly, Zelia vertebrata (Dexiid.). [7] 35: 73-75, ill. **Morgan, B. B.**—The viability of Trichomonas foetus in the house fly (Musca domestica). [Pro. Helminthological Soc. Washington]. 9: 17-20. **Ouellet, J.**—Deux nouveaux Dipteres (Empidid.). [98] 69: 78-85, ill. **Sullivan, Goodhue & Fales.**—Toxicity to adult mosquitoes of aerosols produced by spraying solutions of insecticides in liquefied gas. [12] 35: 48-51.

COLEOPTERA—Bryant, G. E.—Lista provisional de los Crisomelidos de Venezuela. [Bol. Soc. Venezolana Cien. Nat.] 7: 195-208. **Buchanan, L. L.**—Xylocomesus Thatcher a curculionid. [10] 44: 50. **da Costa Lima, A.**—Sobre a "Joaninha" "Coccidophilus citricola". [Rev. Brasil. Biol.] 1: 409-414, ill. **Denier, P. C. L.**—Apuntes sobre la biologia de

Conotrachelus denieri plaga del algodonero. [104] 11: 185-207, ill. Apuntes al margen de publicaciones recientes sobre Curculionidos de la tribu Naupactini. [104] 11: 208-211. **Eaton, C. B.**—The anatomy and histology of the proventriculus of Ips radiatae. (Scolytid.). [7] 35: 41-49, ill. Biology of the weevil Cylindrocopturus eatoni injurious to Ponderosa and Jeffrey Pine reproduction. [12] 35: 20-25, ill. **Fisher, W. S.**—New Coleoptera from Puerto Rico. [Jour. Agric. Univ. Puerto Rico] 25: 37-39. A new Cerambycid beetle from Oregon. [4] 74: 51. **Frohawk, F. W.**—Sparrow chasing stag beetle. [9] 75: 70. **Knowlton & Meier.**—Collops bipunctatus. [12] 35: 108, ill. **Leech, H. B.**—Dimorphism in the flying wings of a species of water beetle, Agabus bifarius (Dytiscidae). [7] 35: 76-80, ill. Mandibular shapes in water beetles of the genus Thermonectus (Dytiscidae). [4] 74: 56, ill. **Linsley, E. G.**—Contributions toward a knowledge of the insect fauna of Lower California. No. 12 Cerambycidae. [61] 24: 21-96, ill. (*). Systematics of the Meloid genera Hornia and Allendesalazaria. [67] 7: 169-187, ill. **Roth, L. M.**—The Oenocytes of Tenebrio. [7] 35: 81-84, ill. **Strickland, E. H.**—Variations in the length of the life-cycle of wireworms. [12] 35: 109. **Timberlake, P. H.**—A new species of Hippodamia from Mexico (Coccinellid.). [10] 44: 39. **Van Dyke, E. C.**—Contribution toward a knowledge of the insect fauna of Lower California. No. 3 Buprestidae. [61] 24: 97-132, ill. (*). **Wittmer, W.**—Contribution a la connaissance des Malacodermes neotropiques. [104] 11: 237-239. **Woodside, A. M.**—Tenebroides corticalis predaceous on codling moth larvae. [12] 35: 110.

HYMENOPTERA—Bradley, W. G.—Methods of breeding Chelonus annulipes on the Mediterranean flour moth for use against the European corn borer. [U. S. Dept. Agric.] Circ. 616: 23pp., ill. **Buren, W. F.**—New ants from Minnesota, Iowa and Wisconsin. [Iowa State Coll. Jour. Sci.] 16: 399-408. **Callan, E. McC.**—A note on Timulla eriphyla (Mutillid.), a parasite of Tachysphex blatticidus (Larrid.), from Trinidad, B. W. I. [107] 17: 18. **Cushman, R. A.**—The synonymy of Idiogramma (Ichneumonid.). [10] 44: 54. **Deleurance, E. P.**—Contributions a l'etude biologique de la Camargue. Observations entomologiques. [Bull. Mus. Hist. Nat. Marseille] 1941: 275-289, ill. **Flanders, S. E.**—Sex differentiation in the polyembryonic proclivity of the Hymenoptera. [12] 35: 108. **Rau, P.**—Temperature as a factor inducing the hibernation of Polistes annularis. [7] 35: 94-96.

SPECIAL NOTICES—Systema Aphididae.—A guide to the phylogeny of the aphids or plant lice. Part 1. The Lachnea. By O. W. Oestlund. Minnesota. 1942. 78pp.

College Entomology. By E. O. Essig, Professor of Entomology, Entomologist in the Agricultural Experiment Station, University of California. New York. The Macmillan Company. 1942. Pp. vii, 900. 308 figs. $5.00—Of recent text books of entomology, in English, this one devotes a proportionally larger share of its pages to taxonomy, as may be seen from the following comparative figures. The first numerals show the number of pages on each topic, those in parenthesis give the percentage value thereof. The sequence of subjects is that of the present volume.

Essig, 1942: Metamorphosis of insects 12 (1.33), Anatomy 40 (4.44), Classification of insects 6 (.67), Thirty-three orders 770 (85.55), General references 3 (.33), Index of authors 5+63 of subjects=68 (7.55), Total pages 907, Number of figures 308, Lines of larger type per page 45, of smaller type 49.

Metcalf and Flint, Fundamentals of Insect Life, 1932: Development and metamorphosis 24 (4.05), Anatomy and physiology 61 (10.3), Twenty-three orders 182 (30.74), Other topics (place of insects, control, ecology, behavior) 254 (42.91), General references 5 (.84), Index 55 (9.29), Total pages 592, Number of figures 315, Lines of larger type per page 42, of smaller type 52.

Imms, General Textbook of Entomology, 3rd edition, 1934: Development and metamorphosis 42 (5.68), Anatomy and physiology 169 (22.87), Classification 4 (.54), Twenty-three orders 479 (64.82), References at the ends of the various sections. Index of authors 8+25 of subjects=33 (4.46), Total pages 739, Number of figures 624, Lines of larger type per page 53, of smaller type 65.

Comstock, Introduction to Entomology, Ninth edition, 1940: Metamorphosis 40 (3.70), Anatomy 139 (12.84), Classification 11 (1.02), Twenty-six orders 791 (73.10), General references 20 (1.85), Index 36 (3.33), Total pages 1082, Number of figures 1228, Lines of larger type per page 41, of smaller type 61.

The greater share given to taxonomy in Prof. Essig's book directs attention to this topic. The thirty-three orders here recognized are essentially those of Handlirsch (in Schröder's Handlirsch, 1913-1925) and of Brues and Melander (Classification of Insects, 1932), except that the names employed are not always the same. The chief taxonomic difference between the three works is that Essig, reverting to "a continued acceptance of Latreille's views" (p. 263), considers the Homoptera and Heteroptera together as one order, Hemiptera. In his preface our author states that "he has considered with great care every change involving the name of an order, family or genus, and the whole is the product of much research, discussion and progressive thinking." As a consequence the name of each order, suborder and family in chapters IV-XXXVI is followed by that of its author and date. Historical evidence for the conclusions reached is often given in footnotes. Quoting again from the preface: "In assigning authors and dates to the names of orders and families considerable difficulty has been experienced in determining priority, and there are no doubt errors in these debatable matters. Suggestions and corrections will be most welcome." We foresee a lively and prolonged discussion of Prof. Essig's results. The accents and derivation of these group names are usually given. The species which are included in this book "have been selected for one of three reasons: (1) long associations with the human race; (2) some peculiarity in form, size, color, habits; or (3) interesting and typical examples of the family." The author "has treated the subject from a world viewpoint rather than from a continental one." Thus, in the family Saturniidae, the giant silkworms, nine North American species and thirteen from other continents are mentioned or described; corresponding figures from Imms are one and ten, from Comstock twelve and one. Keys to the orders, superfamilies and families are supplied. Following the treatment of each order is a list of selected references which extend, in various sections, from 1783 to 1940. Many of the references credited to C. Schröder are really due to Handlirsch and other authors who contributed to the *Handbuch der Entomologie* edited by Schröder. At the beginning of each chapter dealing with a larger order is usually a tabular statement of the anatomical characters, external and internal of the imagos and frequently also of the larvae. Many of the figures are new, some have been taken from the author's *Insects of Western North America* (1926) and *A History of Entomology* (1931); the remainder are from other writers, including Moufet (1634) and Swammerdam (1738). On the inside of the front and rear covers and the fly-leaves facing them is a map of the world in colors showing the usual five zoogeographical regions. We have not sought for errors in the text, but the dates given (p. 2) for Aristotle "(257-185 B. C.)" are not those (384-322 B. C.) to be found in most works on the Greek philisopher. Prof. Essig's new book is well done and a noteworthy addition to entomology. P. P. CALVERT.

FERNALD CLUB YEARBOOK. The Fernald Club, 1941, Massachusetts State College, Amherst, Mass. Number 11. January 1942. Dedicated to Harold Locke Frost. 36 mimeographed pages.—The "aims and guiding purpose of this yearbook are the same as they were eleven years ago—to assemble an account of the activities and achievements of the students, the department and its graduates; to foster a close relationship between students and faculty at the college and graduates working in the field, and to preserve for present and future entomologists information of historical interest which might otherwise be lost." Vincent A. Lafleur, of the Class of 1942, is editor. The staff of the department of entomology and zoology in 1941 comprised one emeritus professor (Henry T. Fernald), five professors, three assistant professors, two instructors, four assistants, two teaching fellows and one clerk. Additions of 6500 specimens during 1941 bring the totals in the insect collection to 9850 species and 75,933 named specimens. Varied activities, including publications, of the staff and students are listed. The work in economic entomology of an earlier student, Charles Pugsley Lounsbury, as Government Entomologist of the Colony of the Cape of Good Hope, 1895-1927, is summarized on pages 21-24 by Prof. C. P. Alexander. Obituaries of recently deceased students who published or did other active work in entomology include Harold Locke Frost, 1875-1940; Frederick Andrew Johnston, 1887-1941; Thomas Henry Jones, 1885-1941; and Dr. John Nicholas Summers, 1884-1941. A reproduction of a group photograph of the departmental personnel appears on the first page of the cover. P. P. CALVERT.

Distribution of Insects by Airplanes.

Attention should be called to the increasing danger of transportation by airplanes of dangerous mosquitoes of various species, and of other disease vectors as well, especially during wartime when military necessity has a tendency to override civilian attempts to control plane movements in the interests of public health. The gambiae could just as easily travel to Asia as it could to the Americas. We do not know whether or not the tsetse fly, one of the vectors of African sleeping sickness, can successfully establish itself in the Americas, but a male of this species was found on a plane going to Brazil from Africa in November, 1941.—*Rockefeller Foundation Review* for 1941.

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—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

I want to collect Rothschildia, agapema, gulfina and io moths and Texas butterflies for interested persons. Eula Frizzell, R 4 San Benito, Texas.

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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

Arctic Lepidoptera especially **Noctuidae**—Wanted to hear from collectors who desire the Arctic Species. Have large collection. R. J. Fitch. Lloydminster, Saskatchewan, Canada.

Wanted—Tropical Lepidoptera and Insects. Also domestic species. Will exchange or buy specimens. M. A. Zappalorti, 253 Senator Street, Brooklyn, N. Y.

Wanted—Specimens of the genus Calendra (Sphenophorus) from North America. Will exchange Eastern U. S. Calendra or other Coleoptera for desired species. R. C. Casselberry, 302 Lincoln Avenue, Lansdowne, Penna.

Coccinellidae wanted from all parts of the world, especially South and Central America. Buy or exchange. G. H. Dieke, 1101 Argonne Drive, Baltimore, Md.

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JULY, 1942

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CONTENTS

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Further information on the above may be obtained from the editor.

Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1942, 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 separates of articles, without covers, over and above the twenty-five given free at the following rates: 1 or 2 pages, 25 copies, 65 cents; 3 or 4 pages, 25 copies, \$1.05; 5 to 8 pages, 25 copies, \$1.75; 9 to 12 pages, 25 copies, \$2.35; each half-tone plate, 25 copies, 30 cents: each plate of line cuts, 25 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, P. C. Stockhausen, 53 North 7th St., Philadelphia, Penna. 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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Clouds of Butterflies in Mexico: A Study in Butterfly Aggregations (Lepid.: Rhopalocera).

By Phil Rau, Kirkwood, Missouri.

(Continued from page 155.)

Summary and Discussion.

The clouds of butterflies along the highways of Mexico were charming to behold, but it was soon discovered that the insects so conspicuously afloat in the air, attained that position for the most part at the behest of artificial disturbances. Normally the butterflies spend the daylight hours at rest in moist places on the ground or in cool culverts under the highway in small or large aggregations of one or more species.

Observing the various species so congregated, one soon notices behavior-patterns among them of great diversity. Their conduct under these conditions, it seems to me, has much to teach us from several avenues of approach, the most important being that of societal evolution. Butterflies, because of their "desire" to be in close company of one another, present links in the chain of evolution of insect-societies which, as is well known, have had their culmination in the complex social conditions of the higher Hymenoptera.

Butterflies as already stated, spend long hours among their fellows in cool culverts or on the moist ground in the tropical sunshine. The coolness, the moisture, and the sunshine evidently are the factors which hold them to the places in which they congregate, while the yen for sociability is what brings them together in the first place. It is quite likely in all of this, that an awareness of color or of color-pattern as well as of odor and tactile perception are the influencing factors; there may also be a recognition of species or of family (taxonomic) by these or by other means.

Many of the reactions, since they come about by the use of the sense organs, are open for experimentation and study, and with proper technique may be weighed and measured. That which is not measurable, however, and also is quite unaccountable, is the peculiar craving for sociability, which appears not alone in butterflies, but more or less strongly in all organisms. Wheeler[4] has discussed the subject solely from the standpoint of insects, and Allee[5] has done so for organisms from Protozoa to Man. Various points of view are expressed by them to account for the presence of social and sub-social conditions, and also its evolution, but both have neglected to mention this kind of gregariousness among butterflies. The last word has not yet been said on the problems involved, nor on the various steps taken by organisms in the evolution of insect societies.

Since butterflies have been overlooked in studies of societal evolution, an attempt is here made to classify the behavior data given in the forepart of this paper. This behavior runs the gamut from the decidedly non-social conditions as observed, for example, in the reddish-brown *Anaca aidea* to the highly gregarious conduct of, say, the large yellow *Phoebis agarithe maxima* where as many as several thousand individuals congregate solidly or congregate in company with the large white *Anteos clorinde*. Between these extremes may be found examples of several kinds and degrees of gregariousness; in fact, the twenty-six species observed in this study may be classified into six categories. The categories and the butterflies which belong to each of them follow:

1. Those which are non-social, showing no tendency to gregariousness; *Anaca aidea, Chioides zilpa.*

2. Those which are non-social, but only occasionally are found to be gregarious; and then only in groups of their own species; *Papilio philolaus, Victorina stelenes biplagiata.*

3. Those which are non-social, but occasionally are found in groups, not of their own species but in groups of other species;

[4] The Social Insects, 1928.

[5] Animal Aggregations, 1931.

none.

4. Those which are found in aggregations solidly of their own species: *Phoebis agarithe maxima, Chiomara asychus, Eurema neda, Achlyades thraso, Colaenis julia, Precis lavinia zonalis, Athena chiron, Athena petreus.*

5. Those which are found in aggregations of different species but all of, more or less, the same color as themselves: *Eurema gratiosa, E. mexicana, E. neda nelphe, Papilio cresphontes, Papilio thoas autocles, Chlosyne janais, Microtia elva.*

6. Those found in aggregations of mixed species and also of different colors: *Phoebis agarithe maxima, Anteos clorinde, Phyciodes vesta boucardi, Anthanassa texana, Chlosyne lacinia, C. adjutrix, C. janais, Ascia monuste monuste.*

It is apparent from the classification that it is possible for some species to be placed in more than one category, as in the case of *Phoebis agarithe maxima*, and also that one category is possible (no. 3) for which no species have yet been found.

It is further apparent, that the gregarious behavior of the butterflies is by no means haphazard, and that the various types may easily be classified; although one may also readily perceive that at other times and in other places a species by its changed behavior may entirely upset its present status of classification. This study, therefore, is suggestive rather than exhaustive. It brings one to the realization of the need for much additional observation and experiment before a phylogenetic scheme may be built up for the evolution of social behavior in insects.

There are two additional aspects of butterfly behavior more or less remote from that of aggregation, which may, however, have an indirect bearing on the subject. One is the proportion of sexes in aggregations and the other has to do with how or where the butterflies spend the night. While I neglected to make first hand observations on where the insects spend the night, I did note in the material brought home for identification that almost all of the butterflies were males. These questions, however, have been answered by Wallace and by Belt, both of whom observed butterfly aggregations in the tropics. Wallace (Tropical Nature, p. 76, 1878) found butterflies "assembling together in flocks of hundreds of individuals, on riversides and margins of pools, but these were almost always composed of males, the females remaining in the forests where toward the afternoon their partners join them." Bates (Naturalist on the Amazon, p. 386, 1863) observed 80 species belonging to 22 different genera congregating on the sand and says "it is a singular fact that, with very few exceptions, the individuals of these various species, sporting in sunny places were of the male sex; their partners, which are much more soberly dressed, and immensely less numerous than the males being confined to the shades of the woods. Every afternoon as the sun was getting low I used to notice these gaudy sunshine loving swains trooping off to the forest."

Notes on a Collection of Centipeds chiefly from Louisiana, Arkansas and Missouri (Chilopoda).

By Ralph V. Chamberlin, University of Utah, Salt Lake City.

Herewith are listed the species of chilopods represented in a collection made for the most part by Mr. Leslie Hubricht in Louisiana, Arkansas, Missouri, Oklahoma and Texas in the years 1935 and 1936.

The types of the four new species described are retained in the author's collection.

Scolopendrida.

Otocryptops sexspinosus (Say). Localities—Louisiana: Sheridom, August 20, 1940, one specimen; Natchitoches Parish, 2 miles south of Saline, April 12, 1936, 2 specimens. Arkansas: Jackson County, 1.5 miles southwest of Oliphant, April 10, 1936, one specimen. Missouri: St. Louis Co., 4.3 miles northwest of Glencoe, March 1, 1936, one specimen.

Theatops posticus (Say). Localities—Louisiana: Talisheek, February 9, 1939, 2 specimens; Greenburg, February 5, 1939, one specimen. Texas: Brazos County, 8 miles south of College Station, April 21, 1936, 3 specimens.

T. SPINICAUDUS (Wood). Locality—Arkansas: Jackson County, 1.5 miles northwest of Oliphant.

SCOLOPENDRA VIRIDIS Say. Locality—Louisiana: Caddo Parish, 5 miles northwest of Shreveport, April 13, 1936, one specimen.

S. HEROS (Girard). Locality—Texas: Brazos County, 14 miles southwest of College Station, April 21, 1936, one specimen.

GEOPHILIDA.

ARENOPHILUS BIPUNCTICEPS (Wood). Localities—Oklahoma: Murray County, Arbuckle Mountains, near Turner Falls, April 23, 1936, two specimens. Louisiana: Caddo Parish, 5 miles northwest of Shreveport, April 13, 1936, two specimens. Missouri: St. Louis County, 1 mile south of Kirkwood, March 15, 1936, one specimen; Musick's Ferry, May 15, 1934, one specimen.

LINOTAENIA BIDENS (Wood). Locality—Missouri: Jefferson County, 1.5 miles southeast of Maxville, December 8, 1935, one specimen taken "under log on hillside."

L. CHIONOPHILA (Wood). Locality—Missouri: St. Louis County, 4.3 miles northwest of Glencoe Station, March 1, 1936, one specimen.

L. FULVA (Sager). Locality—Missouri: St. Louis County, .5 miles east of Morschels, March 15, 1936, one specimen.

Escaryus missouriensis new species.

General color of dorsum dark yellow anteriorly and especially the head of a distinct chestnut tinge.

Head longer than broad in about the ratio 36:29. No front suture. Cephalic plate overlapping the basal. First maxillae without lappets.

Clypeus uniformly areolate throughout. No clear spots free from the polygonal areas; a pair of setae about one-fourth the distance from labrum to anterior end and about eight setae in a patch anteriorly.

Prosternum anteriorly with a median v-shaped excision on each side of which is a low, transverse, chitinous plate; without chitinous lines. Femur of prehensors with a tooth at extreme distal end within; the next 2 joints also with low rounded tubercles at distal end; tooth at base of claw absent or absolete.

Spiracles all circular, the first greatly exceeding the second in size.

Anterior sternites with a deep longitudinal depression or sulcus across the middle portion; all entirely without a "carpophagus" structure.

Last sternite narrow, scarsely narrowing caudad, much longer than wide. Last coxopleurae large, bearing numerous small pores over nearly entire surface except cuadal area above and caudomesal area below.

Anal legs of male moderately inflated; Claw normal.

Anal pores distinct.

Gonopods of male long, slenderly conical.

Pairs of legs, 59.

Length, about 65 mm.

Locality—MISSOURI: St. Louis County, 4.3 miles northwest of Glencoe. One male taken by Leslie Hubricht, March 11, 1936.

LITHOBIIDA.

Gosibius louisianus new species.

A species belonging to *Gosibius* sens. str. in having the posterior angles of the 9th, 11th and 13th dorsal plates produced.

Dorsum chestnut colored.

Antennae moderate, composed of 26 articles in both types. Ocelli, e.g., 1 + 3, 3, 3, 1, the single ocellus much enlarged and the caudal ocellus of top row also considerably enlarged.

Prosternal teeth as usual, 2 + 2, with extal spine setiform.

Ventral spines of first legs 0, 0, 2, 2, 1. Ventral spines of penult legs, 0, 1, 3, 3, 2; dorsal 0, 3, 2, 2; claws 2. None of coxae armed either dorsally or laterally.

In the male the fourth joint is moderately thickened and is longitudinally furrowed above.

Claw of female genital forceps strictly entire as usual; basal spines 2 + 2; basal joint presenting a chitinous mesal edge which is proximally excavated.

Length of male holotype, about 19 mm.; of female allotype, about 15 mm.

Locality—LOUISIANA: 5 miles northwest of Shreveport. Male and female taken under log April 13, 1936, by Leslie Hubricht.

Related to *G. monicus* of California but readily separated in lacking spines on the posterior coxae and in having the ventral spines of the anal legs 0, 1, 3, 2, 1 instead of 0, 1, 3, 3, 1.

Guambius hubrichti new species.

Dorsum light brown, with head and antennae darker.

Antennae composed typically of 28 articles. Ocelli, *e.g.*, 1 + 3, 2(3), 1, the single ocellus much enlarged and those at caudal end of series also notably larger than the anterior ones.

Prosternal teeth and spines as usual.

Posterior angles of 9th, 11th and 13th dorsal plates produced (subgenus *Sibibius*).

Coxal pores small, circular, in number, e.g., 4, 4, 4, 3 and 3, 3, 3, 3.

Ventral spines of first legs, 0, 0, 1, 3, 1. Ventral spines of penult legs, 0, 1, 3, 3, 2; dorsal, 0, 0, 3, 2, 1; claws 2. Ventral spines of anal legs, 0, 1, 3, 3, 1; dorsal, 0, 0, 2, 0, 0; claws 2. None of coxae armed.

Anal legs of male with fourth joint strongly inflated, with longitudinal, laterally compressed, elevated keel which is evenly convex from end to end with a uniform series of setae along the edge. Fifth joint of penult leg with a conspicuous lobe at distal end on caudo-dorsal surface the upper face of this lobe flat.

Claw of female gonopods entire as usual, with the basal spines 2 + 2.

Length, about 12 mm.

Locality—LOUISIANA: Natchatoches Parish, 2 miles south of Saline. Two adult males and a not fully mature female taken under logs April 12, 1936, by Leslie Hubricht, for whom the species is named.

Related to *G. oedipes* but differing in having 2 claws instead of 3 on the anal legs with dorsal spines 0, 0, 2, 0, 0 instead of 0, 0, 3, 2, 1, etc. The form of the fourth joint in the anal legs of male is also clearly distinctive.

LITHOBIUS FORFICATUS (Linne). Locality—Missouri: St. Louis County, Maplewood, January 12, 1936, several specimens of both sexes.

NADABIUS IOWENSIS (Meinert). Localities—Missouri: Kirkwood, Osage Hills, January 10, 1935, three specimens; St. Louis County, Creve Coeur Lake Park, March 8, 1936, one male.

POKABIUS BILABIATUS (Wood). Locality—Missouri: St. Louis County, .5 miles east of Morschels, March 15, 1936, several specimens.

NEOLITHOBIUS AUDACIOR Chamberlin. Locality—ARKANSAS: Jackson County, 1.5 miles southwest of Oliphant, April 10, 1936, four specimens.

N. TRANSMARINUS (L. Koch). Localities—Louisiana: Caddo Parish, 5 miles northwest of Shreveport, April 13, 1936, two specimens. Texas: Brazos County, 8 miles south of College Station, April 21, 1936, three specimens.

Neolithobius entonus new species.

A species related to *N. latzeli* and *N. arkansensis* in general structure and in the spining of the legs but differing from both in having the claw of the female gonopods strictly entire instead of tripartite as well as in its considerably larger size.

Antennae moderately long, composed typically of about 42 articles. Ocelli 1 + 6, 6, 7, 6, 6, 6, the series somewhat oblique, the single ocellus large.

Prosternal teeth typically 9 + 9 or 8 + 8.

Coxal pores strongly transverse, lying in depression or groove; in number usually about 10 on each poriferous coxa.

Spining of legs as in *latzeli.*

Anal legs of male long and slender, the fourth joint but slightly modified.

Length, up to 35 mm.

Localities—OKLAHOMA: Latimer County, 2 miles east of Gowen, 8 specimens taken April 26, 1936. ARKANSAS: Pulaski County, 3 miles northeast of North Little Rock, April 11, 1936, four specimens, and Jefferson County, ½ mile south of Locust Cottage, April 11, 1936, one specimen. All specimens collected by Leslie Hubricht.

BOTHROPOLYS MULTIDENTATUS (Newport). Locality—Missouri: St. Louis County, 2 miles west of Wellston, February 19, 1935, two taken under logs.

SCUTIGERIDA.

SCUTIGERA COLEOPTRATA (Linne). Localities—Missouri: St. Louis County, Forest Park, in bird house, March 14, 1936, one specimen; Fern Glen, March 1, 1936, one specimen; taken under rocks; St. Louis, April 5, 1934, several specimens taken in house on Lincoln Avenue; Musicks Ferry, May 15, 1934, several taken under rocks.

Notes on Bees (Hymen.: Andrenidae).

By J. CHESTER BRADLEY, Cornell University, Ithaca, New York.

TETRALONIA.

The lectotypes of *Melissodes dilecta* (♂) and of *M. speciosa* (♀) of Cresson have both been examined. In neither are the hind tibial spurs hooked. They both come from Colorado.

Several specimens in the collection of the American Entomological Society from Illinois with hooked hind tibial spurs, ♂ and ♀, stand incorrectly determined, the males by Cresson as *dilecta* and one by Viereck as *speciosa,* the females by Cresson as *speciosa.* One ♂ from "Col" and one from "Tex" both are also cospecific with the Illinois specimens.

The type of *frater* Cr. (♂), which name Robertson in 1895 thought synonymous with *dilecta*, is structurally different from the type of the latter species, as well as from the one which Robertson misidentified as *dilecta* Cr. Robertson in 1905 indicated his error in this regard and stated that the hind tibial spurs of the type of *frater* are not hooked, but still overlooked the fact that such is also the case in both *dilecta* and *speciosa.*

Tetralonia hamata n. sp.

♂.—General appearance and coloration of the type of *dilecta* Cresson, but the vestiture of the dorsum of the thorax less dense, and the vestiture of the second (morphologically 3rd) tergite similar to that of the first but shorter, without the white fascia of *dilecta.* Hind tarsal spurs very strongly hooked. Last sternite without a basal lateral fossa but with a strong truncate peg-like process at the middle of each lateral margin, the two divergent but sub-erect. L. 14 mm.

♀.—General appearance and color of the type of *speciosa* Cresson, but the vestiture of the hind tibiae tends to be paler than that of the metatarsus, which is not the case in *speciosa.* Hind tibial spurs hooked, but less strongly so than in the males. The pygidial plate is more broadly rounded than in *speciosa.* L. 15 mm.

Holotype ♂, *Allotype* ♀, 6 ♂ *paratypes* and 4 ♀ *paratypes,* all from ILLINOIS, but without closer indication of locality; one ♂ paratype from "TEX" and one ♂ paratype from "COL," bearing labels as paratypes of *dilecta.* All are in the collection of the American Entomological Society.

Under the names *speciosa* and *dilecta* what is doubtless this species has been recorded from Carlinville and near Chicago, Illinois, as well as from Indiana.

I have seen the true *dilecta* from Colorado, Texas and South Dakota, but whether records from Kansas and New Mexico are *dilecta* or *hamata* is uncertain.

In comparison with *hamata*, it may be stated that the ♂ of *dilecta* has a lateral fossa on the basal half of the last sternite, abruptly terminated internally, and lacks the peg-like processes of the lateral margin.

Professor T. D. A. Cockerell (Trans. Amer. Ent. Soc. '06, 32:94) stated that *dilecta* may be easily distinguished from *frater* and *speciosa* by its hooked spurs; he informs me that he based this statement on a paratype loaned to him at the time and which must have been one of the two that I am now making paratypes of *hamata*. It is to be regretted that when Mr. Cresson later selected the lectotype of *dilecta* he did not select the Texas specimen, as then the species would stand as defined by Professor Cockerell, and as understood by Robertson. But since Cockerell, '06, cannot be construed as making a prior selection of a lectotype (he did not in fact know that two species were involved in the type series, nor even mention in print that he had a type), Mr. Cresson was at liberty to make what selection he saw fit and his published designation must be honored, if we are to attach any weight at all to the idea of lectotype.

Pseudopanurgus (P.) illinoiensis (Cresson). *P. compositarum* Robertson seems to be a synonym. The type (♂) of *illinoiensis* runs to *compositarum* in Robertson's key to Illinois species. I have also compared with it a ♀ "metatype" of *compositarum* in the collection of the American Entomological Society labelled by Viereck.

Calliopsis abdominalis Cresson. *C. tricolor* Ckll. is at best a subspecies. There are two females in the collection of the American Entomological Society both from New Jersey. The female differs from other eastern species in having both metanotum and propodeum uniformly densely granularly punctate, the metanotum without hair. The male differs from our other species in having the 5th and 6th sternites simple, instead of the fifth with a median process which projects posteriorly between two processes of the sixth, these sometimes (*coloradensis*) recurved.

The Butterflies of Roanoke and Montgomery Counties, Virginia (Lepid.: Rhopalocera).

By Carroll E. Wood, Jr., and Carl W. Gottschalk.

(Continued from page 164.)

Colias philodice philodice Godart. S, iv 5, '39; v 1, '38; xi, '37. MF, vi 15, '38. B, iv 19, '24; ix 2, '98; ix 9, '98 (*anthyale*).

C. philodice eurytheme Boisduval. S, iii 25, '38 (*ariadne* ♀, very dark); iii 26, '38 (*ariadne* ♂); iv 28, '38 (white ♀); xii 2, 23, '40. Roanoke Co., ix 17, '37. M, common.

Eurema nicippe (Cramer). S, iv 13, '38; vii 16, '39; xi 12, '38; xi 30, '40; xi '37 (the first and last three reddish beneath). FL, vii 1, '37. CH, x 31, '37. AB, vi 5, '37. Mt. Lake, Giles Co., vii 8, '39.

E. jucunda (Boisduval and LeConte). S, '35; also without date. FL, vii 30, '39; viii 4, '31, '38; ix 6, '38. AB, ix 8, '39. Mill Mt., Roanoke Co., viii 28, '38. Baptist Orphanage, Roanoke Co., ix 1, '37.

E. lisa (Boisduval and LeConte). S, viii 6, ix 30, x 9, '38. FL, vii 10, viii 24, '38. KH, x 31, '37. AB, v 29, '36.

Subfamily Papilioninae.

Papilio philenor Linné. S, ix 16, '39; ix 17, '37. KH, iv 16, 24, '38. FL, vii 21, viii 3, '36. B, viii '94.

P. polyxenes asterias Cramer. S, viii 11, '38. KH, iv 11, '39; ix 16, '38; iv 19, '36. FL, viii 6, '37; ix 5, '38.

P. cresphontes Cramer. S, viii '38. M, v 26, '98.

P. glaucus Linné. S, v 1, '38 (winter form). FL, vii 13, '36; vii 25, '37; viii 8, '38; vii 19, '39. M, iv 10, '99 (black); v 26, '98; viii 19, '07.

P. troilus Linné. S, v 7, '38; vi 3, 6, '39; viii 23, '40. SC, iv 15, '38; viii 22, '39. FL, vii 25, '38.

P. marcellus Cramer. KH, iv 15, '38 (*walshi*); v 9, '38 (*telamonides*); vi 5, '38. FL, vi 5, viii 21, ix 4, '38. MF, iv 13, '38. B, iv 7, '03 (bi-formed ♀ *walshi* & *telamonides*). M, iii 2, '03. Camp Powhatan, Rockbridge County, iv 18, '37 (*walshi*); v 1, '38.

Family HESPERIIDAE; Subfamily Pyrginae.

PROTEIDES CLARUS (Cramer). S, iv 28, '38. KH, vi 10, '38. FL, viii 30, '38. M, vi 2, '99; vii 28, '98.

ACHALARUS LYCIADES (Geyer). FLM, vi 25, '36; vi 9, '39. FL, viii 27, '37. MF, v 25, '38. M, vi '96.

RHABDOIDES CELLUS (Boisduval and LeConte). SC, v 3, '38; vi 9, '39. Ravine east of Blacksburg near Palmer Hill, now called Trillium Vale, v 26, vi 6, 26, '00.

THORYBES BATHYLLUS (J. E. Smith). KH, v 7, 23, 29, 31, vi 5, '38. FL, vii 21, '36; viii 16, '38. M, v 10, '98; viii '99.

T. PYLADES (Scudder). S, v 7, '38. FLM, vi 23, '38. KH, vi 9, '39. AB, vi 14, '38. M, vi 2, '99; vi 9, '39.

PYRGUS CENTAUREAE WYANDOT (W. H. Edwards). KH, iii 28, iv 11, '38. OF, iv 8, '39. M, iv 16, 28, '98.

P. COMMUNIS (Grote). S, iv 24, v 9, '38; iv 18, '39. RC, xi 7, '40. FL, viii 6, '36; viii 18, '37. M, ix 5, '98.

PHOLISORA CATULLUS (Fabricius). S, viii 18, '38. FL, vi 30, '38; vii 26, '38; vii 31, '39; viii 17, '38. AB, v 31, '37. M, no date.

ERYNNIS ICELUS (Scudder and Burgess). KH, iv 11, 12, 26, '38; iv 9, '39; v 3, 18, '38; v 7, '40. FLM, vi '38. M, vi 20, '98.

E. BRIZO (Boisduval and LeConte). FLM, iv 5, '39; v 11, '37. OF, iv 2, '39. SC, iii 26, iv 3, '38. OF, iv 2, '39; iv 5, '38. AB, iv 23, '38. M, v 14, 16, '98.

E. PERSIUS (Scudder). FLM, iv 23, '38; also '40 (kindly determined by W. D. Field).

E. LUCILIUS (Scudder & Burgess). Fort Lewis Mt., April 23, 1938; Salem, May 9, 1937 (determined by W. D. Field).

E. BAPTISIAE Forbes. S, v. FLM, iv 25, '40; viii 20, '37. AB, v 13, '38. M, viii 1, '99. Smyth Co., viii, '40.

E. MARTIALIS (Scudder). KH, iv 11, 28, '38; v 6, '38. FLM, vi 25, '36. MC, viii 7, '40. B, v.

E. JUVENALIS (Fabricius). FL, viii 6, '36; viii 18, '38. OF, iv 19, 22, '38; iv 2, 8, '39; iv 25, '40; v 5, '40. M, iv 17, v 9, '98.

E. HORATIUS (Scudder and Burgess). KH, vi 7, '40; vi 15, '38.

E. ZARUCCO (Lucas). PH, viii 8, '38.

Subfamily Hesperiinae.

ANCYLOXYPHA NUMITOR (Fabricius). S, v 17, '38; vi 30, '37; vii 18, '38. FL, viii 27, '38. MF, vi 1, '40. M, vi 2, '99.

HESPERIA METEA (Scudder). OF, iv 5, 12, 15, 23, '38; iv 25, '40; v i, '38. AB, v 2, '37.

H. LEONARDUS Harris. PH, viii 15, '00; viii 22, '98.

H. SASSACUS Harris. KH, v 6, '38. M, vi 2, '99; vi 6, '00.

HYLEPHILA PHYLAEUS (Drury). S, viii 22, xi 2, '38. FL, vii 26, '38; viii 11, 25, '38; viii 16, '37; ix 5, '38. M, no date.

ATALOPEDES CAMPESTRIS (Boisduval). S, v 5, 10, ix 12, '38; xi 7, '40. FL, v 22, 27, 31, '37. M, v 16, '00; ix 4, '98.

POLITES VERNA (W. H. Edwards). M, vi 20, '99.

P. MYSTIC (Scudder). AB, vi 1, '37. Preston graveyard, Blacksburg, vi 2, 3, '99.

P. MANATAAQUA (Harris). S, v 21, 27, '38; vi 6, '39; viii '38. FLM, v 31, '38; vi 5, 25, '38. FL, viii 30, '39; viii 9, '38. M, vi 2, '99; viii 8, '98.

P. THEMISTOCLES (Latreille). S, v 23, 27, 29, '38. KH, v 28, '38. FL, v 16, vi 7, '38; vii 28, '39; viii 9, '38; viii 2, 9, '39. AB, vi 5, '37. SC, v 7, '38. M, v 16, '00; vi 2, '99.

P. PECKIUS (Kirby). S, v 27, '38. KH, v 21, '38. FL, vii 25, '39; viii 12, '38; viii 17, '39; vii 28, '40. MF, vi 13, '38. M, vi, vii 20, '99.

P. BRETTUS (Boisduval and Leconte). M, no date (2 males).

POANES HOBOMOK (Harris). KH, iv 3, '39; iv 28, '38; v 6, 9, 10, '38. FLM, v 7, vi 5, '38. M, v 25, vi 2, 3, '99.

P. ZABULON (Boisduval and LeConte). S, iv 25, '38. KH, iv 27, v 3, 12, '38. FL, iv 28, vii 28, '38; vii 31, viii 5, 8, '37; viii 25, ix 1, '39. AB, v 20, '37. M, v 12, '00; vi 2, '99.

ATRYTONE AROGOS (Boisduval and LeConte). B, no date.

A. LOGAN (W. H. Edwards). S, vii 22, '26. FL, vii 2, '39. M, viii 8, '98.

A. RURICOLA (Boisduval). S, v 23, '38. FL, vii 4, 9, 17, '38; viii 28, '40. MF, v 21, vi 3, '38. M, vi 29, viii 3, '00.

WALLENGRENIA OTHO EGEREMET (Scudder). FL, vii 27, viii 23, '37. M, vi 20, '99; viii 8, '98.

ATRYTONOPSIS HIANNA (Scudder). KH, v 6, 13, 17, vi 6, '38; vi 3, '40. FLM, v 7, '38.

Lerema accius (J. E. Smith). S, ix 13, '37. KH, v 12, '38. FL, vii 25, viii 31, '37. M, vii 25, '06; x 2, '98.

Amblyscirtes vialis (W. H. Edwards). S, iv 23, '39. KH, iv 11, 13, 19, v 12, vii 27, '38. FLM, iv 23, '38. M, v 12, vii 6, '00.

A. hegon (Scudder). S, iv 24, '38; v 2, '37. AB, iv 23, '38; Dixie Caverns, v 5, '40. M, vi 2, '99.

'38; viii 20, '37. FLM, vi 5, '38. M, vi 2, '99.

Lerodea l'herminier (Latreille). MF, v 12, 17, 21, 31, '38; viii 20, '37. FLM, vi 5, '38. M, vi 2, '99.

L. eufala (W. H. Edwards). FL, vii 23, '39; ix 6, '37.

Panoquina ocola (W. H. Edwards). FL, viii 5, 12, 18, '38; viii 21, '36.

Other Possible Occurrences.

While we feel that the above list represents most of the species occurring in the area under consideration, it is likely that several additional species may occur as casuals, as occasional temporary residents, or as local residents which have escaped observation. In addition to those species listed below (most of which have been taken in adjacent counties), several other forms may possibly turn up in the area.

Enodia portlandia anthedon: Known from Giles County, adjoining Montgomery County on the north, and from Bedford County[5], to the east of Roanoke County.

Argynnis myrina: Has been taken at Kelly Flats, Giles County, by Dr. Clark and at Little Meadows in the same county by the authors.

Phyciodes batesi: Taken by Dr. A. H. Clark in southern Scott County, by Lloyd G. Carr and the junior author at Mt. Lake, Giles County (July 1, 1940 and July 17, 1941, respectively), and by the senior author on Apple Orchard Mountain[6] in Bedford County. These records represent the known occurrence of this butterfly in Virginia.

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[5] Clark, Proc. Biol. Soc. Wash., 47: 177-180.

[6] Clark, Proc. Biol. Soc. Wash., 51: 177-182.

ERORA LAETA: A single specimen was taken by Dr. L. J. Milne, Randolph-Macon College, at Mt. Lake, Giles County, on June 23, 1938, as recorded by Dr. Clark[7]. This southwestern species might just as well turn up in our area as anywhere else.

STRYMON EDWARDSI: An inhabitant of oak woods which might well occur in either county.

ATRYTONE CONSPICUA: An extremely local species which *may* inhabit grassy bogs in the area. Its discovery by Lloyd Carr in July, 1940, at Little Meadows, Giles County, comprises a new southern record,[8] the species being previously unknown from Virginia.

We wish to express here our appreciation to the friends who made this paper possible. Dr. Austin H. Clark, of the U. S. National Museum, whose work on Virginia butterflies is well known, has given us much encouragement and information and has always been our constant counsellor. He has also been so very kind as to help get our records in order and has offered valuable material and suggestions as to the content of this paper.

Our kind friend, the late Dr. Ellison A. Smyth, Jr., always gave us free access to his large collections, records and library and always took a real interest in our work. As pointed out previously, the Montgomery County records are almost exclusively the result of his collecting over a period of years. His passing was keenly felt.

Our thanks also go to Walter Van Gelder and Lloyd G. Carr, who have provided several interesting records and to Mr. W. D. Field, of the U. S. National Museum, who has identified a number of specimens of *Erynnis* for us.

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From time to time scattered notes have appeared on a few species from Montgomery and Roanoke Counties. These notes are included in the following papers.

CLARK, AUSTIN H., Butterflies of Virginia. Explorations and Field-Work of the Smithsonian Institution in 1939, 1940, pp. 63-66.

[7] Clark, Proc. Biol. Soc. Wash., 52: 177-184.

[8] Clark, Expl. & Field Work Smithsonian Inst., 1940, p. 60.

CLARK, AUSTIN H., and LEILA F. CLARK, Butterflies from Virginia and the District of Columbia. Proceedings of the Biological Society of Washington, vol. 51, pp. 1-6, February 18, 1938.

ID., Notes on Virginia Butterflies, Proceedings of the Biological Society of Washington, vol. 51, pp. 177-182, November 3, 1938.

ID., Butterflies from Virginia. Proceedings of the Biological Society of Washington, vol. 52, pp. 177-184, December 15, 1939.

CLARK, AUSTIN H., and CARROLL M. WILLIAMS, Records of Argynnis diana and of some other butterflies from Virginia. Journal of the Washington Academy of Sciences, vol. 27, No. 5, May 15, 1937, pp. 209-213.

SMYTH, ELLISON A., JR., Some entomological notes from Montgomery County, Virginia. Entomological News, vol. 6, No. 8, October, 1895, pp. 243-245.

ID., Calephelis borealis. Psyche, vol. 7, No. 243, July, 1896, p. 403.

ID., Anthocharis genutia. Entomological News, vol. 11, No. 5, May, 1900, pp. 465-468.

ID., Note on Thecla damon (= Mitoura gryneus). Entomological News, vol. 18, No. 8, October, 1907, p. 364.

ID., Two freaks—Papilio ajax and Eudamus tityrus. Entomological News, vol. 19, No. 5, May, 1908, pp. 191-192, pl. 10.

ID., Color phases in Argynnis diana. Entomological News, vol. 27, No. 3, March, 1916, pp. 136-137.

WOOD, WILLIAM C., Argynnis diana. Entomological News, vol. 27, No. 1, January, 1916, p. 35.

In addition to these notes relating to butterflies from Roanoke and Montgomery Counties, the following papers have been referred to.

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CLARK, AUSTIN H., Surveying the butterflies of Virginia.

Scientific Monthly, vol. 45, pp. 256-265, September, 1937.

ID., The butterflies of Virginia. Explorations and field-work of the Smithsonian Institution in 1938, 1939, pp. 65-68.

ID., The Butterflies of the District of Columbia and Vicinity. Smithsonian Institution Bulletin 157, 1932.

ID., Observations on the butterflies of Apple Orchard Mountain, Bedford County, Virginia. Proceedings of the Biological Society of Washington, vol. 47, pp. 177-180.

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SMYTH, ELLISON A., IV, The Raven, vol. 9, No. 7, pp. 56-58, July, 1938.

The Describers of Insect Species.

I am very desirous of obtaining from all entomologists who have described one or more *new species* of insects a statement of the *total number* described by each one to this date. Where more than a single order of insects is involved, an indication of the total for each order would be appreciated. If there are known synonyms among such species, the number of valid species or subspecies should be given. It is hoped that the response to this appeal will be such that a summary of the subject may be presented in the not distant future. A most favorable response from entomologists has been received and further cooperation will be greatly appreciated. In the cases of deceased entomologists, where figures of described species have already been published, many such data are available to me, but further references, especially in obscure journals, would be much appreciated. I wish at this time to express my very deep thanks to the many entomologists who have so kindly cooperated in this attempt to determine more accurately the total number of described insect species. Address all communications to

DR. CHARLES P. ALEXANDER, Fernald Hall, Massachusetts State College, Amherst, Massachusetts, U.S.A.

A Brachypterous Reduvius from Lower California (Heteroptera: Reduviidae).

By Robert L. Usinger, University of California, Davis, California.

The genus *Reduvius* Fabr. (=*Opsicoetus* Klug) is distributed throughout much of the old world with the greatest concentration of species in the Palearctic, Ethiopian, and Oriental Realms. Only the nearly cosmopolitan *Reduvius personatus* Linn. had been reported from the Western Hemisphere until Van Duzee (1906) described *senilis* from the Baboquivari Mountains of Arizona. I later (1933) recorded *senilis* from California and can now report an additional specimen from Patagonia, Arizona, July 1936, E. S. Ross collector.

Three brachypterous specimens of a second native American species were discovered in the collection of the California Academy of Sciences. Although collected by Van Duzee and Chamberlin on the Academy expedition to the Gulf of California, these specimens were not mentioned in the report on the Hemiptera of that expedition (Van Duzee, 1923).

Reduvius sonoraensis new species.

Relatively small, light brown to testaceous, with reduced pronotum, short hemelytral pads exposing the entire dorsal surface of the abdomen, the body densely clothed with long erect or curved hairs.

♂. Head nearly twice as long as broad including eyes, 38::20; strongly produced and moderately deflected in front of eyes; antennae inserted dorso-laterally immediately in front of eyes; an elongate, bilobed elevation between bases of antennae; eyes half as wide as interocular space and about half again as long as wide seen from above; eyes much wider laterally but not extending far beneath the head, the ventral interocular space much wider than an eye. Ocelli small but distinct. Antennae relatively short, the first segment as long as width of head across eyes, second segment slightly more than twice as long as first, 42::20, last two segments very slender and curved. Rostrum stout and curved, the first segment about three-fourths as long as second.

Pronotum scarcely broader across humeri than long, 37::35, the anterior margins strongly depressed, collar-like, with feebly produced, rounded antero-lateral angles; anterior lobe strongly convex, with a median longitudinal impression; posterior lobe reduced, about two-thirds as long as anterior lobe, one-third broader, the disk less strongly convex, feebly transversely wrinkled anteriorly between longitudinal connecting carinae; postero-lateral angles broadly rounded. Scutellum about as broad as long, subtriangular, its apex produced into a cylindrical spine, the disk depressed at middle. Hemelytra reduced to short strap-like or subtriangular pads which just attain hind margin of metathorax.

Abdomen entirely exposed above, the first segment elevated with its posterior margin carinate and with lateral spiracles distinct. Second segment longitudinally carinate on either side of middle. Third, fourth, and fifth segments each with an obscure scent gland opening at middle of posterior margin. Under surface of abdomen distinctly keeled or carinate, the genital capsule convex, with briefly truncate apex. Claspers briefly exposed.

Legs moderately short and stout, the front and middle tibiae feebly bent inward at apices and bearing small but distinct spongy fossae.

Color pale fulvous becoming brown laterally and ventrally on thorax and abdomen. Eyes dark brown. Ocelli red. Posterior lobe of pronotum, hemelytral pads, connexivum, and legs in part pale testaceous.

♀. Similar to the male but with the second antennal segment relatively shorter, scarcely more than half again as long as first, 33::20, and with the brown color more extensive both above and beneath. Female genital plates broadly exposed and subtriangular above, very briefly exposed beneath.

Size: male, length 9 mm., female, 10 mm.

Holotype, male, and *allotype,* female, Nos. 5276 and 5277, Calif. Acad. Sci., Ent., collected by J. C. Chamberlin on Isla Raza, Gulf of California, April 21, 1921. A single female paratype bears the data: Angeles Bay, Gulf of California, May 5, 1921, E. P. Van Duzee collector.

Sonoraensis is related to *Reduvius senilis* Van Duzee. However, *senilis* is somewhat larger, has a shorter and sparser vestiture, and has the first antennal segment distinctly longer than width of eyes, 29::25, the second segment less than twice as long as the first in the male, the first and second rostral segments subequal in length, and the eyes much larger, the ventral interocular space being much less than the width of an eye. Only macropterous specimens of *senilis* are known so a comparison of thoracic and hemelytral characters has not been possible.

References.

Usinger, R. L. 1933. New distributional and host plant records of Heteroptera for California. I. Pan-Pac. Ent., 9:171-172.

Van Duzee, E. P. 1906. New North American Heteroptera. Ent. News, 17:384-391. 1923. Expedition of the California Academy of Sciences to the Gulf of California in 1921. XI. The Hemiptera. Proc. Calif. Acad. Sci., (4) 12:123-200.

The American Commission on Scientific Nomenclature in Entomology.

The disturbed condition of the world during the last few years has interfered with the activities of the International Commission on Zoological Nomenclature and there is no prospect that this Commission will again function successfully for several years to come. Entomologists in the United States have felt that this situation should not be allowed entirely to stifle progress in the development of nomenclature and the clarification of nomenclatorial problems. At the meetings of the Entomological Society of America and the American Association of Economic Entomologists in San Francisco, in December, 1941, a plan was adopted which called for the establishment of an American Commission on Scientific Nomenclature in Entomology.

In accord with the terms of this plan, Mr. C. F. W. Muesebeck and Professor G. F. Ferris were appointed to organize the Commission. That organization has now been completed and the Commission is ready to function. It includes Prof. J. C. Bradley, of Cornell University; Mr. W. J. Brown and Mr. G. Stuart Walley, of the Division of Entomology of the Department of Agriculture of Canada; Prof. G. F. Ferris, of Stanford University; Prof. T. H. Hubbell, of the University of Florida; Prof. H. B. Hungerford, of the University of Kansas; Dr. E. G. Linsley, of the University of California; Prof. Clarence E. Mickel, of the University of Minnesota; Mr. C. F. W. Muesebeck and Mr. P. W. Oman, of the United States Bureau of Entomology and Plant Quarantine; Dr. A. G. Richards, Jr., of the University of Pennsylvania; Dr. Herbert H. Ross, of the State Natural History Survey of Illinois; Prof. C. W. Sabrosky, of the State Agricultural College of Michigan; Dr. R. L. Usinger, of the College of Agriculture of California. Prof. G. F. Ferris has been elected as Chairman.

The Commission will receive, consider and advise upon such nomenclatorial problems as are presented to it. All acts of the Commission will be in harmony with the International Rules of Zoological Nomenclature, although recommendations for the clarification, extension and improvement of these rules may be made. The Commission will report to the two parent societies at their next annual meeting. Communications concerning matters within the province of the Commission may be addressed to any of its members.

Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF.

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.

NEW ADDITIONS TO LIST OF PUBLICATIONS:

124. Bulletin Societe Fouad Ier Entomologie. Cairo, Egypt.
125. Papeis Avulsos, Dept. Zool. Secret. Agric. S. Paulo, Brazil.
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Itineraires botaniques dans l'ile de Cuba. (Ser. 1). Par F. Marie-Victorin et F. Leon. [Contr. de l'Inst. Botan. de l'Univ. de Montreal, No. 41, 1942. 496 pp., ill., map. This botanical itinerary of the authors in Cuba in 1939 gives data on local conditions and plants likely to be useful to entomologists also.

Meeting of Scientific Photographers

The Biological Photographic Association will hold its twelfth annual Convention in New York City September 10th, 11th and 12th. Present-day methods of obtaining photographs for teaching and scientific records will be discussed in detail. Particular emphasis will be placed on the types of photographs needed in the present emergency. The Convention Chairman will be Mr. Joseph Haulenbeek, Illustration Division, Rockefeller Institute for Medical Research, New York City. Further particulars about the meeting and the program may be had by writing him.

The Biological Photographic Association is a national, nonprofit organization, formed to act as a clearing house for information on the methods of scientific illustration. Its members are scientific photographers, scientists interested in the application of photography to their fields, and the makers of precision photographic equipment. Information on various techniques, collected from experienced workers all over the country, is dispensed by means of the Association's Quarterly Journal, Travelling Loan Albums and Print Salons, and direct correspondence through the office of the Secretary. The 1942 Salon of medical and biological prints will be on view at the Convention.

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—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

I want to collect Rothschildia, agapema, gulfina and io moths and Texas butterflies for interested persons. Eula Frizzell, R 4 San Benito, Texas.

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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

Arctic Lepidoptera especially **Noctuidae**—Wanted to hear from collectors who desire the Arctic Species. Have large collection. R. J. Fitch. Lloydminster, Saskatchewan, Canada.

Wanted—Tropical Lepidoptera and Insects. Also domestic species. Will exchange or buy specimens. M. A. Zappalorti, 253 Senator Street, Brooklyn, N. Y.

Wanted—Specimens of the genus Calendra (Sphenophorus) from North America. Will exchange Eastern U. S. Calendra or other Coleoptera for desired species. R. C. Casselberry, 302 Lincoln Avenue, Lansdowne, Penna.

Coccinellidae wanted from all parts of the world, especially South and Central America. Buy or exchange. G. H. Dieke, 1101 Argonne Drive, Baltimore, Md.

ENTOMOLOGICAL NEWS

OCTOBER, 1942

Vol. LIII No. 8

CONTENTS

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1942, 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 separates of articles, without covers, over and above the twenty-five given free at the following rates: 1 or 2 pages, 25 copies, 65 cents; 3 or 4 pages, 25 copies, $1.05; 5 to 8 pages, 25 copies, $1.75; 9 to 12 pages, 25 copies, $2.35; each half-tone plate, 25 copies, 30 cents; each plate of line cuts, 25 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, P. C. Stockhausen, 53 North 7th St., Philadelphia, Penna. Printed covers for 50 copies, $4.00 or more, according to number of pages bound.

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ENTOMOLOGICAL NEWS

Vol. LIII OCTOBER, 1942 No 8

Notes on Mosquitoes in Nebraska (Diptera: Culicidae).[1]

By H. Douglas Tate and Willis W. Wirth[2]
Department of Entomology, College of Agriculture, University of Nebraska.

This paper presents a list of the species of mosquitoes (Culicidae, subfamily Culicinae) represented in the collection of the Department of Entomology, University of Nebraska, and the localities in the state from which the specimens have been collected. The few isolated records previously published also are included. Although mosquitoes have long been a disturbing factor in some parts of the state, they have received relatively little attention. Indications are that in recent years the annoyance caused by them has increased, probably due largely to more extensive irrigation which has introduced favorable breeding conditions. In addition to the nuisance factor these pests frequently have been an economic influence of considerable importance in agricultural development. Of particular interest is their relationship to encephalomyelitis, a disease which in recent years has attained epidemic proportions in this area. These preliminary notes, involving 21 species, are presented at this time largely because of the scarcity of published records on these insects in Nebraska.

Dyar (1922) reports *Aedes dorsalis* Mg. and *Psorophora ciliata* Fab. from Nebraska. A recent publication by King and Bradley (1941) lists *Anopheles occidentalis* Dyar & Knab and *An. punctipennis* Say from this state. In a personal communi-

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[1] Contribution from University of Nebraska Agricultural Experiment Station, Journal Series No. 303.

[2] The authors are indebted to Dr. Alan C. Stone, of the United States National Museum, for checking the identifications of each of the species marked with an asterisk.

cation received by the authors in September, 1941, Dr. Alan C. Stone stated that he had identified four species of mosquitoes from Nebraska, namely *Aedes trivittatus* (Say), *Aedes vexans* (Mg.), *Anopheles quadrimaculatus* Say, and *Culex tarsalis* Coq. These specimens were submitted to him from camps of the Civilian Conservation Corps and exact locality records were not obtained. The writers were unable to secure any other references to mosquitoes collected in this state. Therefore, nearly all of the 21 species reported below presumably are new records for this area.

AEDES DORSALIS Meigen.* Glen (Sioux Co.), Aug. 14, 1906 (P. R. Jones) (♀); Lincoln, April 27, 1915 (L. M. Gates) (♀), July 9, 17, 21, 1929 (R. H. Nelson) (3♀♀), June (H. S. Smith) (♀), Aug. (♂). Also reported from Nebraska by Dyar (1922).

Ae. EXCRUCIANS Walker. (See *Aedes stimulans*).

Ae. FITCHII Felt & Young. (See *Aedes stimulans*).

Ae. IDAHOENSIS (Theobald).* One specimen from Glen (Sioux Co.), Aug., 1906 (P. R. Jones) (♀).

Ae. NIGROMACULUS Ludlow.* Clay Center, July 24, 1921 (R. E. Weir) (♂); Dunbar, Sept. 24, 1941 (W. W. Wirth) (40♀♀, 1♂); Lincoln, June 16, 1908 (J. T. Zimmer) (♂), July 15, 1909 (F. A. Burnham (♀), July 9, 17, 21, 1929 (R. H. Nelson) (4♀♀), Sept. 12, 1934 (R. E. Hill) (♀), Sept. 17, 1935 (W. W. Darlington) (♀). This species formed up to 25 per cent of light-trap collections at Dunbar in September, 1941, about 10 days following heavy rains which flooded a nearby creek valley.

Ae. STIMULANS Walker. Females of *Aedes excrucians, fitchii,* and *stimulans,* the more common members of the *stimulans* group, are difficult to separate. Matheson (1928) separates them on the basis of the lower mesepimeral bristles, and on this basis these three species could be identified from the material in the collection. However, since there were neither male nor larval specimens, and in the absence of more inclusive characters the records of these species have been grouped together under *Aedes* (*stimulans* group).* Glen (Sioux Co.), Aug. 16, 1905

(♀), Aug., 1906 (P. R. Jones) (27 ♀ ♀), July 14, 1910 (L. Bruner) (♀); Pine Ridge (Dawes Co.), July 7, 1910 (L. Bruner) (♀).

Ae. TRISERIATUS Say.* This species, typically a tree-hole breeder, is represented in the collection by specimens as follows: Glen (Sioux Co.), Aug. 11, 1906 (P. R. Jones) (3 ♀ ♀); Monroe Canyon (Sioux Co.), Aug. 29, 1921 (R. E. Weir) (♀).

Ae. TRIVITTATUS Coquillett.* Dunbar, Sept. 24, 1941 (W. W. Wirth) (10 ♀ ♀, 1 ♂); Glen (Sioux Co.), Aug., 1906 (P. R. Jones) (2 ♀ ♀); Monroe Canyon (Sioux Co.), Aug. 5, 1908 (R. W. Dawson) (4 ♀ ♀); Lincoln, July 15, 1929 (R. H. Nelson) (♂). The females from Dunbar were collected in the early afternoon on a cloudy day near weeds beside a flood pool, at which time they were present in large numbers and biting fiercely.

Ae. VEXANS Meigen.* Child's Point May 20, 1905 (♀); Dunbar, Sept. 24, 1941 (W. W. Wirth) (25 ♀ ♀, 6 ♂ ♂); Dundy Co., June 26, 1905 (M. H. Swenk) (♂); Glen (Sioux Co.), Aug. 12, 1906 (P. R. Jones) (♀), July 14, 1910 (L. Bruner) (♀); Jamaica, July 12, 1929 (R. H. Nelson) (♂); Lincoln, May 20, 1904 (♀), Aug. 12, 1905 (♂), Sept. 28, 1905 (♀), July 20, 1910 (F. A. Burnham) (♀), July 9, 11, 12, 15, 17, 1929 (R. H. Nelson) (3 ♀ ♀, 8 ♂ ♂); Waverly, Feb. 10 (L. Bruner) (♀); West Point, June, 1910 (♀).

ANOPHELES OCCIDENTALIS Dyar & Knab.* Glen (Sioux, Co.), Aug. 16, 1905 (10 ♀ ♀), Aug., 1906 (P. R. Jones) (45 ♀ ♀). Also reported by King and Bradley (1941) from Glen (Sioux Co.), Nebraska. Nebraska and Iowa apparently are the most southern limits of its known range.

A. PUNCTIPENNIS Say.* Dunbar, Sept. 24, 1941 (W. W. Wirth) (3 ♀ ♀) light trap; Lincoln, Nov. 5, 1903 (2 ♀ ♀) on window; Waverly, Feb. 10 (L. Bruner) (4 ♀ ♀, 3 ♂ ♂). Also reported by King and Bradley (1941) from Salt Creek, near Waverly, Nebraska, 1904. During September, 1941, first to third stage larvae were found breeding abundantly in shallow grassy lowland pools formed by the overflow from a creek at Dunbar, Nebraska, in association with *Culex tarsalis* larvae and pupae. The November record is interesting in that it shows that Anophelines may be active, at least in houses, well into the winter as far north as Nebraska.

A. QUADRIMACULATUS Say.* One specimen in the Nebraska collection appears to be this species: Lincoln, Sept., 1940 (M. H. Swenk) (♀) in garage. Nebraska is the limit of the known range of *An. quadrimaculatus* north of Kansas and west of Iowa.

CULEX PIPIENS Linnaeus.* Dunbar, Sept. 21, 1941 (W. W. Wirth) larval collections, from a cistern, and 1 adult (♂), Sept. 24, 1941 (W. W. Wirth) (20 ♀ ♀ and 2 ♂ ♂ in collection, found resting in a cesspool); Lincoln, Sept. 28, 1915 (♂), Oct. (♂).

C. QUINQUEFASCIATUS Say.* One male, Lincoln, Nebr., October. (Additional data not available.)

C. RESTUANS Theobald.* Only one specimen; Waverly, Feb. 10 (L. Bruner) (♂).

C. TARSALIS Coquillett.* Dunbar, Sept. 21, 1941 (W. W. Wirth) (35 ♀ ♀, 3 ♂ ♂); Dundy Co., June 25, 26, 1905 (M. H. Swenk) (♀, ♂); Glen (Sioux Co.), Aug., 1906 (P. R. Jones) (♀); Lincoln, June 25, 27, 1910 (11 ♀ ♀, 4 ♂ ♂), Feb. 11, 1911 (L. Bruner) (6 ♀ ♀) in cellar, July 11, 1929 (R. H. Nelson) (♂), Sept. 12, 1934 (R. E. Hill) (♀), Aug. 13, 1936 (W. W. Darlington) (♀); Waverly, Feb. 10 (L. Bruner (12 ♀ ♀, 4 ♂ ♂). *Culex tarsalis* larvae were found developing very abundantly at Dunbar in September, 1941, in ditches and grassy lowlands flooded by a swollen creek. At the same time light-trap collections in this locality yielded up to 50 per cent of this species.

PSOROPHORA CILIATA Fabricius.* Dunbar, Sept. 24, 1941 (W. W. Wirth) (♀); Lincoln, June 18, 1908 (C. N. Gable) (♀), June 15, 1924 (♀, ♂). Also reported by Dyar (1922) from Lincoln.

P. COLUMBIAE Dyar and Knab. One specimen taken in a light trap at Dunbar, Sept. 24, 1941 (W. W. Wirth) (♀).

P. SIGNIPENNIS Coquillett.* Dunbar, Sept. 20, 21, 24, 1941 (W. W. Wirth) (85 ♀ ♀, 6 ♂ ♂); Dundy Co., June 26, 1905

(M. H. Swenk); Lincoln, July 17, 1929 (R. H. Nelson) (♀, ♂).

THEOBALDIA INCIDENS Thomson.* War Bonnet Canyon (Sioux Co.), (♀). Previous records for this species extended as far east as Montana in the North and New Mexico in the South. This apparently is the first time it has been found east of the Rocky Mountains.

T. INORNATA Williston.* Dunbar, Sept. 24, 1941 (W. W. Wirth) (11 ♀ ♀); Lincoln, March 18, 1913 (L. Bruner) (♀), May 26, 1930 (R. Roberts) (2 ♀ ♀); Waverly, Feb. 10 (L. Bruner) (♀).

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DYAR, HARRISON G. 1922. The Mosquitoes of the United States. U. S. Natl. Mus. Proc., 62, art. 1, 119 pp.

KING, W. V., and BRADLEY, G. H. 1941. Distribution of the Nearctic Species of *Anopheles*. In "Malaria," Publication 15 of the American Association for the Advancement of Science, pp. 71-78. Washington.

MATHESON, ROBERT. 1929. A Handbook of the Mosquitoes of North America. 269 pp. Charles C. Thomas, Springfield, Ill., & Baltimore, Md.

Two New Species of Calophya and Notes on Others (Psyllidae: Homoptera).

By L. D. TUTHILL, Iowa State College, Ames, Iowa.

The genus *Calophya* is holarctic in distribution and so far as is known the members all have species of *Rhus* as their host plants, except *C. oweni* which inhabits *Phoradendron juniperinum*. Intensive collecting in areas of the western United States, the homopterous fauna of which has not been well known previously, has resulted in the capture of the two species here described as new.

CALOPHYA CALIFORNICA Schwarz.

1904 *Calophya californica* Schwarz, Proc. Ent. Soc. Wash. VI: 241, 242.

1914 *Calophya californica* Crawford, U. S. N. M. Bull. 85: 50.

The color variations which Schwarz and Crawford record are apparently a sexual difference. The study of specimens shows that the males are dark brown to black on the vertex and thoracic dorsum, the females, however, are much lighter in color, light brown to golden yellow. I have at hand specimens from Los Angeles County, San Jacinto Mountains, Alpine and "west of Jacumba," California and one male from Yarnell Heights, Arizona.

Calophya minuta n. sp.

Length to tip of folded wings 1.5-1.75 mm.

Color: Head, except genal processes and antennae, prothorax except legs, mesothorax except legs, shining black. Metathorax, abdomen and legs light green to yellowish. Antennae white, black-tipped. Genal processes greenish white. Wings hyaline, forewings slightly yellowish.

Structure: Vertex very smooth, evenly rounded downward anteriorly, not bulging. Genal processes of medium length, longer than basal width, subacute, not divergent, extending forward parallel to plane of dorsum of vertex. Antennae thick, short, slightly shorter than width of head. Thorax weakly arched. Legs small. Hind tibia with very small apical spines, one outer, two inner. Forewings rounded apically, slightly over twice as long as wide; Rs long, nearly straight; cubital cell much larger than medial; pterostigma broad, moderately long; small radular areas in both marginal cells and between. Membrane of hind wings set with minute points.

Genitalia: Male proctiger evenly swollen on caudal margin. Forceps shorter than proctiger; in lateral view moderately thick, strongly curved cephalad to subacute apex; in caudal view broad, mesally notched before apex, apical portion a sharp retrorse hook, notch black margined and irregularly serrate. Female genital segment three-fourths as long as rest of abdomen, valves subequal in length; dorsal valve straight, black tipped, flattened and blunt in dorsal view; ventral valve broadly rounded apically.

Described from 19 males and 10 females, Tumicacari Mountain, ARIZONA, July 22, 1938, R. H. Beamer, 3 females, Santa Rita Mountains, Arizona, July 19, 1938, R. H. Beamer and a series of 11 males and 6 females, Atascosa Mountain, Arizona, October 24, 1937, P. W. Oman.

Holotype male, Tumicacari Mountain, Arizona, July 22, 1938, R. H. Beamer, *allotype* female, same data, and paratypes in Snow Collection, University of Kansas. Paratypes in U. S. National Museum and author's collection.

This species resembles *C. californica* in general appearance but may readily be distinguished from the latter by its much smaller size, the much shorter and more rounded vertex and the short, forward projecting genal processes. The genitalia are also distinctive as described.

CALOPHYA DUBIA Crawford. Fig. 1. A.

1914 *Calophya dubia* Crawford, U. S. N. M. Bull. 85: 49, 51.

This species, which was described from a single pair of specimens, has been taken in large numbers at several localities in southern Colorado. It is the most numerous species on *Rhus trilobata* at high altitudes in midsummer. The males fit Crawford's description very well. The females range in color from clear yellow to light brown.

In addition to numerous Colorado specimens several males and females are at hand from Trident, Montana, collected June 4, 1940, by D. J. Pletsch.

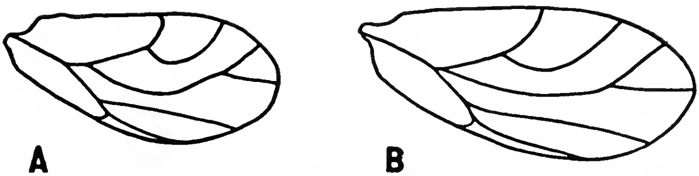

Fig. 1. A. Forewing of *Calophya dubia*. B. Forewing of *Calophya aurea*.

Calophya aurea n. sp. Fig. 1. B.

Length to tip of folded wings 2-2.25 mm.

Color: Uniformly golden yellow. Tips of antennae dark. Wings yellowish, darker along veins.

Structure: Head small. Vertex rather flat dorsally, slightly bulging each side of median line anteriorly. Frons prominent from base of genal processes to ocellus. Genal processes short, stout, sharp, strongly divergent, extending forward, about as long as basal width. Antennae short, thick, a little shorter than width of head. Thorax strongly arched. Pronotum long, vertical. Hind tibia with one outer and two inner apical spines. Membrane of forewings somewhat thickened, three small radular areas on margin; marginal cells elongate for genus, medial cell proportionately larger; pterostigma large. Membrane of hind wings thickly set with minute points.

Genitalia: Male proctiger straight, nearly parallel-margined slightly swollen on caudal margin. Forceps much shorter than proctiger, in lateral view broad, straight, parallel margined, apices obliquely, roundly truncate; in caudal view broad, slightly arched; apices black-margined and serrate mesally, a more prominent tooth at cephalic end. Female genital segment as long as rest of abdomen, dorsal valve slender apically, blunt, dorsal margin concave; ventral valve nearly equal in length, flattened and broad apically.

Described from 7 males and 21 females from Durango, Pagosa Springs, Ridgeway, Creede and El Paso Co., COLORADO and one pair from Trident, MONTANA.

Holotype male, Durango, Colorado, July 4, 1937, L. D. Tuthill; *allotype* female, Pagosa Springs, Colorado, July 16, 1938, L. D. Tuthill. Holotype, allotype and paratypes in author's collection, paratypes in Snow Collection, University of Kansas, U. S. National Museum, collection of Montana State College and collection of Academy of Natural Sciences, Philadelphia.

Most of the specimens were taken on *Rhus trilobata* in early July.

Although occurring on the same host plant and in company with *C. dubia* this form is readily distinguished from the latter. The difference in color, in the shape and venation of the forewing (as shown in the accompanying figures), in shape of head and genal processes and the distinctive genitalia all combine to make it easily recognizable.

OBITUARY.

CHARLES DAVIES SHERBORN, known to entomologists and zoologists generally for his compilation of *Index Animalium*, a complete list of all generic and trivial names from 1758 to 1850, died June 22, 1942, within a week of his 81st birthday. An obituary notice is in Nature (London) for August 1, 1942.

A New Race of Atlides halesus Cramer from California (Lepidoptera: Lycaenidae)

By Harry K. Clench Cambridge, Massachusetts

Upon comparing a series of *Atlides halesus* Cramer [1] from California with specimens of the same species from Florida, the fact was revealed that two races were involved. For reasons stated below, the Florida form has been regarded as typical.

An aberration of *halesus* from California was described by Gunder under the name of *corcorani* [2]. Unfortunately, this name must now be used to denote the race occurring in the West. In the strict sense, however, *corcorani* applies only to those examples in which the basal red markings of the underside of the wings, and the underside of the abdomen, are cream or white, thus leaving the normal form of the race (with these markings red) undescribed.

Atlides halesus corcorani, form *estesi*, new normal form.

Upperside: ♂. Fore wing as in typical *halesus*: bright metallic greenish blue, with rather large, well-defined scent pad at the cell-end, and a moderately broad blackish-brown border on the outer margin.

Hind wing also of the same metallic color, with a large costal border of blackish brown, diminishing sharply on the outer margin. At the end of vein Cu_2 is a tail, and at Cu_1 a slight irregularity in the margin. A faint indication of a steel-blue bar between Cu_1 and Cu_2 on the margin is occasionally present. A larger bar, of similar color, is always present between Cu_2 and 2A.

♀. Differs from the male in the duller, more restricted blue areas, presence of a well-developed tail at Cu_1, and, of course, the absence of a scent-pad at the cell-end of the fore wing.

Underside: ♂. Ground color dark gray, occasionally brownish. Fore wing with a blue dash, perpendicular to the body line, just below the cell in the base. Costa, near base, marked with a black-encircled red spot. Outer margin of wing narrowly blackish.

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[1] *Papilio halesus* Cramer, 1779, Papillons Exotiques, etc. 2, p. 3, pl. 98, figs. B, C.

[2] *Atlides halesus*, trans. frm. *corcorani* Gunder, 1934, Canad. Ent. 66, p. 131 (Various new Butterflies).

Hind wing: ground color as in fore wing. Outer margin narrowly jet black, also as in fore wing. Three rows of metallic dashes near the anal angle. The inner row, tending more toward greenish than the other two, contains three internervural dashes. The middle row is composed of either two or three, while the outer row, like the inner has three. All of the dashes in the three rows are surrounded by dull jet black. The greater parts of veins Cu_1, Cu_2 and 2A are streaked with jet black. Two red spots, one costal, the other inner marginal, are found at the base. The inner margin is bordered narrowly with black, just inward to which is a narrow strip of blue scaling.

♀. Similar to the male, but lacking the blue dash on the fore wing.

Length of fore wing (broadest measurement from base to outer margin, perpendicular to the body line and parallel to the inner margin). ♂ largest 17.5 mm., average 16.1, smallest 14. ♀ largest 18.5 mm., average 17.2, smallest 15.

Holotype, ♂, Riverside, CALIFORNIA, October 6, 1940. (F. Estes). *Allotype*, ♀, same locality and collector, September 29, 1940.

Paratypes, all Riverside, California, as follows: one ♀, Sept. 29, 1940; 5 ♂, 1 ♀, Oct. 6, 1940; 13 ♂, Oct. 11, 1941; 1 ♀, Oct. 14, 1939; 2 ♂, 1 ♀, Oct. 15, 1939; 14 ♂, 6 ♀, Oct. 18, 1941; 1 ♂, Oct. 21, 1939; 1 ♂, Nov. 5, 1938 (all collected by F. Estes); 1 ♂, Oct. 9, 1937 (in coll. D. B. Stallings); 2 ♂, no date or collector, ex Fall Coll. in the Museum of Comparative Zoölogy.

Holotype, allotype and the last two paratypes, No. 25703 in the M. C. Z. collection; one pair in the Canadian National Collection; one male in the collection of Mr. D. B. Stallings, of Caldwell, Kansas. Some will be returned to the collector of the majority, Mr. Fred Estes, of Riverside, California, for whom it gives the author pleasure to name this form. The remainder of the paratypes are at present in the collection of the writer.

Remarks. Although Cramer, in his description of *halesus*, cited no locality for the species, it is fairly reasonable to assume that his specimen or specimens had origin in the South-East, most likely in Virginia, or some neighboring state. Several facts seem to bear out this hypothesis, among which are the following: several of Cramer's species came from this region, one of the early colonies of America; Cramer's figure, while not the best, is sufficiently good to show two tails on the male, a character not found in the western race; Fabricius[3] who redescribed *halesus* (under that name), added the locality "America boreali."

The western race differs from the eastern (typical) in several characters. The former lacks a tail at Cu_1, an irregularity in the outer margin at that point being the only indication of it. It also lacks the red between the outer two rows of bars at the anal angle of the hind wing below, and a similar red basal to the Cu_2-2A steel-blue bar of the hind wing above. The ground color below is grayer than in eastern *halesus*.

Arizona specimens are of the western race, *estesi*, and New Mexico examples will probably be the same. In Texas both subspecies seem to occur, as well as some with mixed characters. Central American specimens will belong either to *estesi* or to another subspecies.

Some Notes on Nearctic Stagbeetles, with Description of a New Species of Platycerus from Pacific Northwest. (Coleoptera: Lucanidae)

By Bernard Benesh, North Chicago, Illinois.

In these notes it is proposed to record field observations on the bionomics of *Pseudolucanus capreolus* (L.), add to the range of *Dorcus brevis* (Say) and describe a new species of *Platycerus* from Oregon. The last was carefully compared by Dr. Chapin with material conserved at the U. S. National Museum; in returning the specimens he states "the best I can do is to say that the two males which are entirely black with a slight tinge of green do not look like anything in the Casey collection or in our own."[1] I gratefully acknowledge the continued co-operation of Dr. Chapin and thank him heartily for his systematic aid.

[3] 1781, Species Insectorum, etc. 2, pp. 116-117. (See also Butler, A. G., 1869, Catalogue of the Diurnal Lepidoptera described by Fabricius in the collection of the British Museum, p. 197.)

[1] Letter of 18 December 1941.

Pseudolucanus capreolus (L.) To recorded host plants [2] of this species we can add tulip poplar (*Liriodendron tulipifera* L.), as five adult males and nine larvæ (apparently in the last instar) were taken in a cavity of this tree, some years ago, at Deer Lodge, Tennessee. The males were observed emerging about four o'clock one torrid afternoon in June, 1935; by digging among the rotting debris, the larvæ were unearthed. It is obvious that the insect is not particularly addicted to any given host and may attack others than those thus far noted.

Platycerus viriditinctus n. sp.

♂ Robust, convex, ebony black, nitid, dorsum with obscure greenish tinge; a member of the *aggassizi* group, its nearest relative being *P. opacus* Fall [3], with which species it is compared throughout.

Head transverse, twice as broad as long, anterad nearly straight, antero-lateral angles rounded and feebly emarginate, canthus short and parallel, eyes fairly large, convex, base gently rounded; anteocular bosses prominent; cribrate-punctate (similar to *opacus*, but shallower and more clearly defined), punctuation becoming larger towards the base. Antennæ short, fairly stout, with scape and funicle piceous, nitid; scape one-third the length of antenna, slightly bent; funicle six-segmented, sparsely setose, first segment pear-shaped, twice as long as the second; second globular and distinctly longer than the succeeding segment, third, fourth and fifth of equal length, dilated towards front, sixth as long as the fifth, twice as broad as long, produced anterad into a point; clava of three segments, longer than the funicle, spongiose, rufous, sub-opaque, first two segments of equal length, produced anterad into a lobe, ultimate segment irregular in outline and twice as long as the preceding segment. Mandibles sickle-shaped, simple.

Pronotum nearly twice as broad as long, frontad hollowed, antero-lateral angles subacute (*opacus* more blunt), sides gently rounded to basal third (*opacus* more broadly arcuate), thence sinuous to the acuminate basal angles, base concave (*opacus* straight); punctuation cribriform (in *opacus* larger and closer), disc with a frontal median impression, lateral margins esplan-

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[2] Blatchley, W. S.: Coleop. of Indiana, pp. 903-909, 1910. Cosens. A.: 52 Annual Rep., Ent. Soc. Ontario, pp. 12-13, 1922. Saunders, W.: Can Ent. 13: 118, 1881.

[3] Fall, Henry C.: Ent. News, 17: 393, 1906.

ate and gently reflexed. Scutellum broader than long, apex rounded, base strongly punctured. Elytra nearly three times the length of pronotum, 5 mm wide and 6.5 mm long, basad ante-humeral area strongly depressed, humeri rounded, diverging to posterior third, thence gently rounded to apex, surface uneven, linearly punctulate (in *opacus* confused). Legs slender, black, nitid; tibiæ with rows of golden setae; anterior tibiæ distad with broad furcation and six unequal serrations; intermediate tibiæ serrate the full length with eight serrations (*opacus* with two to three short, centrally situated spines), posterior tibiæ with five feeble serrations (in *opacus* simple); tarsi slender and as long as the tibiæ, piceous, with short, ventral, golden setæ; claws large, simple. Beneath, black, nitid, sparsely punctured throughout, with punctuation on abdominal segments finer and denser; mouth parts piceous, glabrous.

Dimensions: length (with mandib.) 10.5 mm; width (broadest part of elytra) 5 mm. Female unknown.

Holotypes ♂, Stayton, Oregon, V-3-1941, in the writer's collection, accession number 5362. *Paratopotype*: ♂, same data as holotype, in the cabinet of Mr. K. M. Fender, McMinnville, Oregon.

Described from 2 ♂ ♂, captured by Kenneth M. and Dorothy L. Fender, to whom thanks are due for this valuable addition to the meager series of western *Platycerus* in the writer's reference collection.

Dorcus brevis (Say). Subsequent to the publication of "Some Notes on Boreal American Dorcinæ" [4] I have been presented by Mr. A. B. Wolcott, Field Museum of Natural History, Chicago, with an excerpt from the Proceedings, Journal New York Entomological Society, 30: 201, 1922, in which is recorded data on some beetles taken and exhibited by Mr. J. W. Angell. Among these is noted *Dorcus nanus* Csy, found at Lakehurst, New Jersey, August 15, 1914, by F. M. Shott. Checking my records I find that the insect in question is *D. brevis* (Say) and is so recorded in my "Notes", vide p. 13. Additional localities discovered since the publication of the "Notes" are: Maryland: Md, in Carnegie Museum collection; Kansas: Ks, Univ. of Minnesota collection; Michigan: Stevensville, 7-22-34, Benesh collection, acc. No. 4538, ex-coll. Dybas and Seevers.

[4] Benesh, B.: Trans. Amer. Ent. Soc. 63: 1-16, 1937.

New Cerambycidae with Notes (Coleoptera)

By Josef N. Knull, The Ohio State University, Columbus, Ohio.

Anoplocurius altus n. sp.

♂.—Size and Form of *A. canotiae* Fishr., light brown in color, shining, long flying hairs on both surfaces, legs and antennae.

Head convex, transversely depressed above clypeus; surface crenulate; eyes large, coarsely granulate; antennae extending over four joints beyond apex of elytra, eleven-jointed, scape stout, second joint longer than wide, third joint longer than first two together, fourth slightly shorter than third, fifth longer than fourth, joints six and seven gradually increasing in length, seven, eight and nine equal, ten shorter than nine, eleven equal to nine, scape and second joint with coarse punctures, third joint not spinose.

Pronotum longer than broad, widest back of middle, base and apex of about equal width; disk convex; surface crenulate. Scutellum triangular, punctures small.

Elytra wider than pronotum; sides subparallel, apices truncate; surface coarsely punctured, punctures separated by more than their own diameters, short sparse pubescence intermixed with long flying hairs.

Abdomen coarsely punctured; first ventral tumid at middle, fringed with long pubescence. Legs slender, femora clavate.

Length 7.8 mm.; width 1.9 mm.

♀.—Antennae extending over two joints beyond apex of elytra, third joint not spinose. First segment of abdomen simple.

Holotype male and *allotype* collected in Davis Mountains, Texas, July 2, 1940. Paratypes from the same locality ranging in dates from June 6 to July 6, D. J. and J. N. Knull collectors. All specimens from oak. Holotype, allotype and paratypes in writer's collection. Paratypes in The Ohio State University collection, including one from the Wenzel collection from Texas.

The following key will serve to separate the three known species in the genus.

A. Antennae twelve-jointed............. *canotiae* Fishr.

AA. Antennae eleven-jointed

B. Third joint of antennae spinose at tip in both sexes .... *incompletus* Lins.

BB. Third joint of antennae not spinose. *altus* n. sp.

Perigracilia delicata n. sp.

Form of *P. tenuis* Lins., slender, cylindrical, opaque, fuscous, pubescence minute, inconspicuous.

Head across eyes wider than elytra; surface scabrous; eyes coarsely granulate, deeply emarginate, upper lobe small; terminal palpal joints similar, cylindrical; antennae twice as long as insect, tapering from base to apex, scape stout, elongate; second joint slightly longer than wide; third joint shorter than first; fourth joint shorter than first; joints five to eight inclusive increasing in length; joints nine, ten and eleven equal in length, each shorter than eighth; twelfth joint longer than eleventh; first four joints rugose.

Pronotum narrower than elytra, nearly twice as long as wide, base and apex of equal width, widest in front of base; sides constricted back of apex, gradually expanding to basal fourth, then abruptly constricted at base; disk convex, a lateral depression each side near apex; surface rugulose, granulate at base. Scutellum triangular, granulate.

Elytra three times as long as broad; sides parallel at base, constricted in middle, expanded on apical fourth, apices acutely rounded, suture at tip dehiscent; disk flattened, surface granulate, covered with large shallow punctures, separated by more than their own diameters.

Prosternum long before front coxae; intercoxal process very narrow, pointed behind; coxae large, nearly contiguous; middle coxae about same. Abdomen shining, punctures fine. Femora clavate. Hind tarsus over half the length of tibia, first joint longer than three following joints.

Length: 6 mm.; width 1.2 mm.

Described from eight specimens, probably males, collected at light in the Santa Catalina Mountains, Pima County, ARIZONA, August 5, 1930, by Leonora K. Gloyd. *Holotype* and paratypes in the Museum of Zoology, University of Michigan. Paratypes in writer's collection. I am indebted to Miss A. L. Olson for the privilege of describing this species.

Dr. E. G. Linsley kindly compared a specimen with the type of *P. tenuis* Lins.[1] and stated that the new species differs by being darker in color, head more strongly scabrous, eyes more convex and coarsely granulate, third and fourth antennal segments more robust. The relative proportions of the antennal

[1] E. G. Linsley, Proc. Cal. Acad. Sci., 24, No. 2, p. 49, 1942.

joints of the two species are different.

ANTHOPHYLAX VIRIDIS Lec. This species which was treated as a synonym of *A. malachiticus* (Hald.) by Hopping[2] should be restored to specific standing. A large series of both species was collected on the blossoms of mountain maple (*Acer spicatum* Lamb.) in Sullivan County, Pennsylvania. Many of the adults were in copulation when taken.

In the large series of the former, the femora are not yellow, pronotum usually darker than elytra and color of elytra ranging from dark brown to violet, or green. The last abdominal segment of both sexes is emarginate; the middle area is concave in the female and raised in the male.

In *A. malachiticus* (Hald.) the femora are yellow, pronotum same color as elytra and color ranging from bright green to blue. The last abdominal segment of both sexes is truncate and is not modified. These characters appear to agree with specimens from other localities too.

Taranomis linsleyi n. sp.

♂.—Resembling *Perarthrus vittatus* Lec. in appearance, robust, head, thorax, scutellum, abdomen and tarsi black, three longitudinal stripes on each elytron and antennae dark brown, legs light brown, elytra yellow.

Head convex; surface coarsely punctured, shining, pubescence long; eyes finely granulate; antennae twelve-jointed, extending over five joints beyond apex of elytra, scape stout, second joint as long as broad, third, fourth and fifth equal, each longer than first two together, joints six to eleven inclusive about same length, twelfth longer than eleventh, pubescence very short.

Pronotum narrower than elytra, widest in middle, wider than long, narrower at apex than at base; sides broadly rounded from base to apex; disk flattened; surface shining, punctures small, sparse, dense recumbent white pubescence along sides, with intermixed long flying hairs, central portion glabrous. Scutellum declivous in front, triangular, with long pubescence.

Elytra about twice as long as wide, widest across humeri; sides subparallel, apices sinuate forming a tooth along suture and on outer edge; disk convex, two longitudinal smooth costae on each elytron, also a humeral depression; surface

[2] Ralph Hopping, Bul. 85, pt. II. Can. Dept. Mines and Resources, p. 15, 1937.

coarsely densely punctured, pubescence short, longer flying hairs at base.

Ventral surface clothed with dense white recumbent pubescence with intermixed longer flying hairs.

Length: 11.8 mm.; width 3.7 mm.

♀.—Differs from the male by the antennae extending only a part of a joint beyond apex of elytra, eleven-jointed.

Holotype male and *allotype* female collected at Phoenix, ARIZONA, May 2, 1925, by R. H. Crandall, in collection of the writer. Other paratypes are California: 4 miles E. Edom, Riverside County, April 17, 1937, E. G. Linsley, and Whitewater, April 17, 1937, A. E. Michelbacher, in collection of Dr. E. G. Linsley, Arizona: Florence, April 21, 1935, F. H. Parker and Ajo Mountain, March 19, April 20, E. D. Ball, in writer's collection.

I take pleasure in naming this species for Dr. Linsley, who has loaned material for study.

It can be separated from *T. bivittata* (Dup.) by the pronotum being more rounded, less coarsely punctured and lack of strong elytral costa, as well as lack of protuberant mesosternum. From *T. pallida* (Schffr.) it differs in the above pronotal characters. Schaeffer[3] states that the antennae of both sexes are twelve-jointed and color of pronotum red.

LEPTOSTYLUS ARCUATUS Lec. After examining the type of this species I am convinced that *L. floridanus* Champ. & Knull is the same.

ONCIDERES CORNUTICEPS Schffr. Specimens of this form identified by Schaeffer were examined and found to be what I had recorded[4] as *Lochmaeocles tessellatus* (Thoms.) from Acacia at Brownsville, Texas.

OBITUARY

Mr. PHILIP LAURENT, oldest member of the American Entomological Society in point of election thereto (January 28, 1886), died at his home, Mt. Airy, Philadelphia, on June 17, 1942. We hope to present a notice of him in a later number of the NEWS.

[3] C.F.A. Schaffer, Bul. Brook Inst. I, p. 132, 1905.

[4] Ent. News 48, p. 42, 1937.

Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF.

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.

NEW ADDITION TO LIST OF PUBLICATIONS.

127. Proceedings, 8th American Scientific Congress. Vol. III Biological Sciences. Washington, 1942. Date of publication August 3, 1942 (private communication from the Secretary of the Congress.)

GENERAL—Allen, K. R.—Comparison of bottom faunas as sources of available fish food. [Trans. Amer. Fish. Soc.] 1941: 275-283. **Anon.**—Good insects [Penna. Game News] 13 (5): 12, 20 ill. **Bondar, G.**—A entomologia das flores de palmeiras [127] 3: 297-302. **Bradley, J. C.**—The origin and significance of metamorphosis and wings among insects [127] 3: 303-309, ill. **Chagnon, G. & Fournier, O.**—Les Ordres d'Insectes. [98] 69 (4-5): 128-142, ill. (k). **Champlain, A. B.**—Log of Rattlesnake Shack [Penna. Game News] 13 (5): 8-10, ill. **Chardon, C. E.**—On the origin of the flora and fauna in the upper zones of the equatorial Andes [127] 3: 35-36. **Emerson, A. E.**—Basic comparisons of human and insect societies. [Biol. Symposia Lancaster, Pa.] 8: 163-176. **Ferris, G. F.**—The American commission on scientific nomenclature in entomology. [68] 95 (2476): 598. **Froggatt, Walter Wilson.**—Obituary by A. B. W. [Proc. Linnean Soc. N. S. Wales] 67 (1-2): 77-81. **Fulcher, G. S.**—A grasshopper problem in mechanics [68] 95 (2475): 577. **Henriksen, K. L.**—Obituary by N. A. Kenner. [Opuscula Entomologica] 6 (2-4): 80. **Howell, H. H.**—Bottom organisms in fertilized and unfertilized fish ponds in Alabama. [Trans. Amer. Fish. Soc.] 1941: 165-179. **Knowlton,**

G. F. & Harmston, F. C.—Insect food of the rock wren. [120.] 3 (1): 22. **Leonard, J. W.**—Some observations on the winter feeding habits of brook trout fingerlings in relation to natural food organisms present. [Trans. Amer. Fish. Soc.] 1941: 219-227. **Dr. H. P. Löding**, 1869-1942, Obituary by G. P. Engelhardt. [19] 37 (2): 50-51, portrait. **Martin, J. P.**—Stem galls of sugar-cane induced with insect extracts. [68] 96 (2480): 39. **Macleay, Alexander**, and **Macleay, William**—Biographies by A. B. Walkom [Proc. Linnean Soc. N. S. Wales] 67 (1-2): v-vii, vii-xv. **Munro, J. A.**—Studies of waterfowl in British Columbia, buffle-head. [Canad. Jour. Res.] 20 D (6): 133-160. [Insect food of this bird, pp. 153-158.] **Murrill, W. A.**—Species making. [Amer. Botanist] 48 (3): 79-82. **Needham, P. R. & Sumner, F. K.**—Fish management problems of high western lakes with returns from marked trout planted in Upper Angora Lake, California. [Trans. Amer. Fish. Soc.] 1941: 249-269. **Park, T.**—Integration in infra-social insect populations. [Biol. Symposia, Lancaster, Pa.] 8: 121-138, ill. **Petch, T.**—Notes on entomogenous fungi. [Brit. Mycol. Soc. Trans.] 25 (3): 250-265. **Raney, E. C. & Lachner, E. A.**—Autumn food of recently planted young brown trout in small streams of central New York. [Trans. Amer. Fish. Soc.] 1941: 106-111. **Sherborn, Charles Davies**—Obituary by J. R. Norman. [31] 150 (3796): 146-147. **Stage, H. H. & Hyslop, J. A.**—Origin and spread of important insect pests of animals. [Yearbook, U. S. Dept. Agric. 1942]: 203-208. **Vladykov, V. D. & Gauthier, C.**—Nourriture des jeunes achigans (Micropterus dolomieu) dans la region de Montreal [Insect food of this fish] [Annales de l'ACFAS] 8: 110.

ANATOMY, PHYSIOLOGY, ETC.—Crescitelli, F. and T. Jahn—Oscillatory electrical activity from insect compound eye. [Jour. Cell. and Comp. Physiol.] 19: 47-66. **Dethier, V. G.**—The dioptric apparatus of lateral ocelli. I. The corneal lens. [Jour. Cell. and Comp Physiol.] 19: 301-314. **Fraenkel, G. & Blewett, M.** — Biotin, B_1, riboflavin, nicotinic acid, B_6 and panthotheic acid as growth factors for insects [31] 150 (3797): 177-178. **Jack, R. W.**—The life economy of a tsetse fly. [Proc. Rhodesia Sci. Assoc.] 39: 43-60. **Jackson, H. W.**—Morphology and histogenesis of the blood of the mealworm (Tenebrio molitor L.); Origin of the midgut in T. Molitor. [Va. Jour. Sci.] 1 (7): 221-2; 222. 1940. **Jacobson, H.**—Ueber die Sprungmuskulatur des Uferschwalbenflohes, Ceratophyllus styx

Roths [46] 37 (1): 144-154, ill. 1940. **Koch, A.**—Ueber die vermeintliche Bakteriensymbiose von Tribolium (Tenebrionidae), ein Beitrag zur Oenocytenfrage. [46] 37 (1): 38-62, ill. 1940. **Lotmar, R.**—Das Mitteldarmepithel von Tineola biselliella wahrend der Metamorphose. [41] 18 (9-10): 445-455, ill. **Ludwig, D. and Anderson, J. M.**—Effects of different humidities, at various temperatures, on the early development of four Saturniid moths, and on the weights and water contents of their larvae. [84] 23 (3): 259-274, ill. **Lüdtke, H.**—Die embryonale und postembryonale Entwicklung des Auges bei Notonecta glauca (Heteroptera), zugleich ein Beitrag zum Wachstums- und Häutungs- problem. [46] 37 (1): 1-37, ill. 1940. **Metcalf, R. L. and R. L. Patton**—A study of riboflavin metabolism in the American Roach by fluorescence microscopy. [Journal Cell. and Comp. Physiol.] 19: 373-374. **Pettit, L. C.**—A transitory membrane in the formation of midgut in the cockroach, Blatella germanica. [Va. Jour. Sci.] 2 (6): 187. 1941. **Pilkington, R. W.**—Facet mutants of Drosophila. [93] 111 (A) (3-4): 199-222, ill. **Ris, H.**—A cytological and experimental analysis of the meiotic behavior of the univalent X-chromosome in the bearberry aphid Tamalia (Phyllaphis) coweni (Ckll.) [42] 90: 267-322. **Seitz, W.**—Zur Frage des Extremitätencharakters der Tracheenkiemen von Sialis flavilatera L. im Rahmen allgemeiner biologischer Untersuchungen [46] 37 (2): 214-275, ill. 1940. **Smallman, B. N.**—Quantitative characters of the growth and development of a paurometabolous insect, Dixippus (Carausius) morosus Br. et Redt. I. The loss of water in relation to ecdysis. [Proc. Roy. Soc. Edinburgh B] 61 (2): 167-185, ill. **Tannenbaum, L. W.**—Note on the mesothoracic spiracle of the mormon cricket. [19] 37 (2): 72. **Tauber, O. E. & Clare, S.**—Circulation in the wings of the cockroach, Blatella germanica, IV. Circulation in unsclerotized wings under normal and experimental conditions. [Trans. Amer. Micros. Soc.] 61 (3): 290-296, ill. **Tulloch, G. S., & Goldman, M.**—The Malphighian tubules of Aedes aegypti L. [19] 37 (2): 52-55, ill. **Wigglesworth, V. B.**—The storage of protein, fat, glycogen and uric acid in the fat-body and other tissues of mosquito larvae. [Jour. Expt. Biol.] 19: 56-78. **Williams, C. M.**—The effects of temperature gradients on the pupal-adult transformation of silkworms. [Biol. Bull.] 82 (3): 347-355, ill.

ARACHNIDA AND MYRIOPODA—**Brazil, V.**—Consideraçoes gerais sobre a biologia dos animais peçonhentos.

[127] 3: 311-322. **Browning, H. C.**—The relation of instar length to the external and internal environment in Tegenaria atrica [93] 111 (A) (3-4): 303-317. **Causey, N. B.**—New Lithobiid centipedes from North Carolina [Jour. E. Mitchell Sc. Soc.] 58 (1): 79-83, ill. **Chamberlin, R. V.**—New millipeds from Michoacan. [95] 55: 57-62, ill. **Eddy, G. W. & Joyce, C. R.**—Ticks collected on the Tama (Iowa) Indian Reservation with notes on other species. [Iowa State College Journal of Science] 16 (4): 539-543. **Ewing, H. E. & Nesbitt, H. H. S.**—Some notes on the taxonomy of grain mites (Acarina : Acaridae, formerly Tyroglyphidae) [95] 55: 121-124. **Gertsch, W. J. and Archer, A. F.**—Descriptions of new American Theridiidae [40] 1171: 1-16, ill. **Goodnight, C. J. and M. L.**—Phalangids from British Guiana. [40] 1167: 1-13, ill. (*);—Phalangids from Central America and the West Indies. [40] 1184: 1-23, ill. (*). **Mazzotti, L.**—Los Ornithodoros de Mexico y su relacion con la fiebre recurrente. [Revista Inst. Salubr. Enfermed. Trop., Mexico] 3 (1): 47-52. **Penn, G. H., Jr.**—The life history of Porocephalus crotali, a parasite of the Louisiana muskrat. [Journ. Parasitol.] 28 (4): 277-283, ill. **Pierce, W. D.**—Fauna and flora of the El Segundo sand dunes. 12. Utilization of the black widow parasite and further data on spiders and parasites. [38] 41 (1): 14-28. **Radford, C. D.**—The larval Trombiculinae (Acarina, Trombidiidae) with descriptions of twelve new species. [116] 34 (1): 55-81, ill. (k). **Rey, A.**—Seconde ponte après alteration du cocon chez l'Araignêe labyrinthe (Agelena labyrinthica Clerck); Le tissage de la toile après suppression des pattes postérieures chez Araneus quadratus (Clerck). [Compte Rendu Soc. Phys. Hist. Nat. Geneve] 59 (1): 63-66, 66-68 **Schneider, H.**—Untersuchungen über die Acarapis—Milben der Honigbiene. Die Flügel- und Hinterleibsmilbe. [41] 18 (6): 318-327, ill. 1941. **Spurlock, G. M. & Emlen, J. T., Jr.**—Hypodectes chapini n. sp. (Acarina) from the red-shafted flicker. [Journ. Parasitol.] 28 (4): 341-344. **Truman, L. C.**—A list of spiders collected in western Pennsylvania. [Proc. Penna. Acad. Sci.] 16: 25-28. **Wallace, H. K.**—A study of the lenta group of the genus Lycosa, with descriptions of new species. [40] 1185: 1-21, ill.

THE SMALLER ORDERS OF INSECTS—**Auguston, G. F.**—The allotype of Amphipsylla neotomae I. Fox, 1940 (Siphonaptera : Dolichopsyllidae). [38] 41 (1): 39-41, ill. **Bonet, F.**—Sobre algunos Proturos de Mêxico. [Ciencia, Mex. City] 3 (1): 14-17 (*); Notas synonymicas sobre el orden Colembolos. [Ciencia, Mexico] 3 (2): 56-59 (*). **Calvert, P. P.**—Increase in knowledge of the Odonate fauna of Mexico, Central America and the West Indies since 1908. [127] 3: 323-331. **Clay, T.**—Genera and species of Mallophaga occurring on gallinaceous hosts [93] 110 (B) (1-2): 1-120, ill. (*). **Emerson, A. E.**—The relations of a relict South African termite (Stolotermes). [40] 1187: 1-12, ill. **Jacobson, H.**—See Anatomy & Physiology. **Jellison, W. L.**—Host distribution of lice on native American rodents north of Mexico [Journ. Mamm.] 23 (3): 245-250. (Mallophaga & Anoplura). **Jordan, K.**—On Parapsyllus and some closely related genera of Siphonaptera [Eos] 18 (1): 7-29 (k*). **Roudabush, R. L.**—Parasites of the American Coot (Fulica americana) in central Iowa. [Iowa State College Journal of Science] 16 (4): 437-441. **Seitz, W.**—See Anatomy & Physiology. **Vladykov, V. D.**—Remarques sur la biologie du "scorpion", Corydalis cornuta, dans la rivière Châteauguay. [Annales de l'ACFAS] 8: 109. **von Hagen, V. W.**—Natural history of termites II. [Scientific Monthly] 55: 29-51. **Weber, N. A.**—A neuropterous myrmecophile, Nadiva valida. Erichs. [5] 49 (1-2): 1-3, ill.

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ATLAS OF THE SCALE INSECTS OF NORTH AMERICA. By G. F. FERRIS. Stanford University Press. Series IV, Nos. 385-448. Price, bound $6.75, unbound, $5.75. Publication date May 28, 1942. Received by Entomological News June 4, 1942.—Nos. 385-444 deal each with a separate species, continuing the treatment employed in the first three series as set forth in the NEWS for May, 1937, p. 150, October, 1939, pp. 238-239, and October, 1941, pp. 238-239, respectively. No. 445 contains supplementary notes, including species not considered in this work for lack of material or on account of uncertain status, and disposition of species not previously accounted for. No. 446, The Family Diaspididae, Classification and Keys to the groups and species, 70 pp., 3 pls., is divided into four sections: I. Preliminary Observations, II. The normal Diaspidid pattern, Habit and Morphology, III. Classification, IV. Identification of the Diaspididae occurring in North America. No. 447 is a four-page Epilogue the last section of which is entitled "Prognosis". It reads: "These acknowledgements [of assistance rendered] are here made in detail because of the strong probability that this Atlas will be discontinued with the publication of the present series. In ordinary times it might perhaps have been possible to issue this work with but little financial loss. However, the disturbed condition of the world has eliminated that possibility and the loss has become excessive. Consequently, after the publication of this series, the work will be allowed to lapse and it will not be resumed unless and until some continuing support for it appears. If it is eventually continued, the "loose leaf" form will be abandoned and a different procedure will be adopted. The writer stands ready to do the work that will be involved in carrying the original project through the six to ten years more that will be necessary for its completion. But no publisher can be expected to undertake a work from which financial loss is certain and the author cannot assume that loss himself. If the world wants this Atlas of the Scale Insects of North America completed the world must find some way to pay for it." No. 448 is a General Index to the four series.

In the introduction to the first series, in January, 1937, it was thought that the number of species to be treated would be 750, to be published in something less than ten years. With the termination of the fourth series, after five years and four months, 345 species of the Family Diaspididae have been considered, but the author emphasizes that this Atlas is nothing more than a beginning in the study of this one family. It is a mournful reflection that here again is an instance, all too common in the history of science and of the arts, of the failure to complete an ambitious and worthy enterprise through no fault on the part of the author.—P. P. CALVERT.

OBITUARY

HERMANN HORNIG, entomologist of the Reading Public Museum and Art Gallery, Reading, Pennsylvania, died of a heart attack on June 20, 1942. He was 84 years old, and had occupied his recent position for the past 15 years, having previously been in the employ of the Philadelphia Department of Public Health for a like period. While in Philadelphia he was engaged in cleaning up some of the mosquito-breeding areas in south and west Philadelphia.

He was well known among the entomological fraternity in Philadelphia and Reading, where he spent so many years, as an affable and kindly gentleman of the old school. He was particularly adept at preparing life-history groups of insects, especially those of economic importance.

While his interest was centered chiefly in the order Diptera, his work and absorbing interest gained him a broad working acquaintanceship with the various orders of insects.

Although Mr. Hornig did not have the advantage of academic training in entomology in his early years, his training as a jeweler and the years of experience spent in his trade fitted him admirably for the delicate and painstaking work that he accomplished; and his love for his subject, together with a tireless and inquiring turn of mind, ultimately brought him a tremendous fund of information on the habits and life histories of many insects. This served him in good stead in his work, and he was frequently called upon to advise farmers, horticulturists and others who were beset with insect problems.

Mr. Hornig was born November 5, 1858, in Altwasser, Silesia, of Ernst and Johanna (Eleanor) Hornig, and came to the United States at the age of 21, working at his trade in New York City for two years. He then came to Philadelphia and followed his trade in one of the large wholesale jeweler's houses in this city. His interests eventually brought him into association with many of the local entomologists, and he became active in several of the local entomological groups at the Philadelphia Academy of Natural Sciences and the Wagner Free Institute of Science. He also served as president of the Philadelphia Natural History Society. During his early years he occasionally contributed papers to the Entomological News.

The life history groups, of which he made many during his years in Reading, are and will continue to be, of great educational value to the schools and general public with whom he worked, and his loss will long be felt by his co-workers and the visitors to the museum, many of whom delighted to hear him recount his experiences and tell, in his inimitable way, of the strange activities of the insect world as he saw it.

Mr. Hornig is survived by his widow, Edna (Clark) Hornig.

EARL L. POOLE.

Dr. WILLIAM SCHAUS, until recently honorary assistant curator of the division of insects, United States National Museum and entomologist in the Bureau of Entomology and Plant Quarantine, United States Department of Agriculture, died in Washington, D. C., on June 20th last.

He was born in New York City, January 11, 1859. He early became interested in the Lepidoptera, and, possessed of private means, made collections of these and other insects in the American tropics, visiting Guiana in 1903-04, Mexico in 1906, Costa Rica in 1909-10 and Guatemala in 1915-18. For many years, on these journeys, at home in London and in

Washington and to the hour of his death, his constant friend and companion was John T. Barnes.

Nearly all of the insects he collected went to the National Museum at Washington, as well as large quantities of material which he purchased from collectors all over the world, particularly from Central and South America and including the P. Dognin collection of Ecuadorian Lepidoptera from France. In fact he practically expended his considerable fortune in gifts of this character and of entomological books to our government.

For many years he worked at the National Museum without pay, sharing the Macrolepidoptera with Dyar until the latter's death (1929) and then in full charge, later becoming a salaried official. He was a prolific writer and described more Central and South American butterflies and moths than any other American. One of his earliest papers was "Descriptions of the early stages of some Mexican Lepidoptera" (Papilio 3: 186-189. 1883). In the decade 1910-1920 many of his descriptions appeared in the Annals and Magazine of Natural History of London, but after that time chiefly in American journals, including the Proceedings of the United States National Museum, the Transactions of the American Entomological Society and Entomological News (for example, "Two New Saturnids from South America", in our issue for January, 1925). Among his latest publications are two (1940) on moths of the families Noctuidae, Geometridae and Pyralididae in the Scientific Survey of Porto Rico and the Virgin Islands, of the New York Academy of Sciences.

The University of Wisconsin conferred the honorary degree of Master of Arts upon him in 1921, and the University of Pittsburgh that of Doctor of Science in 1925. He was elected a corresponding member of the American Entomological Society on June 12, 1911 and a correspondent of the Academy of Natural Sciences of Philadelphia on April 20, 1920.

He was a kindly gentleman who will be mourned by many of us, who have shared in his hospitality and in his collections, as a personal loss.

ROSWELL C. WILLIAMS, JR.
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—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

I want to collect Rothschildia, agapema, gulfina and io moths and Texas butterflies for interested persons. Eula Frizzell, R 4 San Benito, Texas.

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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

Arctic Lepidoptera especially **Noctuidae**—Wanted to hear from collectors who desire the Arctic Species. Have large collection. R. J. Fitch. Lloydminster, Saskatchewan, Canada.

Wanted—Tropical Lepidoptera and Insects. Also domestic species. Will exchange or buy specimens. M. A. Zappalorti, 253 Senator Street, Brooklyn, N. Y.

Wanted—Specimens of the genus Calendra (Sphenophorus) from North America. Will exchange Eastern U. S. Calendra or other Coleoptera for desired species. R. C. Casselberry, 302 Lincoln Avenue, Lansdowne, Penna.

Coccinellidae wanted from all parts of the world, especially South and Central America. Buy or exchange. G. H. Dieke, 1101 Argonne Drive, Baltimore, Md.

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1942, 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 separates of articles, without covers, over and above the twenty-five given free at the following rates: 1 or 2 pages, 25 copies, 65 cents; 3 or 4 pages, 25 copies, $1.05; 5 to 8 pages, 25 copies, $1.75; 9 to 12 pages, 25 copies, $2.35; each half-tone plate, 25 copies, 30 cents; each plate of line cuts, 25 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, P. C. Stockhausen, 53 North 7th St., Philadelphia, Penna. 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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Studies on Sibling Callosamia angulifera (Lepidoptera: Saturnidae).

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

In June, 1941, a female *Callosamia angulifera* hatched from a "wild" cocoon that I had found during the previous winter. I placed the moth inside a screened porch, and at nine o'clock that night several males were fluttering outside the screen. A single male was allowed to enter and copulate with the female, so that the subsequent eggs which she laid in a cardboard box were all true siblings, the offspring of a single father and mother. My ensuing studies investigated the variations which might be readily observed among sibling *C. angulifera* within an identical environment. It cannot be assumed fully that such variations represented genetic differences, for there were undoubtedly inequalities even within that confined environment. But the observed differences are at least suggestive of different genic combinations.

The eggs were laid over a period of four days. Hatching occupied an equal period of time, the last eggs laid being the last ones to hatch, showing that fertilization is a progressive process within the female. This is in accord with gross findings in the dissection of a newly-hatched moth. Here the egg "strings" show the best-formed eggs at the peripheral end of the "string" near its junction with the ovipositing organs, while the more central or inner end of the "string" exhibits eggs of less and less maturity, the last ones being so rudimentary that they probably have not time—at least in the non-feeding *Saturnidae*—to develop fully before the moth dies.

The caterpillars, therefore, varied from one another in age from the very beginning, a maximum difference of about one hundred hours obtaining between the extremes. This difference, at first quite noticeable, soon became less obvious, for caterpillars that had hatched on the same day quickly began to show variations in size as well as in their times of ecdysis. Thus by the third instar it was impossible to sort out groups according to age. Thereafter, I regarded them all as a single colony of more or less uniform siblings.

I raised the larvae in mosquito-netting bags covering low branches of a tulip poplar tree at Princeton, New Jersey. During the latter stages of their growth they exhibited differences in size aside from the presumed sexual ones, i.e., the larger larvae varied quite perceptibly among themselves, as did also the smaller ones. There was also slight variation in the intensity of their colors.

But the first marked disparities were noted at the stage of cocoon-spinning. This phase occupied about two weeks. Allowing for the possible four-day difference in chronological age, one concludes that a variation of ten days in physiologic age had been established during the short larval period. This consisted of one day of variation for about ten days of larval life. Spinning occurred at random, regardless of larval size, so that the observed difference is physiologically and genetically valid.

At this time there were also several differences in spinning-technique. Most of the larvae tried to escape from the net, some actually succeeding in chewing or worming their way through its meshes. These fugitives crawled inward along the branch until they reached the main trunk of the tree and then descended to the ground. Those that failed to escape spun their cocoons in the folds of netting where it was gathered together and tied about the branch: this represented the farthest attainable distance from the feeding-grounds in the foliage at the end of the branch.

But about a quarter of the caterpillars spun cocoons in the leaves where they had spent their larval lives. Within this group there was also variation in spinning-behavior. Some merely drew two or more leaves together and spun cocoons without anchorage to the twig. Others began a "strap" which, however, proceeded only part way along a leaf's stem. The rest completed the "strap" so that its upper end embraced the twig firmly, and in this group was found a high percentage of cocoons that utilized only a single curled leaf. The latter type was indistinguishable from the conventional cocoon of *C. promethea.*

One hundred and ten cocoons were gathered at last and placed together in a small screened cage that was open to the environment in all its faces. The cage was hung to a wire fence beneath the tulip poplar tree and allowed to remain there for the winter.

In May, 1942, I transferred the cage to my desk at Swarthmore, Pennsylvania. Here, under indoor conditions, I waited for further exhibitions of variation among the sibling *C. angulifera.*

Table I shows the order in which the cocoons hatched. It will be noted that in general males preceded females, at one early period (May 21) outnumbering the latter almost two to one. But later (after May 26) the females surpassed the males in absolute numbers.

This may indicate several qualities inherent in *C. angulifera* as a species (rather than from the sibling standpoint). Males being on the average smaller than females, their total requisite metabolic processes in attaining hatching-maturity will be calorically less than that of their sisters. Thus a given quantity of heat during Spring days will further males' metamorphosis proportionately more than females'. Hence maturity will arrive first in the male population. This incident may well have survival value to the species, since the first females to hatch will thereby be assured of having potential mates already on the wing. The last females, hatching after the last males, may still mate with decrepit males on the point of death. This does not matter, since the male's responsibility ceases immediately after copulation, while the female's is all the more enhanced. It is essential that females mate on the first evening after hatching, or at least not later than the second evening, for were *they* to copulate when almost exhausted by imaginal living, they could never succeed in laying their eggs in appropriate places—or even in laying them at all.

The relative smallness of males has, of course, an added advantage in survival of the species, for it enables them to fly longer distances with less consumption of fuel. This not only makes it possible for them to range widely in search of females, but may also add to their longevity—again contributing advantageously to the females' chances for being discovered and fertilized.

TABLE I

Hatching of Sibling *C. angulifera*—1942

Date	*Females*	*Males*
May 10		1
11		
12		
13	2	1
14	2	2
15	1	1
16		
17	2	1
18		5
19		
20	2	4
21	1	4
22	3	3
23	3	2
24	2	1
25	2	1
26	3	1
27	7	1
28	2	2
29	6	3
30	4	
31	3	
June 1		
2	1	
3		
4		
5		1
6	1	1
7		
8		
9		
10		1
11	2	
12	1	2
13	2	1
14		
15	1	
16	1	
17	1	
18	2	
19	2	
Totals	59	39

(To be continued.)

Note on the Genus Bertoniella (Orthoptera, Tettigoniidae, Agraeciinae)

By James A. G. Rehn, Curator of Insects, Academy of Natural Sciences of Philadelphia.

There has recently appeared in the "Memorias del Museo de Entre Rios" [1] the first part of a series of studies by Augusto A. Pirán, entitled "Contribucion al Conociemiento de los Tettigonioideos (Orthoptera: Tettigonioidea) de la Mesopotamia Argentina." In the second unit of the four making up this part there is described a "Nueva especie y nuevo género de Conocephalidae," to which the name *Guaranina* is given. The relationship of this new genus is said to be with *Xiphelimum* Caudell, a genus well known to the present author, and which is quite typically a member of the Conocephalinae or Conocephalidae, whichever value may be accorded that aggregation.

Unfortunately, as clearly shown by the very good figures and the relatively brief description, the insect described as *Guaranina daguerrei* is not a member of the same subfamily or family as *Xiphelimum*, but is instead referable to that assemblage called the Agraeciinae or Agraeciidae, whichever value may be preferred.

It is to be regretted that the author of this Argentine paper apparently has failed to consult at least some of the literature dealing with the Orthoptera of the region of the Paraná River. The insect to which he has applied the new generic name *Guaranina* was described and figured in 1911 by the present author as *Bertoniella agraecioides*, new genus and species. The type of the latter came from Puerto Bertoni, Paraguay, a locality not far removed from Posadas, Misiones, Argentina, from which place *Guaranina* was described. With the type male and the allotypic and four other females of *B. agraecioides* now before me, there can be no question as to the identity of Pirán's genus and species.

The synonymy would be as follows:

[1] Zoologia No. 17, pp. 3-8, pls. I-III. Paraná, Argentina, 1942.

BERTONIELLA Rehn.

1911. *Bertoniella* Rehn, Entom. News, xxii, p. 255.

1942. *Guaranina* Pirán, Mem. Mus. Entre Rios, Zool. No. 17, p. 4.

BERTONIELLA AGRAECIOIDES Rehn.

1911. *Bertoniella agraecioides* Rehn, Entom. News, xxii, p. 255, figs. 3-5.
[♂ (type), ♀; Puerto Bertoni, Paraguay.]

1942. *Guaranina daguerrei* Pirán, Mem. Mus. Entre Rios, Zool. No. 17, p. 5, pl. 1, fig. 3, pl. II, figs. 4-6. [♂, ♀ (type); La Picada, near Posadas, Misiones, Argentina.]

The range of the species is more extensive than published literature would indicate, as it extends northeastward into the drainage of some of the head streams of the Paraná. Aside from Puerto Bertoni, Paraguay, the type locality of *agraecioides,* the following localities are represented in the series before me:

Villa Lutecia, vicinity of San Ignacio, Misiones, Argentina; IV, 1910; (E. R. Wagner); 1 ♀; [Hebard Cln.]. Piracicaba, State of São Paulo, Brazil; 3 ♀; [Hebard Cln.].

There is an appreciable amount of variation in general size in this species, and also in the length of the alar appendages.

OBITUARY

DR. ANTON VON SCHULTHESS-SCHINDLER, president of the Third International Entomological Congress at Zurich in 1925, died November 7, 1941, acording to a notice in the Mittheilungen of the Swiss Entomological Society (vol. 18, pp. 398-399).

Additions to the Insects in the U. S. National Museum. The most important accession in insects [during the fiscal year ended June 30, 1941] was the Nevermann collection of Costa Rican Coleoptera, comprising about 33,000 specimens and including much type material. Other important entomological material came in many miscellaneous lots, the largest beng 64,000 insect specimens transferred from the Bureau of Entomology and Plant Quarantine.

A collection of nearly 3000 beetles from Panama was donated by Assistant Curator Richard E. Blackwelder, who collected them several years ago.—Annual Rept. Smithsonian Inst., 1941, p. 20, 1942.

Heavy Infestation of Tent Caterpillars in Chester County, Pennsylvania (Lepidoptera: Lasiocampidae).

By Joseph L. Williams, Lincoln University, Pa.

During the spring of 1942 the infestation of tent caterpillars (*Malacosoma americana* Fabr.) was about the heaviest of any season for several years in Chester County. In both Chester and Delaware Counties, on the highway to Philadelphia, not one wild cherry tree escaped being infested. Apple trees were more heavily infested than usual, but their infestation is never as heavy as that of the wild cherry during any season. Wild cherry is more heavily attacked because the caterpillars prefer this plant to any other. Experiments have been made which show that impregnated females can be induced to lay their eggs around a wire of a suitable diameter, if twigs of trees are not present. If, however, twigs of a suitable diameter of several trees are made available to such females, cherry in most cases is selected. Even virgin females prefer wild cherry, but their effort to lay is in vain. Fertilization is absolutely necessary for normal egg-laying. This egg-laying behavior is true for all Lepidoptera, except a few whose eggs have been reported to hatch parthenogenetically. Adult females selecting wild cherry twigs on which to lay their eggs explain why these trees are more heavily infested than apple.

The author has been trapping insects by means of a light trap since 1936 and during this period, except this season, tent caterpillar moths were never caught in large numbers. This season, however, the light trap was crowded with the moths. The males were much more numerous than the females, yet the latter were present in fairly large numbers each night throughout the flying season. Several nests of caterpillars were burned from a few apple trees on the author's lawn, but many escaped being harmed and climbed the trees again and again to build new nests. After burning the newly formed nests several times, the caterpillars were finally destroyed.

About the middle of June several wild cherry trees in the vicinity of Lincoln University were examined. From ten to twenty or more egg-rings were found on some small trees. This gives some indication of the number of impregnated females on wing during the season. This also gives an indication, if this year's conditions prevail, of next year's crop, since about 180 eggs are present in each egg-mass. Fortunately, females of *M. americana* mate and lay only once before death, which is not true for all Lepidoptera. Unfortunately, however, nearly all females on wing are impregnated, which enables them to lay normally. This statement is substantiated by the fact that dissections of most female Lepidoptera caught at the light trap have spermatophores in their bursae. This means, therefore, that they have mated and the number of spermatophores present indicates the number of pairings. Only one spermatophore is ever found in the bursa copulatrix of *M. americana*.

The work of Turner further substantiates the statement on the fertility of flying females. Our only hope, therefore, must depend on a fly (Diptera), which parasitises the caterpillar if the number is to be normal next year. Perhaps this fly and other parasites of the tent caterpillar were fewer this year, which may explain the outbreak.

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WILLIAMS, J. L. 1939. The mating and egg-laying of Malacosoma americana. Ent. News, 50 (2), 45-50, (3), 69-72.

ID. 1940. The anatomy of the internal geneitalia and the mating behavior of some Lasiocampid moths. J. Morp., 67 (3) 411-433, 2 pls.

The Insects in the American Museum of Natural History, New York City.

We received through 201 gifts approximately 38,000 specimens. Our study collections now contain approximately 1,735,-000 specimens, of which roughly 398,000 are moths or butterflies; 346,000 are beetles; 288,000 are flies; 242,500 are ants, bees or wasps, and 232,500 are spiders and their relatives. Owing to the danger of bombing in New York City we moved our thousands of type specimens to the safer place provided by the Museum.—73rd Ann. Rept. Amer. Mus. Nat. Hist. for 1941, p. 13.

Mating Flights of Isonychia May-flies (Ephemeroptera).

By HERMAN G. COOKE, University of Pennsylvania, Philadelphia.

Relatively few accurate observations have been made on the mating flights of mayflies. Morgan writes, "Actual mating has been observed but a few times. The most satisfactory observation was made (May, 1911) upon a swarm of *Baetis*. Murphy's[2] observations on the mating behavior of *Baetis posticatus* supported Morgan's statements. In a more recent account of the order of mayflies, Needham and associates[3] remark, "And for many mayflies the swarming habits are quite unknown."

In a previous paper[4] the writer has recorded an observation on the mating flights of *Stenonema vicarium*. Opportunity has been afforded to extend this observation to species of *Isonychia*.

The temperatures at which eggs of mayflies hatched have been recorded by writers in several scattered papers. However, data on the temperature for nymphal emergence and that for adult behavior in nature have been greatly restricted. The most available information on the latter two activities may be found in the work by Clemens and by Murphy.

In an ecological study of mayflies Clemens[5] found that temperature had a very marked effect on the length of subimaginal period. Murphy[2] recorded a monthly average of temperature in her study of *Baetis posticatus*. From May to October inclusive, she found that the average temperature for

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[1] Morgan, Ann. H. 1913. Contribution to the Biology of Mayflies. Ann. Soc. Amer. 6: p. 392.

[2] Murphy, Helen. 1922. Notes on the Biology of Mayflies Genus *Baetis* Bull. Lloyd Library Ent. Ser. 2.

[3] Needham, J. G., Traver, Jay R. and Hsu, Yin-Chi. 1935. The Biology of the Mayflies, p. 10.

[4] Cooke, Herman G. Jan., 1940. Observations on Mating Flights of Mayflies *Stenonema vicarium* Ent. News 51.

[5] Clemens, W. A. 1917. An Ecological Study of the Mayfly Chirotenetes. University of Toronto Studies Biol. Ser. 17.

nymphal emergence (of brood four) was 62.2° F., for each month.

The writer also has observed that temperature is quite a factor as regards the behavior of mayflies. He has been able to secure the temperature and date of nymphal emergence and of adult behavior in nature as here noted. All temperatures were counter-checked by a thermometer employed on date of observations. It was found that the nymphs failed to emerge from the water as sub-imagoes when the temperature registered below 65° F. No doubt, the chief difference between the former and latter figures may be attributed to difference in species or environmental conditions or probably both.

The present study began on August 24, 1940, when a lone male was observed descending over the banks of Darby Creek from a large company of imagoes which swarmed high up among the branches of trees beneath a mid-day sun. The location was almost two miles up stream from Oakview, Pennsylvania. Neither copulation nor the movements that usually characterize actual mating took place; nevertheless, the incident occuring at a height of forty or fifty feet served not only as a clue toward further investigations, but also as a confirmation of a report by Needham[3]. In a paragraph on the swarming of *Callibaetis* that author writes, "Other mayflies fly at a higher altitude in swarming; some so high as to be observed with difficulty from the ground."

At 1:30 p. m., on the above date the atmospheric pressure registered 30.23 inches while the temperature was 69° F.[6]

The summer of the following year (1941) was uneventful in this field until September 26 and 27. At 3:30 p. m., both days, a small company of *Isonychia christina* (tentative identification of species) was seen rising and falling in deep rhythmic undulations over an evaporated pond-bed twenty yards from the west bank of the creek. The scene of this flight was approximately one hundred yards up stream from the location

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[6] Records of atmospheric pressure and temperature were obtained from the Weather Bureau at Philadelphia, Pa. The times given are in Eastern War Time, one hour earlier than Eastern Standard Time.

of the male observed in 1940. At times the individuals soared to a height of about fifty feet while at frequent intervals they descended to within five feet of the ground. When the lower level was reached they quickly mounted upward as if the decended distance had been plotted by measurement. The vibratory body motion so effectively displayed by these insects during flight was more highly perfected by the males than by the females.

On September 26, 1941, at 1:30 p. m., the atmospheric pressure was 30 inches and at 4 P. M. the temperature was 78° F. The following day, at the same hours, the atmospheric pressure was 30.21 inches while the temperature fell to 73° F. The weather reports for the three above mentioned dates, suggest a fairly constant range of atmospheric pressure and temperature for the flights of *Isonychia*.

It was of particular interest to note a female entering the group of males attempting, in her sluggish manner, to participate in the rhythmic performance. Up to this point her role had been negligible, but she was soon spotted and attacked by a male as if he had been watchfully awaiting her arrival. The pair remained united during their flight for a distance of nearly thirty yards and then suddenly separated and vanished among the trees. Two other females passed unmolested beneath the swarm of males and continued on their journey. Shortly after this, at intervals of about ten minutes, two additional couples were seen in copulation. Each couple showed a tendency to be borne slightly downward as it proceeded along its course. Otherwise, copulation was conducted in a manner similar to that observed for *Stenonema vicarium*.

One of the most striking features exhibited during these flights was the trend displayed toward net shyness, (i.e., from the swinging of an insect net), a tendency probably carried over from the nymphal stage, as nymphs of this species are among the most wary and are difficult to capture. When the swarm was continuously disturbed it either withdrew to a more distant region, or its members became scattered and disappeared. However, after a few minutes interval they usually returned to resume their performance in increasing numbers and with renewed vigor. Needham[3] also reported similar scattering in the genus *Callibaetis* that he observed: "——— suddenly vanishing ghostlike from view."

In order to capture *Isonychia* imagoes, it was necessary to lie in wait in the grass beneath the swarm until descending members had reached a lower level. Normally, these flights remained in progress for about thirty-five minutes. During prolonged interference, by the collector, the duration could not be accurately estimated. However, in either case, activity ceased long before sun-down.

The writer wishes to express his gratitude and appreciation to Dr. P. P. Calvert for his stimulating interest freely shown throughout this investigation, and to Dr. H. T. Spieth for having aided in the classification of this as well as several other species of mayflies. Thanks are due also to Dr. D. H. Wenrich, Dr R. G. Schmieder and Mr. E. T. Cresson, Jr., for helpful suggestions.

The Carry-over of Jungle Fever Virus. Continued investigation of jungle yellow fever in Colombia brought added evidence that, in certain areas at least, a *Haemagogus* mosquito is the chief villain in the tragedy. One of the puzzling aspects of this problem has been the complete disappearance of this mosquito at certain periods, especially during the dry season, while at the same time the disease has continued among both animals and men. This problem was resolved by the discovery that *Haemagogus* is characteristically an inhabitant of the tree tops and may be found there when it is absent in catches made at ground level. The investigators were forced to develop techniques new to yellow fever work, and as one of them expressed it, it became necessary "to associate with the monkeys in the interlacing branches high above the jungle floor." With this knowledge available it was possible to capture haemagogus mosquitoes throughout the entire dry season of 1941, and the yellow fever virus was found repeatedly in the mosquitoes caught in the tree tops.—Rockefeller Foundation, Annual Rept. 1941, p. 15.

An Apparatus for Obtaining Interval Collections of Insects[1]

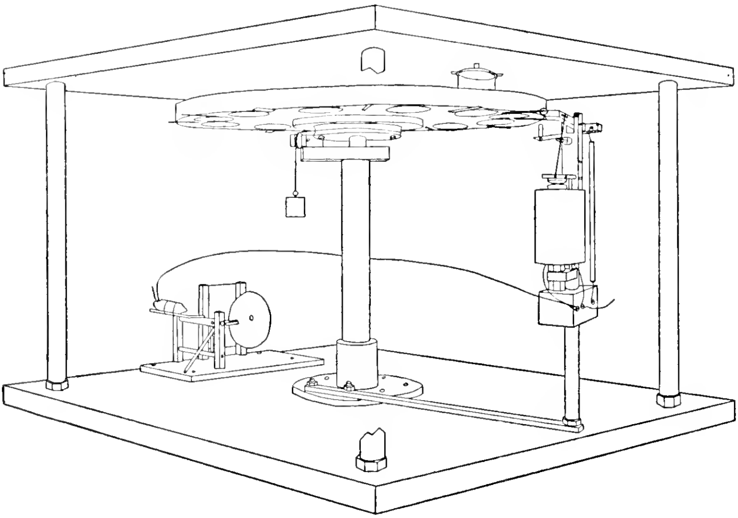
By William R. Horsfall and Allen V. Tuller, University of Arkansas.

Interval collections are often desired in connection with faunal studies of insects, and in order to get reliable results, periodic attention of an operator or some mechanical contrivance is necessary. In instances such as night collecting, continued, regular attention of an operator is often out of the question, and a dependable, automatic device is a desirable substitute.

The automatic change feature herein reported has proved satisfactory in conjunction with a light trap of a modified New Jersey style. Night after night for three months in each of two summers (1940 and 1941) this device operated reliably with a minimum of attention in connection with observations on flight habits of rice-field mosquitos at the University of Arkansas Rice Branch Experiment Station. It might prove equally efficient when used with any type of stationary trap of such a nature that the insects are received in bottles or jars, provided a constant source of electricity is available.

The Light Trap. The New Jersey light trap used in this connection was similar to that reported by Mulhern (1934) except in minor details. It consists exteriorly of a vertical cylinder with a conical cap housing a 40 W. frosted electric globe, an eight-inch electric fan, and a funnel of screen wire. The light bulb is exposed between the cap and cylinder and may shine in all horizontal directions. The fan is placed below the light and the blast is directed downward into the screen funnel below. In the regular trap, a killing jar is attached to the apex of the funnel. In this instance, it is attached to a hole in the top of the box housing the automatic change feature. Another small internal change involved the addition of a screen cone between the fan blades and the light which prevents insects caught in the down draft from lodging in the fan motor or from

[1] Research Paper No. 744, Journal Series, University of Arkansas. Approved for publication by the Director of the Arkansas Agricultural Experiment Station.



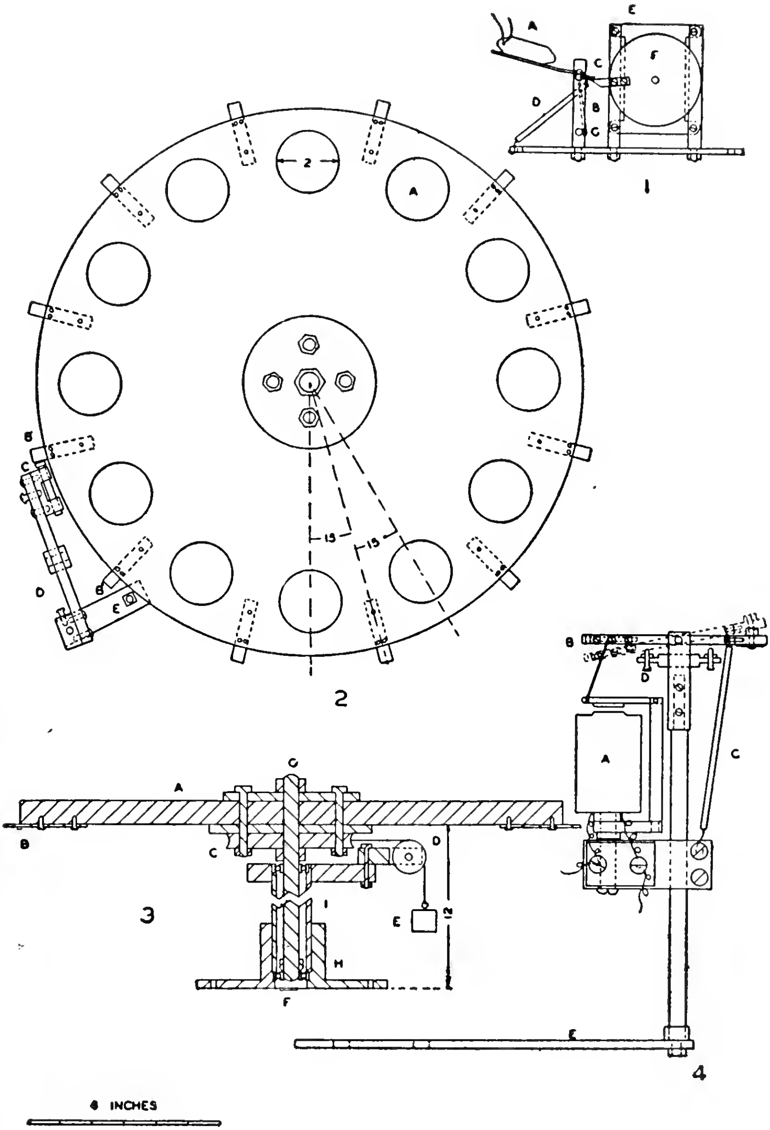
(Fig. A)

being mangled in the whirling blades.

The Automatic Feature. The device for changing the collecting jars is mounted in a box (Fig. A) composed of a top and a bottom made of five-ply wood joined to one another by four steel corner posts 16 inches long and threaded at both ends. Nuts placed on each side of the top and bottom boards enable the operator to make possible any small adjustments of leveling. Both top and bottom are covered with several coats of spar varnish as a preventive against warping or checking. The sides of the box are of sheet metal attached so as to prevent injury to the enclosed mechanism by splashing or blowing rain. One side is easily removable as a means of facilitating changes of collecting jars or adjusting the machine. The box is rectangular in top view and measures 15 inches by 20 inches.

The mechanism proper consists of a turntable (Figs. 2 and 3) to which twelve collecting jars are attached, a tripping device (Figs. 2 and 4) and a timer (Fig. 1).

The turntable (Fig. 2) is composed of a disc of plywood on top of a supporting column that is firmly bolted to the floor


1
2
3
4
8 INCHES

of the rectangular box. The disc is made of five-ply wood in which 12 holes (2A) two inches in diameter are drilled near the margin at 30° intervals. At the same intervals and centered between the holes, are 12 flat metal strips ($2B^1$) ½ inch wide and extending ⅝ inch out from the underside of the disc. Each metal strip is firmly held in place by three wood screws ½ inch long. Metal screw caps for the attachment of 16-ounce collecting jars are cut with holes to fit those in the disc and are fastened by ¼-inch screws to the underside of the disc.

At its center, the turntable is provided with two large metal washers on both top and bottom (Fig. 3). These two washers and thin wooden pulley (3C) are bolted securely to the center of the disc. The whole disc (3A) is attached to its supporting shaft by a nut below and above the disc on the threaded shaft (3G). The disc is held upright and suspended free on two ball bearings (3F) at either end of a hollow column (3I). The bottom bearing supports the thrust and the upper one acts to align the shaft. The supporting column (3I) is threaded into a floor flange (3H) which in turn is bolted to the bottom of the box. This form of support allows the whole turntable to be freely movable by means of a very slight tension.

In operation, a continuous tension is exerted on the turntable by means of a weight (Fig. 3E). This weight is fastened over a free pulley (3D) to the pulley (3C) attached to disc (3A).

Figure 4 is a diagram of the trip-and-check device that allows the tension weight to turn the disc or that prevents the turning as the case may be. Essentially this device is composed of an electromagnet (4A) below a horizontal trip-and-check arm (figs. 2D and 4B). The whole is supported by means of a vertical shaft from a horizontal base plate (4E) which is bolted to the floor of the box. The trip-and-check arm (4B) is pivoted at the center and is free to move by teetering action within limits determined by set screws on crossarm (4D).

The whole is activated by an automatic switch (Fig. 1) by means of which an electric circuit is made or broken at a predetermined interval. The mechanism in use is designed to operate at intervals of one hour by means of a self-starting 1 R.P.H. electric clock (1E) operating on 110 volts A. C. A disc (1F) is attached to the central shaft of the clock. A pointed, radial projection (1B) serves as the means of shifting the position of the mercury switch (1A) so as to complete the circuit through the electromagnet on the trip-and-check device. The mercury switch (1A) lies at such an angle on a hinged bar that the mercury is free of the contacts. When the radial arm (1B) strikes the projection (1C) on the hinge of the mercury switch, the switch is depressed on the contact end, and the circuit is closed. After the radial arm passes the point, spring (1D) snaps the switch back to its normal position and opens the circuit. Arm (1G) on the switch hinge prevents spring (1D) from turning the switch over by striking against a horizontal rod supported between the two posts holding the switch hinge.

In operation, 12 jars containing small bags of potassium cyanide are fastened to the screw caps on the turntable. (It is necessary that all be attached in order to balance the turntable as an aid to uniform turning). The tripping mechanism is released by hand and the turntable is rotated until the tension weight (3E) is in the position shown. Jar Number 1 should be in place beneath the hole leading down from the trap above. Disc (1F) of the timing device is then turned so that the radial trip (1B) is just above the projection (1C). The current is then turned on and the mechanism is set to release at the end of an hour and to operate continuously at hourly intervals until all twelve jars have passed beneath the trap and have been exposed one hour each.

While the circuit is broken through the electromagnet (4A) the trip-and-check arm is in the position shown in Figure 2 with the bumper rod (2C) against the steel plate ($2B^1$). When the current is completed through the electromagnet, the end on which the bumper rod is located is pulled downward by the magnet and the steel plate ($2B^1$) passes over the rod. After the turntable moves only a short distance (about ⅜ inch), plate ($2B^2$) is caught by the upright projection (2E) on the uptilted end of the trip-and-check arm, and it holds the bottle below the trap until the circuit is broken at the timer. This interval is about 1½ minutes. When the magnet is released, the arm is returned to the normal position by the spring (4C). The tension weight, then causes the turntable to rotate until the next succeeding horizontal plate strikes the bumper rod (2C).

Two accessory features of this mechanism insure that all insects in a given period pass into the proper jar. The first of these, a screen tube extending below the hole in the top of the box to which the trap is attached, conveys the insects straight down into the bottle below. The other is a temporary closing device for the jars after they have passed beneath the trap. This consists of a weighted cloth flap suspended from the top of the box and serves to confine all insects for the hour after passing under the trap. By that time, the cyanide will have stunned even the most hardy sufficiently to retain them in the proper collecting jar.

The design of this mechanism lends itself to a variety of time intervals depending on the revolutions of the clock that is used and on the spacing and number of radial tripping arms on the timer disc. In combination with an automatic switch for starting and stopping the mechanism, the possible combinations of intervals are further extended.

Other devices which are adapted to similar purposes are those of Williams (1935) and Hutchins (1940).

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Rearing Technique for Corrodentia[1]

By Kathryn M. Sommerman[2] University of Illinois, Urbana, Illinois.

Using the various methods described, the following species of Corrodentia were successfully reared in the laboratory: Trogiidae: *Liposcelis divinatorius* (Müll.), *L. niger* (Banks); Psocidae: *Pseudopsocus amabilis* (Walsh) (*Pseudopsocus* Chapman 1930); Caeciliidae: *Caecilius manteri* Sommerman MS., *Lachesilla nubilis* (Aaron), *L. pedicularia* (Linné), *L. forcepeta* var. *major* Chapman, *Ectopsocus pumilis* (Banks), *E. californicus* (Banks) and *Caecilius aurantiacus* Hagen. Incidentally all but the last two species were taken from dried corn stalks in the fields.

1. A fairly successful method of raising colonies was devised, but the degree of success varied with the species. It entailed the use of a small cylinder 92 mm. long by 36 mm. in diameter (Fig. 1-A). A cork containing a hole, for the insertion of a glass tube 75 mm. long by 10 mm. in diameter, and two notches in the sides, closed the top. Cut up corn sheaths were put in the cylinder and a moist cotton plug was pushed down into the 10 mm. tube. Small pieces of cotton were used to close the notches in the cork, which served as an air escape as the water soaked through the large cotton plug that was moistened once a day. A cylinder of this kind usually accommodated one generation of psocids. The particular advantage offered by this device lay in the convenience with which new cultures could be transferred. The moist plug could be removed from the tube and the latter pushed into the cork of a freshly fixed cylinder. Within a few hours enough psocids would have passed into the new cylinder so that the old one could be withdrawn, and a new tube, containing a moist plug,

[1] Contribution No. 227 from the Entomological Laboratories of the University of Illinois. This report was included as one section of a thesis submitted in partial fulfillment of the requirements for the Degree of Master of Science in Entomology in the Graduate School of the University of Illinois, 1941.

[2] I wish to express my appreciation of the suggestions given by Professors C. L. Metcalf and W. V. Balduf during my study of the bionomics of some corn (maize) stalk-infesting Corrodentia.

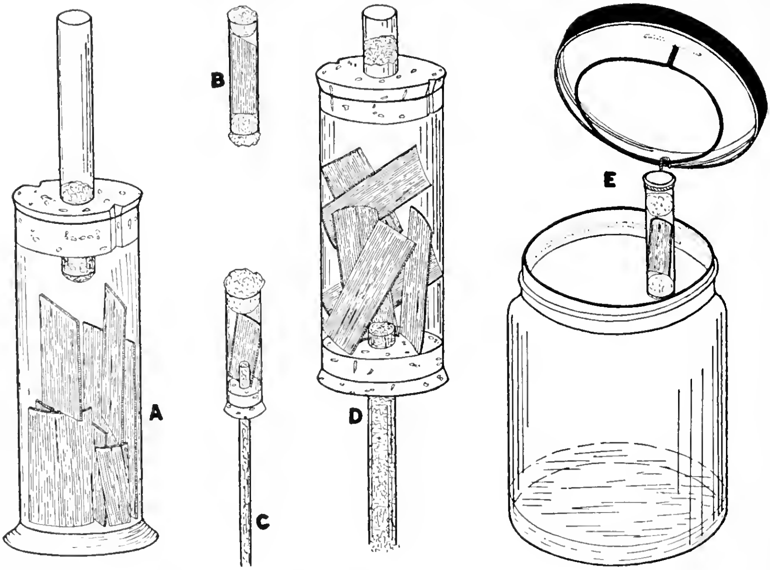

Fig. 1. A, Method 1; B, Method 2; C, Method 3; D, Method 4; E, Method 5.

put into the cork of the second. Usually the cylinders were placed in a horizontal position during the transfer, or a piece of used carbon paper was wrapped around the old culture while the new was subjected to the light. However, in transferring *Ectopsocus pumilis*, either the phototropic method was used or the cylinders were left, one above the other, utilizing the marked negative geotropism exhibited by this species.

2. The most successful individual rearing device (Fig. 1-B) consisted of a glass tube 33 mm. long by 8 mm. in diameter. Cotton plugs were inserted at each end and touched the piece of corn sheath that fitted snugly between them. A notch was cut at the edge of the sheath, or a corner cut off, thus giving the psocid access to both sides. The top plug was saturated with water four times a day at intervals of five hours. If the corn became too mouldy, or if no mould appeared, a fresh piece of corn sheath was inserted. Usually at least three changes were necessary during nymphal development. This device has been tried for some other pine bark inhabiting species but was not

successful.

3. Another fairly successful method was tried. Individual glass tubes (Fig. 1-C) about twice the size of those used in Method 2 were equipped with a cork in the bottom containing a 2 mm. tube 10 cm. long, filled with cotton to serve as a wick, and a cotton plug in the top. These were placed in test tube racks, with the capillary tubes extending through the holes of the rack to a pan of water below. This made it possible to omit the constant watering. Unfortunately if the wick touched the corn, it became too mouldy and the insects would die.

4. This last method was employed on a much larger scale for colonies (Fig. 1-D). Cylinders about the size of those described in method 1 were used, with a cork in the bottom containing an 8 mm. tube 10 cm. long. A dry cotton plug was substituted for the moist one used in Method 1. These tubes were likewise placed in racks like those of Method 3. When the capillary tube was pushed up into the cylinder above the level of the food this method proved very satisfactory for cultures of *Liposcelis divinatorius* and *L. niger*.

5. Small tubes such as those described in Method 2 with pieces of wire around the top prolonged into a hook, were hung to a circle of wire attached through the cardboard of a screw top jar (Fig. 1-E). The jars, filled to a depth of one-fourth inch with various salt solutions to keep the humidity constant, [Chapman (1)] were kept at 70° F. in a constant temperature oven, but the mortality was extremely high; so this method was abandoned.

6. Another method tried, but not adapted to these species, was that described by Rosewall (2).

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Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF.

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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GENERAL.—Bare, C. O.—Some natural enemies of stored tobacco insects, with biological notes. [12] 35 (2): 185-189. **Bishop, A.**—Chemotherapy and avian malaria [116] 34: 1-54. **Breland, O. P.**—For more clarity in entomological writing. [6] 50 (2): 199-201. **Comstock, W. P.**—Dating the Systema Entomologiae by Fabricius and Papillons Exotiques. Volume I by Cramer. [6] 50 (2): 189-190. **Craighead, F. C.**—The influence of insects on the development of forest protection and forest management. [Ann. Rept. Smithson. Inst.] 1941: 367-392, ill. **Curtis, W. E.**—A method of locating insect eggs in plant tissues. [12] 35 (2): 286, ill. **Davis, W. T.**—In memory of Charles Schaeffer. Compiled from memoranda found among the papers of the late Charles W. Leng. [6] 50 (2): 209-210. **MacLagan, D. S.**—Recent animal population studies; and their significance in relation to socio-biological philosophy, part I. [Proc. Univ. Durham Phil. Soc.] 10 (4): 310-330. [Section IV. Effects of density upon insects 316-324, 328-329]. **Medler, J. T.**—A convenient cage for confining insects to plants. [12] 35 (2): 283-284, ill. **Osborn, H.**—Early work and workers in southern entomology. [39] 25 (2): 29-31. **William Schaus,** 1858-1942, obituary by Carl Heinrich and Edward A. Chapin [68] 96 (2489): 244-245. **Stroyan, H. L. G.**—Application of the word "genotype." [9] 75 (750): 162. **Thomas, C. A.**—Mushroom insects: their biology and control. [Penna. State Coll.

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SPECIAL NOTICES.—Those interested in neotropical insects may find data of value in two reviews in Chronica Botanica, Waltham, Massachusetts, 7 (5), Sept., 1942: **Darrah, W. C.**—A brief account of the geology of S. America, 207-211, 1 map. **Hardy, F.**—The soils of South America, 211-217, 3 maps. bibliography with each; also in numerous papers on the geology of Mexico, Central and South America by **Arango, G. B., and many other authors** in Proceedings, 8th American Scientific Congress, Vol. IV, Geological Sciences, pp. 19-762, Washington, 1942.

The Third Part of Mosquitoes of the Ethiopian Region, **Dr. F. W. Edwards'** Culicine Adults and Pupae, printed by order of the Trustees of the British Museum (Natural History) 1941, issued Jan. 24, 1941, has been received recently. Its author died Nov. 15, 1940, as the volume was about to go to press. It consists of viii, 499 pages, 183 text-figures and three colored plates of, chiefly thoraces, of adults. The fourth section of this volume deals with the zoogeography of Ethiopian mosquitoes, pp. 448-485.

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—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

I want to collect Rothschildia, agapema, gulfina and io moths and Texas butterflies for interested persons. Eula Frizzell, R 4 San Benito, Texas.

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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

Arctic Lepidoptera especially **Noctuidae**—Wanted to hear from collectors who desire the Arctic Species. Have large collection. R. J. Fitch. Lloydminster, Saskatchewan, Canada.

Wanted—Tropical Lepidoptera and Insects. Also domestic species. Will exchange or buy specimens. M. A. Zappalorti, 253 Senator Street, Brooklyn, N. Y.

Wanted—Specimens of the genus Calendra (Sphenophorus) from North America. Will exchange Eastern U. S. Calendra or other Coleoptera for desired species. R. C. Casselberry, 302 Lincoln Avenue, Lansdowne, Penna.

Coccinellidae wanted from all parts of the world, especially South and Central America. Buy or exchange. G. H. Dieke, 1101 Argonne Drive, Baltimore, Md.

ENTOMOLOGICAL NEWS

DECEMBER, 1942

Vol. LIII No. 10

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1942, 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 separates of articles, without covers, over and above the twenty-five given free at the following rates: 1 or 2 pages, 25 copies, 65 cents; 3 or 4 pages, 25 copies, $1.05; 5 to 8 pages, 25 copies, $1.75; 9 to 12 pages, 25 copies, $2.35; each half-tone plate, 25 copies, 30 cents; each plate of line cuts, 25 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, P. C. Stockhausen, 53 North 7th St., Philadelphia, Penna. 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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An Appreciation

The first number of Entomological News appeared on January 14, 1890, printed by Paul C. Stockhausen, at 55 North 7th Street, Philadelphia. With two interruptions of one year each, he continued to print it to his death, in July, 1935, as gratefully recorded in the News for October of that year. Since his decease his Estate, under the management of Mr. Charles O. Weber, has continued its publication. The economic events of the last year have had their effects on the printing business and the Estate has decided that it can no longer carry on. We are, therefore, compelled to seek another printer and to announce that at the end of a period of fifty-three years, the honored name of Stockhausen will not be associated with the News after December, 1942. We regret to lose our contact with Mr. Weber who has seen us through our trials and our joys of the past seven and one-half years and he carries with him our best wishes for his future activities.

The Circling of Gyrinus (Coleoptera: Gyrinidae)

By Cyril E. Abbott, Harding College, Searcy, Arkansas

This is by way of reply to a note by C. Brooke Worth which appeared in the June issue (Vol. LIII, No. 6) of Entomological News, concerning the circling of *Gyrinus*. Worth's communication objects to my conclusion that the circling of *Gyrinus* increases the probability that it will encounter prey. The following analysis, a copy of which has also been sent to Dr. Worth, I hope will be published—not simply as an attempted refutation of his conclusion, but for the sake of arousing in others interest in the solution of this problem.

In the first place I want to state positively that I regret having given the impression that the circular movements of *Gyrinus* may be due *entirely* to the increased chances for encountering prey. Indeed, it is a fixed intention of mine never to accept an explanation as final. A living organism of the simplest kind is so complex that even apparently single, automatic responses are seldom the result of a single cause, nor are they generally as simple as they appear. I have as yet to investigate some other possibilities with respect to *Gyrinus*. Some of these will be evident from what follows.

The difficulty in understanding how circling can increase chance encounters may arise from a limited knowledge of the habits of *Gyrinus*. These beetles generally congregate close to the shores of lakes and rivers, and it is only occasionally that they spend long periods in open water.

Now this habit is probably partly the result of efforts of the insects to avoid rough water. But one should also remember that the shore is generally lined with plants, often, if not generally, overhanging the water, from which small insects fall upon the surface of river, lake, or pond. Therefore, the chances for *Gyrinus* to encounter prey are definitely dependent upon remaining inshore. If the beetle swims in a straight line toward the open water, its chance of encountering floating insects decreases progressively. It can, of course, follow the shoreline, in which case its path is necessarily undulatory. As a matter of fact, *Gyrinus* actually does this. Its circling is almost never confined to a single circle of constant diameter, but may be cycloid, ellipsoidal, or it may be that of a "figure eight' ; it may be such that the insect is confined to a limited area, or it may carry the animal considerable distance from its starting point.

The "territory already found sterile" may not remain so near the shoreline where *Gyrinus* is generally found. Unless one is willing to postulate that a spot "found sterile" will remain so for some time, this objection will not hold. And I have already pointed out that insects are constantly falling from the foliage overhead.

I am probably the world's worst mathematician, but, if my simple arithmetic is correct, a square has a greater area than any other rectangle of equal perimeter. If *Gyrinus* moves in a circle with a radius of 2 cm., and if we assume that a strip 2 cm. in width around the circle is within the vibratory "sphere of influence," we find that the diameter of the larger circle is 8 cm. This squared gives us a surface of approximately 64 sq. cm. But the perimeter of *Gyrinus'* circle is approximately 12.5 cm., and assuming that this is extended in a straight line, there is then a total area of influence of 4 cm. The product of these is 50 sq. cm. —14 cm. less than that of the inscribed circle.

Of course, the advantage of this is only present if it can be demonstrated that the number of insects falling within this area is greater than would be the case if the insect moved along a different path. As I have indicated above, I believe this to be the case.

There are undoubtedly other factors that tend to confine *Gyrinus* to a given locality through circling. Among these are the various effects of light and shade, the relative roughness of the water's surface, and a possible "social effect." As to the last, I have noted that the more specimens there are in a given area, the less active the beetles become, and the smaller the curves they describe. Undoubtedly, the presence of other members of its own species has an effect upon *Gyrinus,* though it may be that the peculiarities of group behavior are a concomitant with the formation of the group, and with it the result of a common cause.

Please do not have the impression that I am merely trying to defend a position that is untenable, for if such is the case I am willing to alter my conclusions. I simply do not agree that Worth's brief analysis disposes of the question.

Studies on Sibling Callosamia angulifera (Lepidoptera: Saturnidae).

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

(Continued from Page 244.)

Phylogenetically it is probably the female that has increased relatively in size rather than the male's having become smaller, the species' loss of the digestive function at maturity having made it incumbent upon females to hatch with large numbers of eggs already maturing. But there are undoubtedly forces tending to enlarge the males, too. Greater strength in flight would give larger males an advantage over smaller ones in reaching the females first. But this tendency may be overbalanced by the greater physiologic value in the advanced hatching-date of small males. Thus the present difference in the sizes of the sexes of this species is an indication of the optimum disparity in weight or in quantity of metabolically active tissue.

The hatching sequence of each sex was again random, that is, the successive males or females were not invariably larger than their respective predecessors; nor could I detect even a tendency for this to be true. The very last cocoon to hatch happened actually to be an exceptionally small female. Thus the above physiological generalizations must be looked at quite broadly in terms, as I have said, of the species as a whole. But the lack of successive increase in size of hatching males and females in this series does show a definite physiological variation among the siblings, in accord wth my observations during their larval days.

There were also readily seen differences in the colors and patterns of the moths' wings. The males varied between brownish and blackish, the females between reddish-brown and orange-red. The angular markings on the wings of both sexes also showed variations in their breadth or narrowness.

I was unable to note many differences in the moths' behavior. The principal one was in the choice of a site for clinging while the wings grew—this inequality in reaction was reminiscent of the antics observed during the cocoon-spinning epoch. Most of the moths appeared to be quite content to hang from the wire-netting of their cage. But an occasional one seemed to have no inclination for being thus confined. Racing up and down the walls and over the layer of unhatched cocoons at the bottom, dragging its already expanding wings without apparent regard to injuries sustained by those delicate appendages in their crucial state, knocking down many a more phlegmatic sister or brother, this moth might not resign itself to the cage for an hour or more and would invariably have to pay for its lack of docility by finally acquiring hopelessly deformed wings.

The mating behavior of the moths was quite uniform. Females placed on the same screened porch as their dead mother were discovered by wild males at approximately nine o'clock every night. Copulation lasted about two to two-and-a-half hours. If the females were allowed to remain on the porch overnight they laid no eggs. Nor did females placed in a box lay eggs the first night. Apparently, they are able to resist the impulse to lay for at least twenty-four hours in the absence of the proper stimulus, that is, the foliage of a plant suitable to the future larvae. Females placed in nets surrounding a tulip poplar branch began laying eggs almost immediately following the termination of copulation.

While the males gathered outside the screened porch, we kept the lights burning in our house as usual. Yet not a male fluttered against the windows toward the light. The mating instinct was stronger than positive phototropism. Nor did the light seem to interfere at all with the males' sense of the females' direction and position: they readily found the exact spots on the screen behind which females were waiting, even though in some cases one of the lights was shining directly upon them.

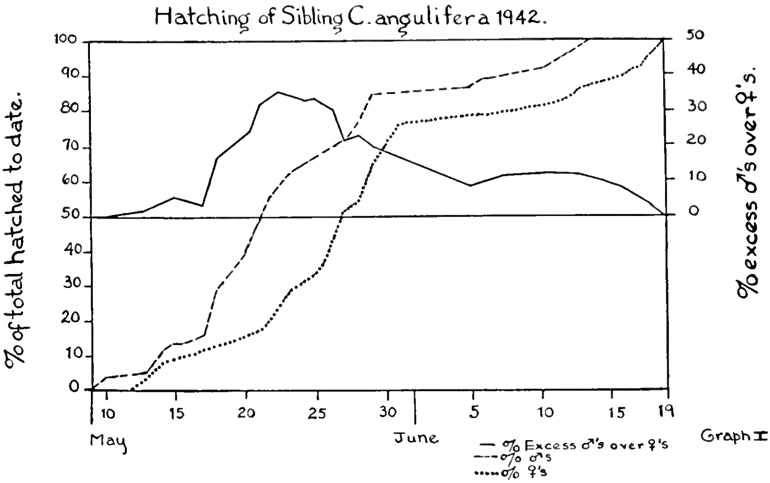
In no case did any of the females mate with more than one male. I mention this because of an experience I once had when wishing to raise sibling *T. polyphemus.* The virginal female was tied with string to a twig out-of-doors. The next morning she was mated to one male while two other males clung to the copulating pair. At four o'clock in the afternoon the first male unclasped, whereupon a second one immediately continued the act of fertilization. At nine that night he ceased, and the third and last one copulated with the female for two hours longer. Thus the capture of an already fertilized wild moth cannot always give one assurance that the offspring will be full-blooded siblings.

Of the original one hundred and ten cocoons of *C. angulifera*, only ninety-eight hatched. The remaining twelve showed three general causes of death: failure of the caterpillar to pupate; drying of the pupa without imaginal metamorphosis; and death of the pupa after varying degrees of imaginal metamorphosis had occurred. Metazoal parasitization of the caterpillars had been eliminated by the use of protective mosquito-netting bags. Hence these deaths must have been due either to disease caused by micro-organisms or else to constitutional or genetic deficiencies of the caterpillars and pupae themselves.

Among successfully hatched cocoons there were thirty-nine males and fifty-nine females. While this is a ratio of approximately two to three, it does not deviate sufficiently from a one-to-one sex ratio to be significant. It is even possible that unknown factors in the rearing of the caterpillars favored the survival of females.

In Graph I, I have charted the successively hatching moths in terms of the percent total of each sex hatched to date. It will be seen in this comparison that males always retained their lead over the females; that the first male preceded the first female by three days; and that the last female followed the last male by six days. It is barely conceivable that a six-day-old male might still be able to fertilize a female!

The effect of temperature is readily seen in the graph. The last half of May was uniformly warm and dry. During this period most of the moths hatched. June started in with a cloudy period, however, with some rain and many chilly days. Few moths hatched during this interval. After June 8 it became warm again and hatching was promptly resumed.



To emphasize the tendency of males to hatch before females, I have also charted the percent excess of hatched males over hatched females on successive dates. This curve is striking in the demonstration that when hatching is most rapid *in both sexes,* the relative excess of males over females also reaches *its* maximum. The period May 20 to 27 represents the peak of such excessive hatching activity among the males. A secondary tendency toward a peak—or at least a resistance to decline—is seen at the beginning of warm weather following the first week of June. After hatching of the last male on June 13, the curve naturally drops rapidly to zero.

It may be finally remarked that hatching of these moths required forty days from start to finish. The initial four-day difference in their ages was, therefore, ultimately stretched to thirty-six days. Males hatched during a thirty-four-day period, females during thirty-seven days. Thus a pronounced chronological difference in hatching physiology became evident in siblings of approximately equal age, amounting to thirty days among males and thirty-three days among females. This variation is in surprising accord with the one noted when the caterpillars spun their cocoons: for the complete annual cycle of my colony of sibling *C. angulifera* it *still* consists of one day for about ten days of total life.

CONCLUSIONS.

1. Morphological variation among sibling *C. angulifera* may be detected as early as in the third instar.

2. Variations in behavior of sibling *C. angulifera* is very noticeable during the cocoon-spinning epoch.

3. The smaller size of male *C. angulifera* than that of females leads to earlier hatching of the males. This has survival value for the species.

4. Physiologic variation among sibling *C. angulifera* is demonstrated by their random times of spinning and hatching, regardless of size, in an identical environment.

5. When hatching is most rapid in both sexes of *C. angulifera,* the relative excess of males over females also reaches its maximum.

6. Chronological variation in development of sibling *C. angulifera* is augmented at the rate of one day of variation for every ten days of the colony's life.

7. Variations noted in these studies indicate that members of this colony of sibling *C. angulifera* were markedly heterozygous—so much so that the colony's activities were strongly suggestive of the species as a whole.

My thanks are due to Eleanor M. Paxson for drawing the graph accompanying this article.

The Genus Megistanis (Lepidoptera, Nymphalidae)

By WM. T. M. FORBES, Cornell University, Ithaca, New York.

This genus is one of the most striking elements of the Neotropical butterfly fauna, ranging from Central America (the single species *baeotus*) to the Upper Amazon basin, with its tributaries. We have not seen specimens from Venezuela, Guiana, or the whole eastern and soutehrn part of South America, though it seems probable that the lost *M. acilus* came from some part of this area, (It was described from "Amboina"). The butterflies are not rare, though not too easy to catch, on the main Amazon tributaries, where I have often seen them hawking up and down over the water, a little like a dragon-fly, and alighting on any projecting object, such as the collector's shoulder or net;- one of my specimens of *M. deucalion* was flipped into the net from a position on its edge, but others got away.

On structure it may be described as a Vanessid with the build and wing-form of a *Charaxes*. Authors who have examined it carefully, such as Reuter and Schatz, agree that it belongs to a small group of genera derived from the Vanessid stem near *Kallima*, which we may call the Gynaeciini, following Seitz. This group contains *Historis* and *Coëa*, which are very close to *Megistanis*, and also *Smyrna*, *Gynaecia* and *Callizona*, which are a little more distinct, and is most sharply defined by the palpal character given by Reuter. Superficially the species are widely divergent, but two pattern features may be noted: *Megistanis*, *Historis* and *Coëa* have a translucent spot in the fork of R_3, without any closely adjacent spot in cell R_4 or just below the R-stem, and *Megistanis* and *Coëa* have an ocellate spot on the under side of the hind wing in cell Cu_1. The first spot appears on the upper side in *Callizona* and occasional specimens of *Gynaecia*, but it is replaced by a bar below;- in all other Nymphalinae examined by me it is absent or is merely a member of a more extensive series. I know nothing of the early stages, but to judge by related forms the larva will have rows of regular branched spines, each with a strong simple apex and a whorl of spines about its middle, and most probably a weaker middorsal series (though these are vestigial in *Gynaecia*); the food is likely to belong to the Urticaceae, perhaps *Cecropia*. The pupa, to judge by *Historis* and *Coëa*, will be strongly compressed, with a pair of processes on the head and a row of middorsal spines on the abdomen.

Misidentification of the species is the rule in American collections, probably because the blue species are rather similar, and the recently described *M. amazonicus* has been generally mistaken for *baeotus* or *japetus*; and a more legitimate source of confusion is the sexual dimorphism of *amazonicus*, which is probably the reason why some earlier workers thought the entire genus was a single dimorphic species, labelling all the blue forms male and all the buff ones female. We have never seen *aeilus,* but to judge by the known species, the extra buff spots probably indicate a distinct species rather than a mere aberration. The absence of the median band above may well be aberrational, and we have the corresponding aberration of *Victorina sulpitia,* as a gift from Mr. Frank Johnson, who received it from Satipo, South-Central Peru.

M. AEILUS Cramer. This species or form is the oldest in the genus and has never been recovered in modern times. I know it only from Cramer's figure. The absence of the blue or buff band is probably aberrational, but the small buff spots are likely to be a specific character. The original figure also shows seven black bars in cell Cu_1 in place of the four or five of known species, but this may be a slip of the colorist. If an aberration this can only belong to *amazonicus*, but the known range of *amazonicus* was not collected in those days and the probability is of a lost species from Surinam. The name has suffered badly. I folow Stoll's original spelling, which is repeated four times in text and index, and so is obviously not merely misprinted. It looks corrupt, but it is safer not to try to guess of what. Fabricius misspells it "*aeclus*" both in Mantissa and Ent. Syst., and Godart further corrupts this to "*oeclus*". Hübner, in the "Verzeichniss" misspells it "*ailus*" and corrects this to "*aile*". Finally Kirby completes the confusion by accepting the "*aeclus*" misspelling, but adding the reference to *aeolus* of Fabricius' Syst. Ent. 1775,- a *Thecla*,- and giving the latter priority!

M. AMAZONICUS Riley, Ent. lii, 186, 1919. Riley did not know the dimorphic female. We have received it from Wucherpfennig, the male labelled *baeotus* and female *deucalion,* from Teffé, along with true *deucalion*. This is out of the range of true *baeotus*. In our most western specimen, from the junction of the Curaray and Napo, the buff on the hind wing is extended in two narrow bands clear across cells M_3 and M_2,- a first step toward the more complete subterminal band of *Callizona*.

1. Translucent spot in fork of R_3 buff, above and below, additional small buff spots on forewing below in cells M_1 and M_3; no median band above . . . . *acilus*
—Translucent spot in fork of R_3 white, and buff on under side limited to spots in and adjacent to cell Cu_1; wings above with a broad median band 2
2. Median band on upper side buff; spotting on under side always rather heavy 3
—Median band on upper side blue 4
3. Median band on upper side limited by vein Cu_1, or with a small spot in cell M_3; buff spot on under side of fore wing a narrow vertical bar, followed by a large black area, often in the form of a black square with round white spot in center . . . . *deucalion*
—Median band on upper side of fore wing broadly extended into cell M_3; buff spot below large and squarish, followed by a pair of small black spots . . . . *amazonicus* ♀
4. Buff spot on under side of fore wing irregular, partly surrounding the white st. spot, which shows through from above, and followed by the two black submarginal lines only; black markings of hind wing linear; hind wing above with small, rounded, largely white st. spots in cells R and M_1 . . . . *japetus*
—Buff spot on under side of fore wing simple, squarish and followed by a double black spot; black markings on hind wing thick; st. spots on upper side of hind wing blue when distinct 5
5. Black markings on under side very thick, the spot just beyond end of cell (e.g.) more than half as wide as high; buff patch on hind wing covering half width of cell M_3 as well as Cu_1, and half-enclosing a minute black ocellus in cell M_3. Hind wing above normally with two diagonally placed spots each in cells M_3 and Cu_1, and conspicuous blue spots in upper intersapces (Central America to Peru . . . . *baeotus*
—Black markings on under side lighter, the spot at end of cell a third as thick as high; yellow patch smaller, not enclosing an ocellus in cell M_3. Hind wing above normally with transverse blue bars in lower cells, and no blue in upper ones (Upper Amazon and tributaries) *amazonicus* ♂

Overwintering Habits in Utah of Anopheles maculipennis freeborni Aitkens (Diptera: Culicidae).

By Don M. Rees, University of Utah, Salt Lake City.

A number of investigators have apparently had difficulty in finding overwintering Anophelines in any considerable numbers. They have, therefore, been unable to describe the type of shelters selected by these overwintering mosquitoes.

The observations recorded in the present paper of *Anopheles maculipennis freeborni* are submitted at the suggestion of Dr. Robert Matheson.

The author has been observing the overwintering habits of this species in Salt Lake City and vicinity each year since 1928. Adult females have been observed and specimens collected on numerous occasions during all of the winter months and at times when outside air temperatures were below zero degrees Fahrenheit.

The adult females pass the winter in Utah in sheltered places such as rock cellars, potato pits, granaries, garages, stables and other outbuildings. They are always more numerous in warm, dark, unoccupied or little used shelters. The females seek the protected dark corners of these structures, hiding between rafters or in cracks and crevices. Cobwebs provide a favorite resting place for these overwintering adults. They secrete themselves throughout the webbing whenever it is available and favorably situated.

During the winter months, hibernation is not complete because the females will take wing and fly short distances when disturbed. However, they have never been induced to feed in their natural shelters during the winter months.

During the latter part of April or May, the overwintering females issue from their hiding places and become active in the vicinity of their breeding water. The date of their appearance depends upon climatic conditions and is largely determined by the temperature. Overwintering Anopheline females have been induced to lay eggs under laboratory conditions but only after a blood feeding.

An Unusual Rearing of Rainieria brunneipes (Cresson) (Diptera: Micropezidae)[1]

By Curtis W. Sabrosky, Michigan State College, East Lansing.

The long-legged flies, *Rainieria antennaepes* (Say) and its variety *brunneipes* (Cresson), as the latter has recently been recorded in a monograph of the family (Cresson, 1938, Trans. Amer. Ent. Soc., 64:351), are collected on the bark of trees or flying about in the woods, but they have not hitherto been reared as far as the writer can determine. Very little is known of the early stages or breeding places of most species in the family.

A severe windstorm on the evening of May 29, 1942, caused widespread damage across central Michigan, blowing down numerous trees, breaking off limbs, etc. After the storm, broken trees on the Michigan State College campus were inspected for fungus diseases by F. C. Strong, forest pathologist, and L. O. Miller, Campus Forester. Some puparia which they found were turned over to the department of entomology for rearing, and from these emerged adults of *Rainieria brunneipes*.

The puparia were found about twenty feet above the ground in the crotch of a large American elm, *Ulmus americana*. The crotch was formed by three large limbs, two of which broke away during the storm and exposed a more or less decayed area at the center, with considerable damage by fungi. On one of the broken pieces of wood left in the crotch were numerous puparia, some singly, but more commonly laid out in rows, side by side. In all, 119 puparia were counted in an area about twelve inches long and less than two inches wide, with 38 concentrated in one square inch. The wood to which the puparia adhered was still firm, though dead, but the larvae might well have been working in the softer, rotten wood nearby, some of which showed irregular granules which might have resulted from feeding by the larvae. From the general situation

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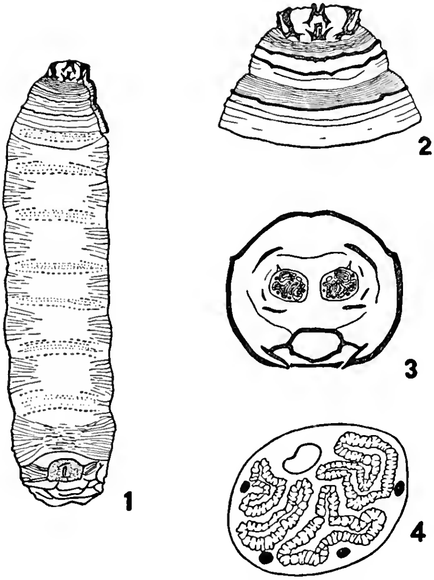
[1] Journal Article No. 596 (n. s.) from the Michigan Agricultural Experiment Station.



Puparium of *Rainieria brunneipes* (Cresson). Fig. 1, Ventral aspect. Fig. 2, Dehiscent tergal plate. Fig. 3, Posterior end showing the stigmal plates. Fig. 4, Greatly enlarged view of one stigmal plate.

it seems likely that the larvae were saprophagous. Of the specimens recorded in Cresson's monograph, the type and two paratypes were collected in a bald eagle's nest, but it is not known whether they had bred there or had emerged from rotten wood or were only chance visitors.

Most of the puparia were somewhat crushed, but 22 adults (10 ♂, 12 ♀) emerged between June 3rd and June 8th, most of them on the first date. Emergence apparently occurred in the early morning, for teneral specimens were found in the rearing cage between 8:00 and 9:00 A. M., but no others throughout the day.

It is worthy of note that the entire series was of the form *brunneipes*, and not a single specimen of the so-called typical form *R. antennaepes,* which has a more extensive yellow color pattern, especially on the legs. The homogeneity of this series suggests that *R. brunneipes* may be a valid species on the basis of its coloration, instead of a variety of *R. antennaepes*. In this same connection it may be remarked that of the many records in the family monograph by Cresson, the two forms were never collected at the same time, although they are known from the same locality in several instances.

Description of the puparia (Cf. Figs. 1-4): Shining reddish brown. Rather elongate and subcylindrical, over four times as long as broad. Anterior end depressed and truncate, posterior end blunt but slightly rounded, the stigmal plates situated on slight protuberances but not on the end of definite processes as in some families (Drosophilidae). Both tergal and sternal anterior plates are dehiscent, but the sternal plate commonly remains loosely attached to the puparium. Integument entirely without spines, tubercles or other processes, smooth with only weak striations except for the strongly striated anterior plates, and slightly stronger sculpturing at the posterior end and ventrally. Stigmal plates orange, located slightly above the longitudinal axis and separated from each other by a distance equal to little over one-third the diameter of one plate. Under low magnification they appear like brain coral, without conspicuous slits but with a distinct button and with four black spots at intervals on the periphery of each plate (Figs. 3, 4). Under high magnification, each plate appears to have four irregular to serpentine slits (Fig. 4). A small triangular sclerotized flap projects dorso-laterad from each ring. Anal opening situated far below the spiracles and not visible in direct posterior aspect.

Length, 5.75-6.5 mm.; diameter, 1.5-1.75 mm.

Specimens will be deposited in the Michigan State College Collection, the United States National Museum, and the Academy of Natural Sciences of Philadelphia

Spotted Fever in the Gulf Coast of Texas.

Four children living in a wooded area of this coast were attacked by this disease, which was fatal in two cases. The locality was found to be infested heavily with the tick *Amblyomma americanum,* two specimens of which were collected from the family of the victims. Experimental transmission tests by Parker, Philip and Jellison (1933) have proven *A. americanum* as an efficient carrier of Rocky Mountain spotted fever but no case of spontaneous infection has been definitely attributed to this tick before the observations reported here. L. Anigstein and M. N. Bader, *Science,* Oct. 16, 1942.

Annotated List of Florida Sphecinae (Hym., Sphecidae).

By H. T. Fernald, Winter Park, Florida.

In preparing this list data have been obtained from specimens in most of the larger collections both in this country and Europe. Unfortunately, many of these specimens were collected at a time when a label "Fla." was considered sufficient with no date or place of capture given. In many cases fuller data are now available and these are included here. No attempt at a complete list of published references has been made, only synonyms for the different species being supplied in order that old name labels on specimens may be brought up to date. In a few cases brief explanations have been added to make the situation clearer. None of the specific names here given are new, all having been previously published elsewhere.

Tribe Chlorionini.

Chlorion (Chlorion) cyaneum (Dahlb.) Dahlbom, Hym. Eur., I, 24, 1843.

This insect is generally bright blue in the more southern states as far west as Texas where a greenish shade begins to appear. West of this, it may become a bright green. I have not seen specimens of the blue from Florida, but it may occur there.

This species and variety are frequently called *caeruleum* L. in literature, but this name is preoccupied, it being not the *caerulea* of Linne's Xth edition, but first described in the XIIth edition where there are two *caeruleas,* one the same as in the other edition, the other the one now under consideration. This situation, therefore, results in the rejection of the name of the *caerulea* first described in the XIIth edition as a homonym leaving Dahlbom's *cyaneum* as the correct name for this insect.

Chlorion (Chlorion) cyaneum aerarium Patt.
Chlorion aerarium Patton, Can. Ent., XI, 133, 1879.

Orlando, IX, 4, 1941. This subspecies is bronze-blue and is the most common form in the eastern states.

Chlorion (Palmodes) abdominalis (Cress.)
Sphex abdominalis Cresson, Trans. Am. Ent. Soc., IV, 211,

1874.

Florida: Tampa; Indian River City; Conway; Orlando. Between April 15 and June 15 on New Jersey Tea, and between Sept. 1 and Nov. 1 on Goldenrod. Common in central Florida at least.

CHLORION (PRIONONYX) Thomae (F.).

Sphex thomae Fabricius, Syst. Ent., 346, 1775.

Pepsis crucis Fabricius, Syst. Piez., 209, 1804.

Reported as having been taken in Florida, but all the specimens I have seen were C. *pubidorsum* Costa.

CHLORION (PRIONONYX) PUBIDORSUM (A. Costa).

Enodia pubidorsum A. Costa, Ann. Mus. Zool. Napoli, I, 69, 1862.

Priononyx bifoveolata Tasch., Zeits f. d. ges. Natur., XXXIV, 408, 1869.

Orlando; Winter Park; Winter Garden; Clarcona; Lake Harris; Indian River City; Cedar Key; Gainesville. Occurs from April 15 to June 20; first half of July and a few specimens September to November. Fairly common.

CHLORION (ISODONTIA) EXORNATUM Fern.

Isodontia exornata Fernald, Can. Ent., XXXV, 270, 1903.

Biscayne Bay; Indian River; Orlando, III, 14, 1927; IV, 25, 1942. Quite rare; apparently more common in southern Florida.

CHLORION (ISODONTIA) AZTECUM (Sauss.).

Sphex aztecus Saussure, Reise d. Novara, Hym., 38, 1867.

Sphex robusta Cameron, Biol. Centr-Am., Hym., II, 36, 1899.

Sphex macrocephalus Fox, Ent. News, I, 137, 1890.

Chokoloskee; Winter Garden, IV, 25, 1928. Rare.

CHLORION (ISODONTIA) AZTECUM CINEREUM Fern.

Sphex apicalis Smith, Cat. Hym. Brit. Mus., IV, 262, 1856. (Name preoccupied).

Isodontia macrocephala var. *cinerea* Fernald, Can. Ent., XXXIV, 271, 1903.

Enterprise; Indian River; Lake Harris, IV, 26, 1932; Winter Park, VIII, 30, 1941. Apparently rather rare.

CHLORION (ISODONTIA) AURIPES Fern.

Sphex tibialis Lepeletier, Nat, Ins. Hym., III, 339, 1845. (Name preoccupied).

Chlorion (*Isodontia*) *auripes* Fernald, Proc. U. S. Nat. Mus., XXXI, 356, 1906.

Wagner, V, 6, 1940; Orlando, IV, 21, 1928, IV, 10, 1941; Winter Park, V, 6, 1940. Not common.

CHLORION (ISODONTIA) HARRISI Fern.

Sphex philadelphica Lepeletier, Hist. Nat. Ins., Hym., III, 340, 1845.

Sphex apicalis Smith, Cat. Hym. Brit. Mus., IV, 262, 1856. (Preoccupied.)

Chlorion (*Isodontia*) *harrisi* Fernald, Proc. U. S. Nat. Mus., XXXI, 359, 1906.

Chokoloskee; Orlando, II, 11, 1932; III, 14, 1927, V, 25, 1931, XI, 8, 1935; Lake Butler, IV, 13, 1931; Winter Park, IV. 29, 1937, VI 5, 1942. Not very common. Taken on New Jersey Tea and Goldenrod.

CHLORION (AMMOBIA) HABENUM (Say).

Sphex habena Say, Ins. of Louisiana, 14, 1832.

Sphex lauta Cresson, Trans. Am. Ent. Soc., IV, 212, 1872.

Sphex lauta var. *illustris* Cress., Trans. Am. Ent. Soc., IV, 213, 1872.

Sphex princeps Kohl, Ann. natur. Hofmus. Wien, V. 398, 1889. ♀.

Sphex chrysophorus Kohl, Ann. natur. Hofmus. Wien, V, III, 399, 1890.

Sphex lanciger Kohl, Ann. natur. Hofmus. Wien, X, 55, 1895. ♂.

Chlorion habenum Fernald, Fla. Ent., XXIII, 45, 1940.

Orlando, 16 specimens (11 males, 5 females) taken between VIII, 17, and IX, 6, 1939, 1940 and 1941. The females nearly always have a black abdomen, but rarely it is brown with blackish shades. The male abdomen is brown, often with blackish shades.

CHLORION (AMMOBIA) SINGULARIS Sm.

Sphex singularis Smith, Cat. Hym. Brit. Mus., IV, 261, 1856.

Sphex chlorargyrica Costa, Ann. Mus. zool. Napoli, I, 69, 1862.

Sphex spiniger Kohl, Ann. natur. Hofmus. Wien, V, III, 428, 1890.

Chokoloskee; Orlando, IX, 2, 1939. Rare.

CHLORION (AMMOBIA) DUBITATUM (Cress.).

Sphex micans Taschenberg, Zeits. f. d. ges. Natur. XXXIV, 419, 1869. (Name preoccupied).

Sphex dubitata Cresson, Trans. Am. Ent. Soc., IV, 213, 1872.

Florida; Winter Garden, IV, 4, 1928; Gainesville, V, 11, 1928. I believe this to be the female of *C. singularis* Sm. as these two are the only species of about the same size found in Florida of which the other sex is not known. While the type of *singularis* has an entirely black abdomen, in other specimens ferruginous is mingled with the black. In quite a number of specimens from Barbadoes the males (certainly *singularis*) were accompanied by females of *dubitatum*.

Since this article was sent to the printer a male *Chlorion singularis* taken IX, 13 and three female *C. dubitatum* taken IX, 13, 16 and 19, 1942, at Daytona Beach, all at one place on the flowers of *Bidens* strengthens the belief that these are the two sexes of the same species.

CHLORION (AMMOBIA) ICHNEUMONEUM (L.).

Apis ichneumoneum Linné, Syst. Nat., Xth. ed., 578, 1758.

Florida; Orlando, and generally distributed in the State.

CHLORION (AMMOBIA) ICHNEUMONEUM AURIFLUUM (Perty).

Sphex auriflua Perty, Delect. anim., 142, 1834.

Chokoloskee; In southern Florida.

CHLORION (AMMOBIA) ICHNEUMONEUM FULVIVENTRIS (Guer.).

Sphex fulviventris Guerin, Duperry, Voy. Coquille, Zool. II, 1, 1830.

Chokoloskee; Spanish Wells. In southern Florida.

Chlorion (Ammobia) pensylvanicum (L.).

Sphex pensylvanica Linné, Centur. Ins. rar., 30, 1763.

Winter Garden, V, 17, 1940; Winter Park, VIII, 23, 1940; Orlando, VIII, 19, 1940, IX, 6, 1940. Quite common everywhere in Florida.

Tribe Sceliphronini.

Sceliphron caementarium (Dru.).

Sphex caementaria Drury, Illustr. Nat. Hist., I, 105, 1770.

Present everywhere in Florida from about the middle of March into November. Common.

Chalybion cyaneum (F.).

Sphex cyanea Fabricius, Syst. Ent., 346, 1775.

Present practically everywhere in Florida from early in April to November. Common.

Tribe Podiini.

No species of this tribe have as yet been reported from Florida, but they have been taken in Illinois, North Carolina, Mississippi and Texas and may occur here. They are very rare.

Tribe Sphecini.

Sphex aureonotatus (Cam.).

Ammophila aureonotata Cameron, Biol. Centr.-Am., Hym, II, 7, 1888.

This species is not the *Pelopoeus abbreviatus* F. by which name it has often been referred to.

Orlando; Winter Park; Lake Harris; May, June, September. Not very common.

Sphex floridensis Fernald, N. A. Species of Sphex, 126, 1934.

Quite common at nearly all seasons of the year. Apparently, generally distributed in the State.

In the opinion of Murray (Ann. Ent. Soc. Am., XXXI, 36, 1938) this is a subspecies of *Sphex urnarius* (Dahlb.).

SPHEX PLACIDUS PLACIDUS (Sm.).

Ammophila placida Smith, Cat. Hym. Brit. Mus., Part 4, 221, 1856.

Ammophila pictipennis Walsh, Am. Ent., I, pp. 128 and 164, 1869.

Taken in March, April and May; also one specimen each in September and November. All specimens seen were from central Florida. Not very common.

So-called Papilio ajax americus Kollar in North America (Lepidoptera: Papilionidae).

By F. MARTIN BROWN, Colorado Springs, Colorado.

For many years this race has been included in the lists of North American butterflies. It does not belong there. It is the South American race and the name must be restricted to those specimens from Venezuela, Colombia, Ecuador and possibly Panama. Kollar's specimen was collected by Schomberg probably between 2000 and 1500 meters on the eastern slope of Ecuador or Colombia while enroute to the Rio Orinoco. Within that altitude range it is a very common butterfly. It is extremely variable.

All of the so-called *americus* that I have seen from the southwestern states have come from Arizona. All of them represent race *stabilis* Rothschild and Jordan. This is the typical Mexican race and its occurance on the border is to be expected. Occasionally a form occurs among typical *ajax* in the middle west states that resembles *stabilis* or *americus*. This form has been referred to *americus* Kollar.

Since this name cannot be used I propose PSEUDOAMERICUS for it. It differs from the typical form of *ajax ajax* in the breadth of the yellow bands which almost equal those of *zolicaon* Bvd. The limbal row of spots on the under side of the forewings is obscure. Otherwise, the maculation is well within the range of variation for P. *ajax ajax* L. The sides of the abdomen are yellow. This band of color is confluent with the upper row of yellow dots. Dr. Edwin P. Meiners informed me that about one per cent of the specimens from the midwest are or approach this form. I designate his specimen, taken May 9, 1910, at Troy, ILLINOIS, now in his collection at St. Louis, Missouri, the type of *pseudoamericus*.

The Nymphs of Aelia and Neottiglossa (Hemiptera: Pentatomidae)

By Richard C. Froeschner, St. Louis, Missouri.

Hart (1919)* gives a partial generic key to the nymphs of the tribe Pentatomini. In it he includes seventeen genera. However, under the name *Neottiglossa* he has apparently confused two genera: *Neottiglossa* and *Aelia*. The confusion of these two very closely allied groups is quite natural under the circumstances. According to his distributional data for *Aelia* he was not aware of its occurence eastward and so, perhaps, assumed that it was not to be considered when associating nymphs of local material with adults. He, therefore, lumped the two. This is obvious when he says, "color pale with four longitudinal black stripes or else black, with median line of notum, a very narrow lateral margin, and intermediate spots, yellowish." The first statement, that of the pale color and dark stripes, is characteristic of *Aelia* nymphs, while the remainder is true of immatures of *Neottiglossa.*

These two genera differ from *Dendrocoris* (which is in the other half of the dichotomy leading to *Neottiglossa* in Hart's key) by having the head convex dorsally with the jugae obliquely truncated anteriorly; and the lateral margin of the pronotum sparsely but distinctly punctured for its full length and without a series of short, widely-spaced spines just under the edge.

Aelia and *Neottiglossa* can be separated in the immature stages by the following couplet:

Color brownish-yellow with four black stripes: a pair running from apices of jugae posteriorly along the tylo-jugal sutures and along either side of midline as far back as the middle of the sixth tergite, and a submarginal one extending posteriorly along either side from apex of jugum to hind margin of eighth tergite; lateral and mediodorsal plates not entirely black; lateral and mediodorsal plates and tergum uniformly punctured .... *Aelia.*

Head and notum shining bronzy black, the latter with median line, very narrow lateral margins and intermediate spots

* State of Illinois Natural History Survey, Bull. 13 (art. 7).

pale; tergum pale, lateral and mediodorsal plates entirely black; lateral and mediodorsal plates much more coarsely and densely punctured than tergum.........*Neottiglossa.*

Habitat Preferences of Polistes Wasps (Hymenoptera: Vespidae).

By PHIL RAU, Kirkwood, Missouri.

In many areas near St. Louis one may find all four species of our Missouri *Polistes* wasps nesting within easy distances of one another, but each of the four will occupy its own restricted niche, *P. annularis* in the trees, *P. pallipes* in man-made structures, *P. variatus* in or near the ground, and *P. rubiginosus* in dark, sheltered places. (Bull. Brook. Ent. Soc. 26: 111-118, 1931, and Ecology 10: 191-200, 1929). This specialization of habitat is more clear-cut when one finds only one species in a restricted area; this area, then, ceases to be the niche for the species, but assumes the status of a habitat. In the course of my studies I have come across four such habitats, i.e., the area given over to one species of *Polistes* wasps to the exclusion of all the others. The details of these habitats follow.

POLISTES RUBIGINOSUS.

Climbing Iron Mountain (one hundred miles south of St. Louis) in quest of insects on July 24, 1938, I saw many *Polistes* wasps on the wing and among the scanty vegetation of the wooded slopes. A careful examination revealed that every one was of this species. The only explanation that I could give for this is that probably the hollow trees there offered them homes. Since their nests are not exposed to the hot sun, these wasps do not require large amounts of water, as do *annularis*. The latter could not thrive on this mountain side because of the lack of water, and their absence is not surprising. *P. pallipes* were likewise lacking, as were also their favorite nesting places, sheds and other structures.

Polistes annularis.

The next day was spent at the "shut-in" at Stout's Creek, four miles distant. The creek flows between high bluffs over a wide floor of rock which is interspersed with immense boulders (black poryphyry and red phenocysts, which give it a granite-like appearance). Struggling trees and shrubs grow sparcely among the rocks, but the steep walls of the gorge are more richly covered with vegetation. The rocks cause rapids in mid-stream, but at the edges they form many small pockets of water which are convenient and safe pools for thirsty *annularis* wasps. This valley on this July day, with no breeze reaching it and the rocks throwing back the vibrant heat, seemed the hottest place on earth. This, then, seemed to be a good habitat for *annularis*, and true to my expectations, they were there in ample numbers—they, and no others. An examination of the ravine for a third of a mile yielded twenty-two nests, from medium to very large in size, all hanging from the trees very near the stream. None were found in the thick vegetation on the slopes away from the water; neither were members of any of the other three species seen there. *Annularis* is probably the only one of the four that could survive such heat. This is not to be wondered at when we realize that *annularis* of the temperate region is an offshoot of *P. canadensis* of the tropics, and during the course of its northward migration has never lost the love for the burning sun and for the cooling water.

A similar area occupied by this species was noted along the Meramac River at Gray's Summit on the premises of the Missouri Botanical Garden. A road runs parallel with the river for a half-mile, and only about a hundred yards away from it. This road is cut through the dense growth of trees covering the river bottom. In the Spring before the trees leaf out one may easily count the last-year's nests among the branches. On April 10, 1941, I did so and counted among the trees beside or overhanging the road 36 nests, and in the bottom-land nearer the river 25 more. A total of 61 nests, medium and large, all hung diagonally on the branches and high in the trees, constituted the 1940 population of *annularis* wasps occupying less than twenty acres of this valley. A study of the positions of these 61 nests showed that 47 of them hung from the branches in such a way as to receive the maximum amount of sunlight. The size and excellence of the nests gave testimony that this spot in the blazing sun and beside the stream fulfilled the requirements of this species.

POLISTES VARIATUS.

This species was also found occupying an exclusive habitat, and that in the heart of St. Louis. I often refer to *variatus* in my manuscript notes as the "pots-and-pans" wasps, because of its habit of nesting in old kitchen utensils and cans on dump heaps in city lots; she likes to be near to the ground, so she makes the best use of any available shelter. The nesting site observed was a sloping hill-side along the River des Peres, used for years as a dump. Many of the items of rubbish, pots, tubs and pans, which rolled to the lower levels, often were chosen by the *variatus* as nesting sites. This hill-side in summer is covered with flowering weeds, offering nectar and caterpillars, and is very attractive to many insects. A large number of *Polistes* wasps are to be found on these plants during the summer, but for the last three years (since I began to watch for them) the only species I have seen there has been *P. variatus*. Often the pans and cans are partly covered with grass and weeds, but *variatus* seeks out an opening to them somewhere to build her nest inside. I have seen dozens of nests in these situations, and I am sure I did not examine a hundredth part of the likely places among the rubbish heaps in a single season. *Variatus* wasps are ground-loving creatures, occupyng rodent burrows in the prairies of Kansas, and even though there still remain several stout, woody plants upon which they could have placed their nests, all of the queens chose to build near the ground in metal shelters. This territory harbored no other species of *Polistes* but *variatus*, but only on the opposite side of the river, in the sheds belonging to a brick-yard, were several nests of another species, *P. pallipes*, but each species kept rigidly to its own territory, although it seemed easy, since the river was very narrow, for the two to intrude into each other's domain.

Current Entomological Literature

COMPILED BY THE EDITORIAL STAFF.

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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NOTICE

With the increasing demands of the present war times upon the volunteer services of all concerned with the work of the NEWS, and the limitations imposed upon business, it is impossible to foresee what the coming months may bring forth, but it is our earnest hope that a change of printers will be the least of our problems, and that our journal may continue to fill the place it has so long occupied in American Entomology.

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—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

I want to collect Rothschildia, agapema, gulfina and io moths and Texas butterflies for interested persons. Eula Frizzell, R 4 San Benito, Texas.

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, Woodbine Rd., Lakemont, 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.

Wanted—To buy, specimens of bees of the genus **Nomada**, any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

Arctic Lepidoptera especially **Noctuidae**—Wanted to hear from collectors who desire the Arctic Species. Have large collection. R. J. Fitch. Lloydminster, Saskatchewan, Canada,

Wanted—Tropical Lepidoptera and Insects. Also domestic species. Will exchange or buy specimens. M. A. Zappalorti, 253 Senator Street, Brooklyn, N. Y.

Wanted—Specimens of the genus Calendra (Sphenophorus) from North America. Will exchange Eastern U. S. Calendra or other Coleoptera for desired species. R. C. Casselberry, 302 Lincoln Avenue, Lansdowne, Penna.

Coccinellidae wanted from all parts of the world, especially South and Central America. Buy or exchange. G. H. Dicke, 1101 Argonne Drive, Baltimore, Md.

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