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The Directional Sound Waves of Oecanthus Nigricornis Argentinus or A Violinist Listens to an Insect

Millard Williams, Santa Monica, California

The second title much more nearly fits the writer than does the scientific description set forth above it. But possession of a trained musical ear has led to an interesting discovery regarding the abilities of what I first considered as a quite ordinary cricket-like wing singer. And hence a violin teacher finds himself writing along a line about which he knows comparatively little, except for the discovery itself. The reader will therefore bear with a lack of scientific terminology, and I must also ask that my frequent use of the first person be pardoned.

Some fifteen years ago, while living in Pacific Palisades (a section of Los Angeles just north of my present home city of Santa Monica), I took frequent walks over the vacant lots of the then sparsely settled district. These walks were taken in the evenings and thus led to my becoming interested in the songs of various insects. It was found that one could approach these little creatures quite closely, if care was taken not to snap twigs or otherwise set up vibrations which they could perceive, and it was further noted that they did not object to the brilliant beam of a three cell focusing-model flashlight. Thus ground crickets were observed, together with grasshoppers and so forth. But one type of insect in particular drew my attention because of its high pitched continuous song which seemed to vary constantly in volume as I moved about the bushes whereon they were perched. During the summer nights these insects sang with might and main, holding their wings straight up or even slightly forward of the vertical. The bright light did not bother them in the least which permitted close examination of very many of them.

As time went on the fact of the marked change in tonal intensity began to impress itself upon my attention, which led to my trying to find out what the cause of this might be. No apparent change seemed present in the wing motion, yet the tone volume increased and decreased constantly as I moved about watching any particular insect. Fortunately I did not credit these changes to the interference caused by stems or leaves of the bushes, particularly since they were in a kind of milk-weed with comparatively light foliage and rather delicate structure.

It occurred to me, one evening, to focus my light upon a certain insect while it was singing loudly but not moving on its perch, and then walk slowly about the bush and note what effect my motions would have on the tone volume. As I moved the tone became gradually less and less until it was almost inaudible, and then it began to increase until it reached its former volume, which was followed by another drop in loudness, and then a return to clear strong tone as I completed my circuit of the bush. I had taken great care to see that the insect had not moved the position of its body, and hence I felt sure that something connected with my own motions had brought about the marked change in tonal power of this wing singer. It was then only a matter of minutes before I found that if I stood either directly behind or before the line of the insect's body the tone would be loud and clear, but if I moved to either side it became less until it reached the least audible point in a line parallel with the plane of vibration of the wings. This effect I tested again and again with these insects, always finding the results the same.

Supposing that this fact of the peculiar ability of the little green cricket to send out highly directional sound waves perpendicular to the plane of its wings was well known to entomologists, I did nothing about the discovery for a number of years. But as the years continued to come and go it became apparent to me, particularly in reading the articles on insects published in the National Geographic Magazine, that no mention was made of this special sound effect. Then, after still more years had passed, I presented the matter to the National Geographic with a request that they place it in the hands of some one who would be in a position to check the data in order that the discovery, if such it actually was, might not go unrecorded. The magazine replied that it was forwarding my letter to Dr. Edward A. Chapin, Curator of the Division of Insects of the U. S. National Museum, and he wrote to me that he had not read any material wherein such a sound effect was discussed. He said that he wished to send my letter to Mr. James A. G. Rehn, Curator of the Department of Insects of the Academy of Natural Sciences of Philadelphia, and asked that I try to obtain a specimen of the insect in question and if possible repeat some of my observations of it.

Inspired by this request I went at once to the West Los Angeles Police Department! This appearing to be a quite necessary precaution for one preparing to become an admitted prowler after dark close to a section of the Pacific coast during war time. The Police read my letter from Dr. Chapin with much interest, and advised me to carry it with me, saying that if I did not try to run away I would probably not be shot, although they would have to send a patrol car for me if a call came in about my doings. Thus officially registered as an unofficial agent of the Smithsonian Institution in Washington, D. C., I drove over to Pacific Palisades and managed to locate some of the insects desired. It proved an easy matter to capture two of them, in spite of my rather unorthodox equipment consisting of a kitchen glass and a bit of cardboard, for both of the creatures elected to sit tight instead of hopping away as they can so easily do. I was able to re-check most carefully my observations of the sound wave—using it, in fact, to locate the insects since one needs only to find the point of greatest intensity and the singer will be seen in a light beam directed along the sound wave line. The marked variation in tonal intensity was even more pronounced than I had previously considered it to be, for moving my ear a very few inches from the point of greatest loudness brought a noticeable drop in volume.

I was, of course, most pleased to have all the data, including the specimens, sent to Mr. Rehn for his consideration, and I wish to express my sincere appreciation of the most careful study he has given the matter. This article is written at his request, and I trust that he will add to it his findings concerning the insect under discussion.

It is indeed a pleasure to me to feel that *Oecanthus nigricornis argentinus*—a name which I shall always spell in underlined form with due reverence for its immensity in the ears of the layman—is to receive recognition as possibly the first creature to send out highly directional sound waves, even as the spider has long since established its reputation as the first aviator.

Notes on Some North American Hesperiidae, with Two New Records for the United States (Lepidoptera, Rhopalocera)

By H. A. Freeman, Pharr, Texas

Urbanus eurycles (Latreille)

Henry Skinner recorded this species for the United States in 1901,[1] and since that time no authentic records have been made. Some doubt has existed as to the correct determination of Skinners' record, however this can now be put aside as *eurycles* is well established in the lower Rio Grande Valley of Texas. Mr. T. M. Dunkle, Saratoga, California, sent the writer a ♀ specimen collected at Brownsville, Texas, July, 1943. The writer collected 6 ♂♂, V–26–44, at Brownsville and 1 ♀ at Pharr, Hidalgo County, Texas, VIII–24–44. A number of other specimens were observed at Brownsville during May, flying in company with *simplicius* (Stoll). *Eurycles,* however prefers the shade, whereas *simplicius* flies in the bright sunshine.

[1] Ent. News, XII, 171, 1901.

Astraptes fulgerator (Walsh)

W. D. Field recorded the capture of a specimen of this species at Donna, Texas.[2] The writer caught two ♂♂ at Brownsville, Texas, one V–26–44 and another VIII–29–44. While looking over a collection of Lepidoptera made by Mrs. E. J. Kelso, a number of both sexes of this species were found, all having been caught in her yard at Pharr, Texas. Apparently this species is established in the Lower Rio Grande Valley of Texas as a number of the specimens observed were fresh.

Astraptes anaphus (Cramer)

The writer caught a fresh, ♀ *anaphus* at Pharr, Texas, IX–9–44. As far as the writer knows this is the first record of this species having been caught in the United States. Although this species is said to be common in Mexico the writer caught only one ♂ during two summers of collecting from Nuevo Laredo to Acapulco, so apparently it is rather local in its habits.

Lerodea tyrtaeus (Ploetz)

Since recording the capture of a ♀ *tyrtaeus* at West Columbia, Texas,[3] the writer has collected seven more specimens of this species, two ♂♂ at Brownsville, Texas, V–25–44 and two ♀♀, VIII–29–44; one ♂ and one ♀ at Pharr, Texas, IX–10–44 and another ♀, IX–17–44. This species has become established in Texas as five of the specimens taken were freshly emerged. This species prefers to fly in the shade of the tropical undergrowth so abundant along the lower Rio Grande River.

Perichares phocion dolores (Reakirt)

Mrs. E. J. Kelso caught a fresh, ♂ specimen of this species in her yard at Pharr, Hidalgo County, Texas, during November, 1940. As far as the writer can ascertain this is the first record of this species or any of its races having been collected in the United States. Apparently this specimen strayed across the border from Mexico, where it is more common.

[2] Journal of the Kansas Entomological Society, Vol. 13, April 1940; No. 2.

[3] Field & Laboratory, Vol. IX, May, 1941, No. 2.

An Observation of Ants Killing a Larva of the Japanese Beetle

By Joseph L. Williams, Lincoln University, Pennsylvania

At Lincoln University in Chester County, Pennsylvania, a nest of ground ants was disturbed while hoeing in the garden during the latter part of May. A short period was spent observing the workers frantically carrying their larvae and pupae to a place of safety. Shortly afterwards hoeing was resumed. A short distance from the ants a Japanese beetle larva was unearthed without injury.

In a few minutes several ants began attacking the beetle larva about its head. Later other ants were attracted to this struggle, until finally the body of the larva was almost covered with ants. This fight, however, did not cause all of the ants to stop and join in the attack, for hundreds of them were still busy carrying off their larvae and pupae to a place of safety.

The larva did not take this attack quietly. It fought back grimly with great vigor. Many ants were killed by its powerful mandibles. The ants, however, kept on coming. They attacked most severely around the larva's head. Two other groups were attacking it on the thorax and at its extreme posterior end. The larva, now being attacked from all sides, gave up fighting and tried to escape by burrowing into the soil. The ants prevented the larva from burrowing by crowding in and inflicting such severe pain that it was forced to fight for its life.

The beetle larva finally lost its balance and fell over on its back. It tried desperately to right its body. The ants prevented this by some piling small particles of dirt around the body. These particles formed a groove throughout the length of the larva's body. During this operation the other ants continued biting the larva.

Having the larva badly injured, the ants crowded in for the kill. The larva became so weak that it was unable to fight the ants. Movement of the beetle's body became weak and spasmodic, and finally ceased.

This struggle began at 11:45 A.M. and the larva was completely paralyzed or dead by 1:20 P.M. After the fight ended the ants began covering the larva's body with fine soil. This operation was observed until the body was half covered with soil. At this point the larva and specimens of the ants were collected and sent to the United States Museum for identification.

The larva was confirmed as that of the Japanese beetle (*Popillia japonica* Newn.). The ants were identified as *Tetramorium caespitum* L. The author is grateful to the officials of the Museum for this kindness.

An examination of the larva under the dissecting microscope revealed deep wounds just behind the head and on the thorax just above the legs. The femoral part of each leg on the right side had deep cavities eaten into it. The exoskeleton did not appear broken over the remainder of the body.

Midwinter Collecting of Lepidoptera in Michigan

JOHN H. NEWMAN, Detroit, Michigan

A strip of woods which extends for about two miles, from a short distance north of the town of Utica, Macomb County, Michigan (about twelve miles north of the city limits of Detroit) has yielded interesting and rare specimens of many kinds of insects. Owing to the proximity of the locality to the writer's home he has been able to collect moths there in every month of the year and presents the following notes on captures in January, February and early March in the hope that they might add in a small way to our knowledge of the habits and distribution of these moths and that they might interest other collectors. November and December captures are much more plentiful and the author has numerous species collected in these months which complete recorded captures for each month of the year. It has been my experience when seeking off-season or midwinter specimens one must, it seems, forget the calendar and pay more attention to the thermometer. The locality, known to old residents as the Devil's Hole, is a mixed hardwoods composed chiefly of oak, hickory, maple and elm with rather heavy concentrations of poplar and some basswood. The ground vegetation is luxuriant owing to the low humid situation. Hygrometer readings have always been at least 58%. The first attempt at winter collecting was on March 7, 1942, when the temperature rose to 54 degrees. In one and one-half hours collecting the following specimens were taken, at bait 1, *Graptolitha antennata;* 4, *Conistra morrisoni;* at light 38, *Homoglaea hircina.* The latter were interesting as no more than 3 or 4 had been taken in Michigan previously.

The second opportunity was offered on February 22, 1943, when the temperature rose to 57 degrees. That evening in the company of Mr. Sherman Moore the sugaring technique of more normal collecting nights was tried, but in vain. However on draping a light sheet over a bush 4 specimens of *Homoglaea hircina* were secured, although by this time the temperature had receded to 30 degrees and the ground and grass tufts crackled with ice crystals underfoot. One specimen of *Conistra morrisoni* was also taken off a small sapling apparently feeding on a moist exudate. We collected a little more than an hour.

The following night, February 23, 1943, was warmer; in the woods at 9:00 p.m. the temperature was 46 degrees, the humidity 60%, and in sharp contrast to the preceding night the sugar-beer bait was alive with moths, most trees attracting 18 to 24 specimens. By nine o'clock I had collected 63 examples and could easily have taken at least 150, although additional material would have been repetition. I collected about one and one-half hours until a steady rain began soon after nine o'clock. The evening's catch was determined as follows. At bait: 24, *Conistra morrisoni;* 26, *Conistra sidus;* 1, *Graptolitha bethunei;* 2, *Graptolitha laticinera;* 2, *Graptolitha antennata.* At light: 7, *Homoglaea hircina;* 1, *Xylena curvimacula.* The next day the temperature dropped to 34 and during the night it registered 12 degrees.

On January 25, 1944, the temperature rose to 61 degrees, a record of at least 71 years. Since the weather had been mild for some days previous I considered it a good time to see what could be collected in January. At 6:50 p.m. the first moth was taken at bait and at 8 o'clock after having taken 12 specimens the show seemed to be over, for the last two trips along the bait-line yielded nothing at all. The material collected was: 4, *Conistra morrisoni;* 5, *Conistra sidus;* 1, *Conistra indirecta;* 1, *Pyreferra graefiana;* 1, *Peronia ferrugana.* All were in excellent condition, fresh in color and wing fringes unimpaired. The following day, January 26, 1944, gave another temperature record, 64 degrees. I set my bait rather early and by 7:50 p.m., when things called a halt rather suddenly I had taken another 13 specimens. A light-sheet draped over a bush yielded nothing, *Homoglaea hircina* being conspicuous by its absence. The material collected was as follows. 4, *Conistra indirecta;* 5, *Conistra morrisoni;* 2, *Pyreferra graefiana;* 1, *Agnopteryx nigrinotella;* 1, *Agnopteryx pulvipennella.*

The collections may be tabulated as follows.

Phalaenidae Cuculliinae:

Conistra indirecta Wlk.—1, Jan. 25 and 4, Jan. 26, 1944.
C. morrisoni Grt.—4, Mar. 7, 1942; 1, Feb. 22 and 24, Feb. 23.
C. sidus Gn.—26, Feb. 23, 1943; 5, Jan. 26, 1944.
Pyreferra graefiana Grt.—1, Jan. 25, and 2, Jan. 26, 1944.
Graptolitha antennata Wlk.—1, Mar. 7, 1942; 2, Feb. 23, 1943.
G. bethunei G. and R.—1, Feb. 23, 1943.
G. laticinera Grt.—2, Feb. 23, 1943.
Homoglaea hircina Morr.—38, Mar. 7, 1942; 4, Feb. 22 and 7, Feb. 23, 1943.
Xylena curvimacula Morr.—1, Feb. 23, 1943.

Oecophoridae (det. Sherman Moore):

Agnopteryx nigrinotella Busck—1, Jan. 26, 1944.
A. pulvipennella Clem.—1, Jan. 26, 1944.

Tortricidae (det. Sherman Moore):

Peronea ferrugana Schiff.—1, Jan. 25, 1944.

Notes on Fleas (Siphonaptera) in Nebraska * †

By Doris B. Gates, Nebraska Agricultural Experiment Station

In view of the fact that increased attention is being given various parasites, particularly their connection with diseases (endemic and introduced) it seems desirable to publish a list of the Nebraska fleas now in the collection maintained by the University of Nebraska Department of Entomology. Since relatively little work has been done on ectoparasites in Nebraska, this list may be only a small percentage of the species present in the state. Towns are Nebraska towns; names of collectors are in parentheses.

Cediopsylla (Acediopsylla) inaequalis inaequalis (Baker) 1895. On *Sylvilagus auduboni baileyi* (Merriam), Harrisburg, May 7, 1942 (3 ♀♀, 2 ♂♂) (H. J. Martley). On *Cynomys ludovicianus ludovicianus* (Ord), Crawford, June, 1944 (♀) (H. J. Martley). On *Lepus townsendii campanius* Hollister, Crawford, June, 1944 (♂) (H. J. Martley). On *Sylvilagus* sp., Chadron, July 15, 1944 (5 ♀♀–3 ♂♂); Hay Springs, July 17, 1944 (4 ♀♀–2 ♂♂) (D. Gates). On *Sylvilagus floridanus similis* Nelson, Chadron, July 29, 1944 (♂) (H. J. Martley). Reported from Nebraska by Jellison (1940).

Cediopsylla (Cediopsylla) simplex (Baker) 1895. On rabbit, Roca, Oct. 31, 1915 (♀) (G. H. Kohls). On *Lepus townsendii campanius* Hollister, Lincoln, June 2, 1944, (♀) (D. Gates).

Ctenocephalides canis (Curtis) 1826; *Ctenocephalides felis* (Bouché) 1835.

Most specimens exhibit short rounded heads as in *C. canis*

* Keys by Fox (1940) and Ewing and Fox (1943) were followed in most determinations. These were supplemented by Baker's key (1904); for fleas from prairie dogs, Jellison's publication (1939), and for fleas from rabbits, Jellison's bulletin (1940) were used. Anthony's Field Book of North American Mammals (1928) was used for host identfiication.

† Published with the approval of the Director as Paper No. 356, Journal Series, Nebraska Agricultural Experiment Station.

and nearly equal ctenidial spines I and II as in *C. felis,* possibly indicating hybridization.

On cat, Lincoln, Nov. 16, 1895 (4 ♀♀, 2 ♂♂) (Coll. ?). On dog, Lincoln, July 24, 1890 (3 ♀♀, 3 ♂♂) (L. Bruner), May 2, 1944 (♂) (D. Gates). In house, Deweese, June 26, 1943 (♀, ♂) (Mary Homolka); Lincoln, June 26, 1942 (6 ♀♀, 16 ♂♂) (H. D. Tate). In basement of house, Beatrice, Aug. 7, 1943 (8 ♀♀) (Coll. ?). In house, Lincoln, June 11, 1944 (18 ♀♀, 3 ♂♂) (D. Gates); June 15, 1944 (8 ♀♀) (D. B. Whelan). On dog, Lincoln, June 23, 1944 (♀) (D. Gates); Geneva, June 28, 1944 (2 ♀♀, 1 ♂); Lincoln, August 7, 1944 (8 ♀♀) (Coll. ?).

Ctenophthalmus pseudagyrtes Baker 1904. On *Microtus pennsylvanicus* subsp., Lincoln, Febr. 9, 1944 (3 ♀♀, 7 ♂♂) (D. Gates). On mole, Lincoln, Sept. 27, 1901 (5 ♀♀, 5 ♂♂) (Coll. ?); May 30, 1894 (3 ♀♀, 2 ♂♂) (L. Bruner); Oct. 11, 1915 (♀) (Coll. ?); Date ? (4 ♀♀, 1 ♂). On *Rattus norvegicus* (Erxleben), Lincoln, Mar. 30, 1944 (♀) (D. Gates). On *Scalopus aquaticus machrinoides* Jackson, Lincoln, July, 1921 (♀) (M. H. Swenk); Dec. 30, 1943 (6 ♀♀, 1 ♂); Louisville, Dec. 2, 1943 (9 ♀♀, 6 ♂♂) (D. Gates); Hendley, Sept. 18, 1944 (2 ♀♀, 1 ♂) (L. M. Gates). Previously reported by Baker (1895) as *Typhlopsylla assimilis.*

Dactylopsylla (Foxella) ignota ignota (Baker) 1895. On *Geomys bursarius* (Shaw), Schuyler, May 8, 1943 (7 ♀♀, 2 ♂♂); Blair, March 8, 1943 (♀, ♂) Herman, March 8, 1943 (♀, ♂) (H. D. Tate). On *Geomys lutescens* (Merriam), Crawford, Sept. 26, 1943 (2 ♀♀, 1 ♂) (H. J. Martley). On pocket gopher, Lincoln, Oct. 22, 1931 (3 ♀♀, 1 ♂) (Coll. ?).

Hoplopsyllus (Euhoplopsyllus) affinis (Baker) 1904. On rabbit, Roca, Oct. 31, 1915 (♀) (G. H. Kohls). On *Sylvilagus floridanus mearnsi* (Allen), Lincoln, March 27, 1944 (5 ♀♀, 1 ♂); April 25, 1944 (2 ♀♀, 2 ♂♂); Union, May 7, 1944 (♀) (D. Gates). On *Lepus townsendii campanius* Hollister, Huntley, August 8, 1944 (1 ♀, 2 ♂♂) (D. Gates). Reported from Nebraska by Jellison (1940).

Nearctopsylla genalis genalis (Baker) 1904. On *Scalopus aquaticus machrinoides* Jackson, Louisville, Dec. 2, 1943 (2 ♀♀, 2 ♂♂) (D. Gates).

Nosopsylla fasciatus (Bosc) 1801. Questionably recorded on rat by Swingle (1911).

Orchopeas howardii (Baker) 1895. On fox squirrel, Lincoln, Jan. 19, 1901 (3 ♀♀) (M. A. Carriker, Jr.); Dec. 1, 1890 (3 ♀♀, 1 ♂); Nov. 28, 1890 (♀) (L. Bruner). From cage of *Didelphis virginiana virginiana* Kerr, May 12, 1944 (10 ♀♀, 9 ♂♂) (D. Gates). On *Sylvilagus floridanus mearnsi* (Allen), Malcolm, April 25, 1944 (♀) (D. Gates). Described by Baker (1895) from specimens collected in Nebraska.

Orchopeas leucopus (Baker) 1904. On field mouse nest, Lincoln, April 11, 1889 (♀) (L. Bruner). On meadow mouse, Lincoln, March 4, 1893 (♂) (L. Bruner). On *Microtus pennsylvanicus* subsp., Lincoln, Aug. 25, 1942 (2 ♀♀, 1 ♂) (D. B. Whelan); Febr. 9, 1944 (3 ♀♀, 2 ♂♂); Febr. 10, 1944 (3 ♀♀, 3 ♂♂); March 4, 1944 (14 ♀♀, 6 ♂♂); March 21, 1944 (1 ♀, 2 ♀♀); Union, May 7, 1944 (3 ♀♀) (D. Gates). On *Mus musculus musculus* Linnaeus, Lincoln, March 21, 1944 (♀) (D. Gates). On *Peromyscus* sp., Lincoln, Febr. 8, 1944 (2 ♀♀); Febr. 28, 1944 (1 ♀, 5 ♂♂); March 11, 1944 (1 ♀, 2 ♂♂); March 23, 1944 (4 ♀♀, 2 ♂♂) (D. Gates).

Oropsylla (*Opisocrostis*) *bruneri* (Baker) 1895 (Marked "type"). On *Citellus franklini* (Sabine), Lincoln, Sept. 30, 1890 (♀) (L. Bruner). Described by Baker (1895) from specimens collected in Nebraska.

Oropsylla (*Opisocrostis*) *hirsuta* (Baker) 1895. On *Cynomys ludovicianus ludovicianus* (Ord), Harrisburg, May 12, 1942 (2 ♀♀, 2 ♂♂) (H. J. Martley); South central Cherry County, Oct. 16, 1943 (2 ♀♀, 2 ♂♂); Oct. 17, 1943 (15 ♂♂) (D. Gates); Chadron, July 15, 1944 (7 ♀♀, 5 ♂♂); Huntley, August 29, 1944 (2 ♀♀, 4 ♂♂) (D. Gates). On *Lepus townsendii campanius* Hollister, Huntley, August 29, 1944 (♂) (D. Gates).

Oropsylla (*Oropsylla*) sp. On *Callospermophilus* sp. Chadron, July 15, 1944 (♀) (D. Gates). On chipmunk, Chadron, July 15, 1944 (♀) (D. Gates).

Pulex irritans irritans Linnaeus 1758. House, Schuyler, Date ? (1 ♀, 2 ♂♂) (G. M. Byrne); Stromsburg, March 22, 1933 (2 ♂♂) (A. Lind). On *Canis nebracensis nebracensis* Merriam, Belmont, June 9, 1943 (2 ♀♀); Crawford, April 23, 1943 (2 ♀♀, 2 ♂♂) (H. J. Martley); 4–O Ranch, South central Cherry County, Nov. 17, 1943 (♀, ♂) (E. P. Ericksen); Hay Springs, June, 1944, (3 ♀♀) (H. J. Martley). Previously reported by Trembley and Bishopp (1940).

Xenophylla cheopis (Rothschild) 1903. On *Rattus norvegicus* (Erxleben), Lincoln, Dec. 28, 1943 (♂, ♀); Hastings, May 13, 1944 (4 ♀♀) (D. Gates). Reported by Gates (1944); questionably recorded by Swingle (1911).

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Taxonomic Categories and Population Genetics

By Alfred E. Emerson, Department of Zoology,
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Species constitute the primary taxonomic units and many definitions have been suggested. A species is an evolved or evolving, genetically distinctive, reproductively isolated, natural population. All these criteria are necessary and no others would seem to be essential.

Species are dynamic entities rather than static, so evolutionary characterization is necessary in a definition. Demarcation is sometimes arbitrary when transitional stages are encountered, but true evolutionary gradations between living sexual species are not very common because most ancient continuities have become discontinuous at present.

Genetic distinction would seem to be the common denominator for all valid qualitative or quantitative species characters including cytological, physiological, ecological, embryological, behavioristic and morphological characters. Taxonomists, of course, can seldom experimentally investigate the genetics of their material. However, heredity may be inferred through germinal continuity in populations and the genetic basis of similar characters in investigated organisms. The taxonomist also often observes hybrids and intergrading populations which give some genetic information.

Reproductive isolation may result from psychological, physiological, genetic, chronological, spatial, geographical or ecological separation, or from selection pressure against intermediates and hybrids. The essential point is the lack of chromosome or gene exchange. If no genetic distinction differentiates isolated populations they are treated as a single species as in the case of the Pacific coast and Appalachian populations of the roach, *Cryptocercus punctulatus* Scudder.

Finally, the species is a population. Different populations may differ in their genes or chromosomes or in percentage incidence of genes or gene arrangements. Wright (Huxley, 1940, p. 164) has stated that the elementary evolutionary process is change of gene frequency rather than mutation. Populations always have characteristic geographical patterns, but geography need not be incorporated separately in the definition. Taxonomists have quite consistently used the individual as a sample of a population which shares basic genetic characteristics. Populations have real biological attributes which are not merely the statistical summation of the individuals, just as individual organisms have properties which transcend the cellular units of which they are composed.

Groups of genetically related species constitute higher categories with separation based largely on extinction of intermediate species or groups of species. If all related species have become extinct leaving a single survivor, monotypic higher categories are recognized. Thus *Mastotermes darwiniensis* Froggatt is the sole surviving species of termite in the genus and the only living genus in the family Mastotermitidae.

Taxonomic subdivisions of the species are based upon genetic distinction of the natural populations and partial reproductive isolation. Often intermediate populations are found on the geographical or ecological borders of subspecies. On islands, occasional sharing of hereditary characteristics through interbreeding with stray individuals may result in subspecific status even though the borders of the populations are sharp. Ecological populations with genetic distinctions and partial reproductive isolation are called *ecotypes* (Turesson, 1922) and are in reality ecological subspecies or races.

Local populations with genetic characteristics are often given a status below the rank of subspecies. There is no established basis for the separation of subspecies and races. If genetic differences follow uniform gradients from one population to another, delimitation is arbitrary. If the gradients are not uniform or are discontinuous, delimitation is not arbitrary. Huxley (1939) has introduced the term *cline* for quantitative variations connecting populations and *stepped clines* within a species may indicate the genetic connections between subspecies or races. Dobzhansky and Epling (1944) distinguish a multitude of chromosomal races of *Drosophila pseudoobscura* Frolova with adequate geographical rather than Latin names.

Taxonomists commonly use morphological characters for distinguishing various taxonomic categories. Morphology is the visible result of complex physiological effects upon patterns of growth. Probably structures are the end effects of long series of enzyme chain reactions on protoplasmic substrates. Physiological effects upon the morphological characters used by the vast majority of taxonomists are initiated by genes or chromosomal arrangements. Genes may be thought of as autocatalytic enzymes which may activate or inhibit the development of other enzymes. Taxonomic characters are commonly the result of the action of many genes (multiple factor or polygenic characters). Such characters may be detected by intermediates in the first hybrid generation and a wide quantitative variation rather than simple segregation in the second hybrid generation. Of course the genetic units would exhibit Mendelian segregation, but the interaction of many units is likely to show apparent blending of characters. Very rarely taxonomic characters exhibit simple Mendelian ratios in the second hybrid generation.

Forms and varieties caused by environmental factors and not by genetic differences have often received mistaken taxonomic recognition. The term *ecophene* seems adequate for such forms (Turesson, 1922). The capacity of an organism to react to the enviroment may have a genetic basis, but if hereditary constitution is not the cause of the difference, then taxonomic distinction is not valid.

Many authorities do not include asexual, parthenogenetic, self-fertilizing or closely inbreeding populations in the species concept. Populations of similar genotypes could still be regarded as species according to my definition. However, if slight genetic modifications result in distinctive populations, we are faced with an array of reproductively isolated *strains* such as occur among the bacteria and species nomenclature presents many difficulties.

With this background of principles, let us attempt to analyze particular cases. Valentine (1932) has separated subspecies of cave beetles (*Pseudanophthalmus*) from isolated caves. Because of the indicated reproductive isolation, such named subspecies should be placed in species categories. The so-called races A and B of *Drosophila pseudoobscura* Frolova are quite surely reproductively isolated in nature. Adequate morphological differences are not sufficient for determination of pinned specimens. However, the salivary gland chromosomes indicate considerable genetic distinction between the populations. Dobzhansky and Epling (1944) have described race B as a new species, *Drosophila persimilis*. Such a taxonomic assignment seems thoroughly justified. Bates (1940) has, in conformity to the foregoing principles, raised morphologically close populations of mosquitoes to species status which were formerly incorrectly included under *Anopheles maculipennis*. These populations are reproductively isolated and have genetic distinctions exhibited in the color pattern of the egg floats and in other slight characters of the larvae and adults. Fulton (1933) refers to "subspecies" of the cricket *Nemobius fasciatus* which can be distinguished by slight morphological characters, color, call, and habitat. Although his experiments show that these "subspecies" may interbreed in the laboratory, there seems to be no indication of interbreeding in nature. In spite of the small and often quantitative distinctions, these so-called subspecies are best classified as species. Holmgren (1913) described some striking termite soldiers from the oriental region and assigned them to a new genus and species, *Gnathotermes Aurivillii*. Kemner (1925) showed that these modified soldiers were parasitized individuals from colonies of *Macrotermes malaccensis* (Haviland) and correctly relegated Holmgren's genus and species to synonymy in spite of the great morphological differences. I have separated two species of termites, *Nasutitermes guayanae* (Holmgren) and *N. similis* Emerson (1935), on the basis of different species of termitophilous beetles living in the nests and overlapping quantitative morphological characters. Dwarf soldiers from incipient colonies and intercastes between soldiers and workers show greater size and morphological differentiation within a species than the taxonomic distinction between the species, but great non-heritable differences have no taxonomic implication while slight heritable differences may. Polymorphic, seasonal, or migratory forms without genetic and population distinction within the same species of termite, ant, butterfly, aphid, grasshopper, or Army Worm do not deserve taxonomic status.

Domestic varieties or mutations in laboratory stocks are not natural populations. They may be referred to under the taxonomic name of the *coenospecies* which Turesson (1922) defined as the sumtotal of possible combinations in a genotype compound as seen particularly through cultivation under artificial conditions.

Although taxonomic names should not be given to non-taxonomic forms, such forms may be discovered by taxonomists and often have biological importance (Faure, 1932, 1943). Inasmuch as Latin names have been firmly established for taxonomic categories and are governed by international rules of nomenclature, confusion may be avoided by the use of other nomenclatural systems for non-taxonomic categories.

In a great many cases the data are insufficient to make more than a tentative guess concerning the genetics, reproductive isolation, or population characteristics of a given specimen or specimens. In such instances, one is justified in giving a name on the basis of a working hypothesis until further information is gathered. The tentative taxonomic assignment may subsequently be either reaffirmed, raised to higher rank, placed in a lower category, or relegated to synonymy. The accepted rules of nomenclature quite adequately facilitate such changes without breaking bibliographical continuity. All sciences propose working hypotheses which with increasing information may later become untenable. Taxonomy advances through the same methodology.

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Harrison Garman

Harrison Garman, State Entomologist and Botanist of Kentucky from 1889 to 1929, died at Lexington, in that State, August 7, 1944, after an illness of six years, aged nearly eighty-eight. His name originally was William Harrison Garman, but the William was dropped about 1881. He was born at Lena, Illinois, December 27, 1856, son of Benjamin and Sarah A. (Griffith) Garman. Later the family moved to Normal, Illinois, where he attended the State Normal School and came in contact with Stephen A. Forbes and his associates. In 1881–82 he was at Johns Hopkins University under Prof. W. K. Brooks, whence he and B. P. Colton published his first paper, on the development of a sea-urchin, *Arbacia punctulata* (1882).

In 1883 he became assistant entomologist to Forbes and remained in Illinois until 1889. Results of his activity here, partly as Associate Professor of Zoology at the University, were papers on injurious insects, the anatomy and histology of a new earthworm (1888), animals of the Mississippi bottoms near Quincy (1889), Illinois reptiles and amphibians (1890, 1892) and the mouth-parts of Thysanoptera (1890).

In 1889 began his official services in Kentucky noted in the first sentence above, added to which, in 1912, was the professorship of entomology and zoology at the University of Kentucky. In the annual reports, bulletins, circulars and newspaper bulletins of the Kentucky Agricultural Experiment Station are 106 papers by Garman, of which 51 deal with entomology, 39 with botany, 9 with entomology and botany, 3 with entomology and other zoology, 2 with other zoology, 1 with botany and zoology, 1 with horticulture; these chiefly on the economic side. In the same period he published elsewhere not fewer than 47 papers (26 entomology, 8 botany, 1 entomology and botany, 10 other zoology, 2 horticulture). This group of entomological papers deals with insects from Kentucky caves (1891, 1892, 1893, 1894), life histories of two species of Coleoptera (1891), a gland of the cave cricket, *Hadenoecus subterraneus* (1893), the head and mouth-parts of Thysanoptera (1896), cited by Sharp (Cambridge Nat. Hist. vi: 528, 1899) and by Imms (Textbook of Entom., 1st edit.; 323, 327, 1924), the setae of lepidopterous larvae (1921) and Odonata of Kentucky (1924), as well as some on economic topics. His other zoological contributions treated of vertebrates (1894), crustaceans (1924) and fresh-water medusae (1916, 1922, 1924) of Kentucky, and the brain and pineal structures of the paddle-fish, *Polyodon folium* (1896).

Subsequent to his retirement in 1929, he published two papers: on the odonate *Archilestes* in Kentucky (1932) and on collecting insects in a sink hole cave (1937). He was the first to find *Archilestes* in the south-eastern States, both imago and larva. The Archilestes paper and that of 1924 on Odonata of Kentucky appeared in Entomological News.

He married Rosalie Miller, of Hatfield, Massachusetts, in 1883, and is survived by two sons, Frederick, of Juniata, Pennsylvania, and Philip, of Hamden, Connecticut, the latter likewise known for work in entomology. An older brother of Harrison Garman was Samuel Garman (1843–1927), a special pupil of Louis Agassiz and long assistant in herpetology and ichthyology at the Museum of Comparative Zoology, Harvard College.

Miss Mary L. Didlake, associate entomologist and botanist of the Kentucky Agricultural Experiment Station, has kindly furnished the following appreciation.

"Dr. Harrison Garman was out-standing as an entomologist, not a specialist in any one group, but having a surprisingly full knowledge of many. He was also an old-fashioned naturalist, studying life in all forms and in all relationships, knew wild flowers and trees, bacteria, fungi, protozoa, crustacea, fishes, frogs, snakes and birds as well as insects. His scientific work, as published in numerous bulletins and articles in journals, is widely recognized as conscientious and accurate.

"He was a good teacher, holding the interest and the respect of his students, rather strict and sparing of praise, his most enthusiastic commendation being, 'Well that's not so bad.'

"For many years, as State Entomologist, he personally inspected nurseries, gaining first-hand knowledge of the flora and fauna and of the occurrence of insect pest and fungous diseases and adding specimens to the herbarium and insect collection. Roads were bad in remote districts, but he was untiring in his zeal and always as careful in the expenditure of State funds as of his own."

Philip P. Calvert

A Word from a Famous Collector, Orazio Querci

I have just recently received from the Academy a letter from which I quote:

"We always remember the valuable help which we had from you, and the proof of great confidence when you gave me the keys to your wonderful library, which we kept for two years. Amongst these books I had the happiest days of my life, and considerably increased my knowledge.

"I received your last letters from Greece; after the situation of the world had become chaotic.

"My wife is still an indefatigable collector. My daughter (Erilda Romei) went with her husband to Somaliland to study the insect life in an equatorial zone. She has returned and is now an interpreter in an Allied Command. It is now one year since we have heard from Dr. Romei who remained in Africa.

"My granddaughter Lycaena, whom you knew as a little girl, is now a Doctor in Natural Sciences. She speaks English, French, Spanish and a little Greek. She also speaks American which she learned while playing with the children in the magnificent Quaker's College." (Friends' school.)

I met Mr. Querci in Florence, Italy, many years ago, and established a connection that lasted till 1936, during which time he sent me one of the best collections of European butterflies in this country. After his return to Italy he collected extensively in Spain and Portugal, and wrote up the Butterflies of the Peninsula.

The last I heard from him was in 1936 when Lycaena, now a tall girl, sent me her photograph, with an alpinestock, collecting in the mountains of Salonica, Greece. That they have been out of touch for a long time is indicated by their inquiry as to my old friends, Mengel, Schaus and Benjamin, all passed on.

Some account of his work was published by Jean Gunder in the Ent. News, Vol. 41, p. 292, 1930, and on pl. 28, his interesting family, in Cuba. His address now is Via Aterno 15, Roma, Italia.

Our mutual friends will be delighted to learn that this interesting family has survived. R. C. WILLLIAMS, JR.

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 and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Anon.—Random notes on winter collecting. [Turtox News] 22: 159–60. **Chapin, E. A. et al.**—Insects and mites. Biological results of the last cruise of the Carnegie. [Sci. Res. Cruise VII of Carnegie] Biol. 4: 91–92. (Some Diptera by Aldrich & Stone) (S). **Falkenström, Gustaf.**—(Obituary.) [4] 76: 211. **Fletcher, F. C.**—Some different kinds of insect collections. [118] 18: 14–15. **Garman, Harrison.** 1856–1944.—(Obituary.) [12] 37: 720–21, photo. **Grensted, L. W.**—Formation and gender of generic names. [8] 80: 229–333. **Hemming, F.**—Recent and forthcoming publications of the International Commission on Zoological Nomenclature. [93] 113 B: 176–77. **William Williams Henderson.** 1879–1944.—(Obituary.) [Farm and Home Sci. Utah Ag. Ex. Sta.] 5 (4): 4, 6. **Jordan, K.**—The status and functions of the International Commission on Zoological Nomenclature and the present state of its work. [6] 52: 385–87. **Linsley, E. G.**—Natural sources, habitats and reservoirs of insects associated with stored food products. [Hilgardia] 16: 187–224. **Popham, E. J.**—Study of the changes in an aquatic insect population, using minnows as predators. [93] 114 B: 74–81. **Rau, P.**—Entomological trivialities and personalities. [19] 39: 119–21. **Sanderson, E. Dwight.**—(Obituary.) [12] 37: 721. **Stern, C.**—Study of race. (Rev. of contributions to genetics, etc. of Drosophila pseudoobscura. [Jour. Heredity] 35: 314–16. **Torre-Bueno, J. R.**—Why not eat insects. [19] 39: 122–31. Why amateurs. [19] 39: 137. **Townsend, Charles H. T.**—Obituary note. [105] 15: 236–37, port. **Walkden & Wilbur.**—Insects and other arthropods collected in pasture grasses, waste lands and forage crops, Manhattan, Kans. [103] 17: 128–43.

ANATOMY, PHYSIOLOGY, MEDICAL—Arrow, G. J.—Reduction of segmentation in the Coleoptera. [107] 19: 107–8. **Brand, Th. von.**—Occurrence of anaerobiosis among invertebrates. A review. [Biodynamica] 4 (92): 185–328. **Bridges & Brehme.**—Mutants of Drosophila melanogaster. [Carnegie Inst. Wash. Pub.] no. 552, 252 pp. ill. **Carlson, Cassil & Yothers.**—Ether-extract content of codling moth cocoons. [12] 37: 711. **Crombie, A. C.**—Effect of crowding upon the natality of grain-infesting insects. [93] 113 B: 77–98. **Davidson, J.**—On the growth of insect populations with successive generations. [Australian J. Exp. Biol. & Med. Sci.] 22: 95–103, ill. **Dobzhansky & Epling.**—Contributions to the genetics, taxonomy, and ecology of Drosophila pseudoobscura and its relatives. [Carnegie Inst. Wash. Pub.] no. 554, 183 pp. **Fennah, R. G.**—Morphology of the tegimina and wings of Fulgoridae. [10] 46: 185–99, ill. **Flanders, S. E.**—Olfactory responses of parasitic hymenoptera in relation to their mass production. [12] 37: 711–12. **Ford, E. B.**—Studies on the chemistry of pigments in the Lepidoptera, with reference to their bearing on systematics. 3. Red pigments of the Papilionidae. [107] 19: 92–106. **Henson, H.**—Development of the malpighian tubules of Blatta orientalis (Orth.). [107] 19: 73–91, ill. **Keilin, D.**—Respiratory systems and respiratory adaptations in larvae and pupae of Diptera. [116] 36: 1–66, ill. **Richards, A. G., Jr.**—The structure of living insect nerves and nerve sheaths as deduced from the optical properties. [6] 52: 285–310, ill. **Roy & Ghosh.**—Studies on the population of head-lice, Pediculus humanus var. capitis. [116] 36: 69–72. **Snodgrass, R. E.**—Feeding apparatus of biting and sucking insects affecting man and animals. [60] 104 (7): 113 pp., ill. **Xavier da Cunhia, A.**—O desenvolvimento das glandulas e sexualis na Ephestia kuehniella. [Mem. e Estud. Mus. Zool. Univ. Coimbra] 131: 29 pp., ill.

ARACHNIDA AND MYRIOPODA—Cooley, R. A.—Ixodes ozarkus n. sp. and Ornithodoros aquilae n. sp. with notes on O. talaje and O. kelleyi. [17] 30: 287–94, ill. **Hoffmann, A.**—Periglischrus vargasi n. sp. (Acarina: Parasitid). [56] 5: 91–96, ill. **Robinson, G. G.**—More cases of abnormal development in the argasid tick Ornithodorus moubata. [116] 36: 95–97, ill. **Baker & Balock.**—Mites of the family Bdellidae. [10] 46: 176–82, ill. (*). **Turk, F. A.**—Myriapoda (Chilopoda and Diplopoda) from Cornwall, with notes and descriptions of forms new to the British fauna. [75] (11) 71: 532–51 (*). **Lunn, H. F.**—Observations on the Sarcoptes of man. [116] 36: 67–68, ill.

SMALLER ORDERS AND ORTHOPTERA—Carriker, M. A.—Studies in Neotropical Mallophaga III. [50] 95: 81–233, ill. (*). **Crawford, J. C.**—New Sericothrips from Brazil. [10] 46: 200–01. **Rau, P.**—Note on the period of incubation of the eggs of the cockroach Blatella germanica. [4] 76: 212. **Roy & Ghosh.**—(See under medical.) **Soukup, J.**—Los tisanopteros Peruanos. [66] 8: 57–66. **Tuthill, L. D.**—Contributions to the knowledge of the Psyllidae of Mexico. [103] 17: 143–59, cont. (*). **Whitehead & Miner.**—Biology and control of the camel cricket. [12] 37: 573–81, ill. **Wygodzinsky, P.**—Contribuicao ao conhecimento da familia Machilidae do Mexico, do Brasil e Argentina (Thysanura). [105] 15: 54–96 (*).

HEMIPTERA—Caldwell, J. S.—Psyllidae from tropical and semitropical America. [6] 52: 335–41, ill. (*). Tribe Cenchreini with special reference to the Cenchrea complex. [19] 39: 99–110, ill. (*). Pintalia with special reference to Mexico (Cixiid). [55] 20: 154–60, ill. (*). **Carvalho, J. C. M.**—Mirideos neotropicais: Revisao do gen. Derophthalma e descr. do um gen. n. fauna chilena. Sobre os gen. Jobertus, Parachius e Pliniella. [105] 15: 144–53, ill.; 162–71. **Carvalho & Drake.**—Knightonia n. n. for Knightiella (Mirid). [105] 15: 239. **De Long, D. M.**—Four n. sps. of Cloanthanus and Tumeus from Mexico and Brazil (Cicadellid). [55] 20: 129–31. **Essig, E. O.**—New aphid on guayule and notes on other sps. of Cerosipha. [Hilgardia] 16: 177–84. **Fennah, R. G.**—(See under anatomy.) **Hawboldt, L. S.**—History of spread of the beech scale, Cryptococcus bagi, an insect introduced into the maritime provinces. [Academy Nat. Bull. Nat. Hist. Soc. N. Brunswick] 137–46. **Metcalf & Bruner.**—Cercopidae of Cuba.

[80] 109–28, ill. (*). **Oman & Beamer.**—Some n. sps. of Cuerna (Cicadellid). [103] 17: 121–28. **Smith, R. H.**—Bionomics and control of the nigra scale, Saissetia nigra. [Hilgardia] 16: 225–88. **Holedo Piza, S. de, Jr.**—Duas novas esp. de ploiariideos brasilleiros. [105] 15: 135–38, ill. **Torre-Bueno, J. R.**—Comment on Solabea Bergroth. [19] 39: 114–16 (k). New records of Oncopeltus. [19] 39: 135–36 (*). **Wygodzinsky, P.**—Notas sobre a biologia e o desenvolvimento de Macrocephalus notatus (Phymatid). [105] 15: 139–43, 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 longest in) are discontinued.

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.

Coleoptera—Will exchange mounted and labeled specimens from North America. All groups except Rhynchophora. G. P. Mackenzie, 1284 Sherwood Road, San Marino, Calif.

Lepidoptera—Should like to hear from collectors interested in species from central Alberta and Saskatchewan. Would collect other Orders. Paul F. Bruggemann, R. R. 1, Furness, Sask., Canada.

Lampyridae of U. S. and Canada wanted from the South and West, especially Photinus and Pyractomena for revisional study. Buy or exchange. J. W. Green, R. D. 2, Easton, Pa.

Lepidoptera—Would like to exchange Californian butterflies, noctuids, geometrids, etc. for eastern specimens. Glenn E. Pollard, 500 Clark Drive, San Mateo, Calif.

Lepidoptera—Am still collecting here and have only fine specimens for exchange. H. W. Eustis, Woodbine Rd., Augusta, Ga.

Insects

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PAPILIO

ENTOMOLOGICAL NEWS

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Papilio aristodemus ponceana Schaus (Lepidoptera: Papilionidae)

W. F. Henderson,* Chicago, Illinois

In the winter of 1938 the writer spent a very pleasant hour looking over the collection of Mr. and Mrs. C. N. Grimshawe in Miami, Florida. Mrs. Grimshawe showed a series of *Papilio aristodemus ponceana* Schaus and told a very interesting story about this sub-species. Since the destructive hurricane of 1935, no *ponceanas* had been seen up to the time of this visit and it was feared that this sub-species might be extinct.

Later the writer had an opportunity to acquire five specimens of *ponceana* and it occurred to him that it would be interesting to assemble the known data concerning this sub-species. Correspondence soon revealed a most fortunate fact, viz., that *ponceana* had been seen and taken on three occasions since 1939. Evidently it is not extinct as was once feared, although it does seem to be very rare.

Papillo ponceana was first taken by William Schaus in May 1898 near Miami. He described it in 1911 (1), indicating that it is allied to *P. aristodemus* Esper and to *P. temenes* Godart. The types are in the U. S. National Museum. *Papilio aristodemus* was first described by Esper in 1794 (2). *P. temenes* was described in 1819 by Godart (3) who makes the very general statement, "It is found in the Antilles and in North America."

In 1917, Barnes and McDunnough (4) listed this species as follows:

* Present address, 9833 S. Hamilton Avenue, Chicago, Illinois.

12 *aristodemus* Esper
a *ponceana* Schaus

Barnes and Benjamin (5) listed it in the same way, as No. 13 in their diurnal list in 1926. This relationship has been continued, although in 1930, Holland (6) argued that *ponceana* should be considered a distinct and true species. He listed it and figured it as *ponceanus* in the second edition of his Butterfly Book in 1931 (7).

Bates (8) answered Holland's statement in 1934, apparently preferring to accept the sub-specific status as set forth in Barnes' check list. When McDunnough (9) published a revision of the check list in 1938, he again placed *ponceana* as a sub-species of *aristodemus*. In all the collections contacted where specimens of *ponceana* occur, this status seems to be the accepted one.

An article describing the finding of *ponceana* and also its early stages was written by Mrs. F. M. Grimshawe in Nature Magazine (10) in December 1940. Of all the known specimens of *ponceana* (24 to date), seventeen of these have been either collected or reared by the Grimshawes. They deserve much credit for their contribution to our knowledge of this sub-species.

The writer has assembled all of the data he has been able to find in regard to *ponceana*. There may be other specimens, now unknown, in other collections, and if this is true, the data concerning these should be added. The accompanying table sets forth the data collected.

Summary

Papilio aristodemus ponceana Schaus is not extinct. Twenty-four specimens have been accounted for in American collections. The available data concerning *ponceana* have been tabulated.

The author is grateful to all of those who have cooperated with him in assembling these data.

No.	Sex	Collecting Data			Present Possessor
		Locality	Date	Collector	
1	♂	Miami, Florida	May 1898	W. Schaus	Type; U. S. National Museum
2	♀	Miami, Florida	May 1898	W. Schaus	Type; U. S. National Museum
3	♀	Cuba (Error; prob. Fla.)	1899–1900	W. Schaus *	Amer. Museum Nat. Hist., N. Y.
4	♀	Cocoanut Grove, Fla.	5–31–24	G. B. Fairchild	Mus. Compar. Zool., Cambridge, Mass.
5	♀	Lower Matecombe Key, Fla.	5–19–35	C. N. Grimshawe	Amer. Museum Nat. Hist., N. Y.
6	♀	Lower Matecombe Key, Fla.	5–26–35	C. N. Grimshawe	Amer. Museum Nat. Hist., N. Y.
7	♂	Lower Matecombe Key, Fla.	6–1–35	C. N. Grimshawe	Amer. Museum Nat. Hist., N. Y.
8	♂	Lower Matecombe Key, Fla.	6–1–35	C. N. Grimshawe	Amer. Museum Nat. Hist., N. Y.
9	♀	Lower Matecombe Key, Fla.	6–1–35	C. N. Grimshawe	Amer. Museum Nat. Hist., N. Y.
10	♂	Lower Matecombe Key, Fla.	6–2–35	C. N. Grimshawe	W. F. Henderson, Chicago, Ill.
11	♀	Lower Matecombe Key, Fla.	6–9–35	C. N. Grimshawe	Amer. Museum Nat. Hist., N. Y.
12	♀	Lower Matecombe Key, Fla.	6–9–35	C. N. Grimshawe	Amer. Museum Nat. Hist., N. Y.
13	♂	Lower Matecombe Key, Fla.	6–10–35	C. N. Grimshawe	W. F. Henderson, Chicago, Ill.
14	♀	Lower Matecombe Key, Fla.	6–13–35	C. N. Grimshawe	W. F. Henderson, Chicago, Ill.
15	♂	Lower Matecombe Key, Fla.	6–18–35	C. N. Grimshawe	Stallings-Turner Coll., Caldwell, Kas.
16	♂	Lower Matecombe Key, Fla.	6–23–35	C. N. Grimshawe	Amer. Museum Nat. Hist., N. Y.
17	♀	Lower Matecombe Key, Fla.	8–11–35	C. N. Grimshawe	Amer. Museum Nat. Hist., N. Y.
18	♂	Lower Matecombe Key Bred	4–13–36	C. N. Grimshawe	W. F. Henderson, Chicago, Ill.
19	♀	Lower Matecombe Key Bred	5–13–36	C. N. Grimshawe	Amer. Museum Nat. Hist., N. Y.
20	♀	Lower Matecombe Key Bred	6–1–36	C. N. Grimshawe	Stallings-Turner Coll., Caldwell, Kas.
21	♀	Lower Matecombe Key Bred	5–15–37	C. N. Grimshawe	W. F. Henderson, Chicago, Ill.
22	♂	Key Largo, Florida	6–4–40	D. F. Berry	D. F. Berry, Orlando, Fla.
23	♀	Key Largo, Florida	6–5–40	Mrs. D. F. Berry	C. F. Dos Passos, Mendham, N. J.
24	—	Matheson Hammock, Fla.	1943	R. Chermock	F. H. Chermock, Butler, Pa.

* This specimen bears a datum "Jacob Doll," but Mr. W. P. Comstock of the American Museum of Nat Hist. advises that it was probably taken by Schaus, near Miami.

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The Feeding Habits of Uranotaenia lowii Theobald (Diptera: Culicidae)

Charles L. Remington,[1] Medical Department, Army of the United States

The host preferences of mosquitoes important to man as carriers of pathogenic organisms have long been investigated. However, several large genera and parts of others are not known to include disease vectors, and little dependable information on these mosquitoes exists. Instead, many casual notes have appeared, containing presumed or suspected facts. The genus *Uranotaenia* L.-Arr. stands out among the neglected groups, and the present paper deals with a species of that genus.

[1] I am grateful to Mr. M. Graham Netting of the Carnegie Museum for identification of the amphibians mentioned in this paper; to Mr. Robert Alrutz for obtaining these determinations from Mr. Netting and for records of *U. lowii* biting in the field; and to my many entomological associates for helpful suggestions during the preparation of the manuscript.

Over twenty species of *Uranotaenia* are known from British India, and yet the knowledge of their bionomics was summarized by Barraud (1934) thus: "Little is known of the habits of the adults; they do not appear to attack man to any extent." Edwards (1941) in his classic study of African culicines discusses 25 species and 5 varieties of *Uranotaenia.* He states: "Little is known of the habits of adult members of this genus. None of the African species has been observed to suck blood . . ." A clue to the feeding habits of one species is found by Davis and Philip (1931). In Africa precipitin tests were made with 66 *U. annulata* Theob. with antihuman and anti-chicken sera. All were negative for human blood, and 7 were positive for chicken blood. These writers state that: "The *Uranotaenia* were poorly blooded on the whole; the samples were small and considerably altered in most cases." This host indication for *U. annulata* awaits confirmation by observations.

Uranotaenia sapphirina (O.-S.) and *U. lowii* Theob. are the representatives of the genus in the eastern half of the United States. In correspondence, Mr. G. H. Bradley has informed me: "I have observed both of these species to alight on man and move around as if preparing to bite, however, no piercing of the skin ever was noted and it appeared as if they were merely lapping up perspiration." Rozeboom (1942) writes: "Rarely they were observed biting a horse or man" in Oklahoma. Headley (1921) believes that *sapphirina* does not take blood. Dyar (1922) relates that: "While every attempt possible was made to try to get females to suck blood, the writer has never observed a single one biting." A contradictory statement appears in his later work (1928), when he states: "The adults will bite under favorable conditions but are very seldom met with."

Even less is written about *U. lowii.* Hinman (1935) finds that: "Under no conditions have they been induced to suck blood." King, Bradley, and McNeel (1939) concisely conclude: "The adults are rarely seen and are not known to bite humans." Theobald (1903) quotes Hewlett, who, in a statement of questionable accuracy, reports *U. lowii* rare in Trinidad and biting (man) severely.

The first known observation of *Uranotaenia lowii* taking blood was made in August, 1944, during general insect collecting at lights near New Orleans, Louisiana. It was feeding on a tree frog (*Hyla cinerea*) under a light. In order to obtain further information on the host preferences, a series of biting tests was undertaken in the laboratory. *U. lowii* was very abundant and provided adequate living material for the investigations. Amphibians and reptiles were plentiful and those used for study were collected during field trips. All mosquitoes and hosts used were taken near Harahan, Jefferson Parish, Louisiana, and all biting tests were made there.

Equipment and Methods

The *U. lowii* females desired for the tests were collected at lights. The mosquitoes were taken alive into the laboratory and their identity checked with the aid of a dissecting microscope. The presence of white distal segments on the hind tarsi and the absence of blue-purple iridescence on the mid-mesonotal longitudinal line easily separate *U. lowii* from the other Louisiana species of *Uranotaenia, U. sapphirina.* The latter occurred in the same area where *U. lowii* was being collected, but none was found at light in the vicinity of the laboratory. About one mile to the east, beside the Mississippi River, the two species were taken in a light trap in nearly equal numbers. Male *lowii* were rare at light.

The cage used for the biting tests was a one-foot cube with a solid wood bottom and sides of 16-mesh hardware cloth fastened to a wooden frame. To observe biting mosquitoes a Spencer binocular microscope was used with a 9 × eyepiece and 1 ×, 2 ×, and 3 × objectives in a revolving mount. The barrels of the instrument were lifted from the upright of the frame of the microscope, and manual support and focussing, rather than mechanical, had to be used. The objective could then be brought as near the side of the cage as desired. Objects more than four inches from the objective were out of focus. Consequently, the animals being tested had to be near the side of the cage. They were placed in the cage through the cloth sleeve and were placed near the side and allowed to become quiet before mosquitoes were introduced.

U. lowii showed no desire to feed under a direct light. A cloth placed to reduce the amount of illumination entering the cage diffused the light, and the mosquitoes quickly flew to the lower part of the cage and discovered any hosts present. Once an individual had begun to feed, the cloth could be removed without interrupting the process.

Biting Habits Observed

The mosquitoes, if placed with an unattractive animal, gave it no attention at any time. On the other hand, when a suitable host was present, *U. lowii* quickly showed interest, and some soon began to feed. Usually the tiny culicines did not fly to the body of the host. Most often, they lit on the floor near the animal and walked toward it. On contacting the animal, *U. lowii* placed the front legs and proboscis against the host, rested on the front and middle legs, and slowly, alternately rotated the elevated, white-footed hind legs. As many as five minutes were consumed in tapping over an area of the skin with the flexible proboscis. During the process, some individuals moved up onto the body of the host, although most remained on the floor. The tapping seemed to be the means of locating the most superficial capillaries of the host.[2] At length, the mosquito inserted the proboscis and began feeding in the above-described position, leaning forward against the host and continuing to rotate the hind legs. This practice of resting beside the host, rather than on it, while feeding, though common with *U. lowii,* must be somewhat unusual.

With most *Uranotaenia lowii* females captured for use in the biting tests, the abdomen contained varying amounts of a pale yellow fluid, possibly a plant juice. Some with distended abdomens took a blood meal as readily as those only slightly fed. One of the first *U. lowii* whose feeding was watched was full of

[2] However, Gordon and Lumsden (1939) believe, from their observations of *Aedes aegypti* (L.), that at least the fascicle of the proboscis is incapable of sensing the location of blood vessels.

the pale liquid before being placed with a toad. It fed unusually long, and after about five minutes it began issuing tiny drops of the fluid from its anus. For fully ten minutes these fell, apparently forced out by the blood entering the stomach as the mosquito continued to feed. When the proboscis was withdrawn, the stomach was red and greatly distended. It may be that *U. lowii* takes the juices for its own sustenance, but requires blood to produce eggs; in which case, when a blood meal is secured, the less valuable plant juices or animal excretions are forced out.

Host Preferences

Homo sapiens L. Twelve female *Psorophora confinnis* (L.-Arr.) and twenty female *Uranotaenia lowii* were placed in the cage and the writer's bare arm was thrust in through the sleeve. The *P. confinnis* quickly attacked the arm. The *U. lowii* rested as readily on the arm as on parts of the cage, but none evidenced any desire to feed on man. A few minutes later these *lowii* fed on a toad.

Terrapene carolina (L.). Ten *U. lowii* were introduced into the cage with the tortoise. None had tried to feed after 30 minutes. Then ten more were added. During the next 30 minutes none of the twenty fed. At the same time ten *U. lowii* were placed with two *Bufo valliceps* in a cage under similar conditions. Several of the *U. lowii* immediately approached the toads and were soon feeding. Their lack of response to the presence of the tortoise was clear, while they fed normally on a known host.

Leiolopisma laterale (Say). Twenty *U. lowii* were placed in the cage with three of these Ground Lizards, which are very numerous in southern Louisiana. No lizards had been attacked after 100 minutes. Ten *lowii* were simultaneously released into a similar cage containing two toads, and as in all other controls used, the *lowii* fed eagerly on the toads. This test was twice repeated with the same results.

Anolis carolinensis Voigt. On three separate occasions twenty *U. lowii* were placed in a cage with an American Chameleon, for periods varying from 45 to 100 minutes, and no desire to bite was shown by the mosquitoes. The toads in the nearby cage were readily attacked in each of these tests.

Rana sphenocephala (Cope). A single *U. lowii* was taken feeding on the amphibian under field conditions, but no laboratory tests were made with this Southern Leopard Frog.

Hyla c. cinerea (Schneider). *U. lowii* were collected in the field feeding on this common tree frog on two occasions. Five large *H. cinerea* were placed in the cage and twenty *U. lowii* females were introduced with them. Some difficulty was experienced when the tree frogs ate five of the twenty mosquitoes, but the latter avoided the attention of the amphibians after becoming accustomed to the cage. Within 30 minutes all of the surviving mosquitoes had approached the Hylae, and at least three had fed to repletion. The thigh of the hind legs of the frogs was the object of all observed feedings. Several *U. lowii* flew to a patch of urine discharged by a *Hyla*, and some seemed to feed briefly on the fluid. Twelve *Psorophora confinnis* introduced with the *U. lowii* showed no desire to feed on the amphibians, and rested most of the time on the ceiling of the cage. (See below under *Bufo valliceps* for further notes on *Hyla*.)

Bufo valliceps Weigmann. One *U. lowii* was collected in the field from this, the Mexican Toad, and several were seen biting the species on another occasion. This species was clearly a favorite host of *U. lowii* in southern Louisiana. In the laboratory ten female *lowii* were placed in a cage containing two small *Bufo valliceps* and an equal-sized *Hyla cinerea*. After 75 minutes the ten *U. lowii* were collected in a chloroform tube and examined. Eight had taken blood meals in the cage. The *Hyla* was carefully watched throughout the 75 minutes, and only one *lowii* fed on it. Therefore, seven of the eight which took blood meals preferred the two *Bufo* to the *Hyla*. These *Uranotaenia* seemed to evidence such a preference for *B. valliceps* that the toad was used as the comparison species in the controls run with the tests on other animals. These controls are mentioned under foregoing species.

(To be continued)

Statement on DDT by the American Association of Economic Entomologists

At the annual meetings of the two national entomological societies in New York, December 13–15, 1944, most of the papers and discussions involved recent experimental work with DDT. At the end of the meetings the American Association of Economic Entomologists adopted the following statement to summarize the results of various research projects and to correct "misunderstanding, over-optimism and distorted impressions." This statement seems of sufficient general interest to repeat in full here. THE EDITORS.

"We feel that never in the history of entomology has a chemical been discovered that offers such promise to mankind for relief from his insect problems as DDT. There are limitations and qualifications, however.

"Subject to these, this promise covers three chief fields: public health, household comfort, and agriculture. As public health we include control of the insects which carry diseases that have scourged humanity, such as malaria, typhus and yellow fever. Household comfort is taken to cover such things as flies, fleas, bedbugs and mosquitoes. Agriculture includes not only farms, gardens and orchards but forests, livestock and poultry.

"In the public health field DDT insecticides are so much more effective than previous weapons against malaria mosquitoes that for the first time there is a practical hope for eradicating that disease from this country. DDT proved in Italy that it is the first and only practical control for typhus. In the household field its amazing lasting effect promises relief for months from flies, mosquitoes and fleas. In the case of bedbugs, eradication from the American home has become a possibility.

"In agriculture, it is promising against a wide variety of destructive pests. These include most potato insects, many orchard and vineyard pests, numerous vegetable insects, as well as the chief insect enemies of vitally important seed crops. It appears to be effective against the pink bollworm and outstanding against the Japanese beetle, two of our worst imported pests.

It promises also a more practical control of the pests which ravage thousands of square miles of forest, and against many of those which harass livestock.

"DDT will not kill all the important insect pects. It will kill many beneficial insects which are allies of mankind against the destructive species. Because of its toxicity to a wide variety of insects, its large-scale use might create problems which do not now exist. To illustrate, it is a superior insecticide for control of codling moth on apples, but in some sections at least will kill certain natural enemies and thus release other insects which may then become major problems.

"The research reports emphasize that we have not had time to develop entirely satisfactory mixtures and dosages of DDT insecticides, nor the method and timing of application for many possible uses. Modern agricultural pest control often requires mixing several materials in combination treatments, and we know little of DDT's compatibility with many of these others. Researches thus far were made with a material which was produced under pressure for military needs, and which is not necessarily the best form for agriculture.

"We do not know enough about effects on plants, animals and soils. While most plants were not harmed by DDT insecticides in the experiments, injury to squash, corn, tomatoes and possibly fruit trees was reported. DDT is toxic to animal life when large amounts are taken internally or absorbed through the skin from oil solutions, but reports indicate a reasonable margin of safety. In the light of our present knowledge, heavy deposits on edible parts of plants should be avoided. Reports show definite toxicity to cold-blooded animal life including fish and frogs. There has not been time to learn the possible cumulative effects on soils.

"More and larger-scale experimentation is needed. Enough DDT for such research in 1945 should be provided."

Raids of Formica sanguinea Latr. (Hym., Formicidae)[1]

W. V. Balduf, University of Illinois

During the years 1938, 1940 and 1944, I took advantage of chance opportunities to observe twelve raids by four separate colonies of the red slave ant, *Formica sanguinea* Latr. found on the University campus at Urbana. The identity of the subspecies of *sanguinea* and the ants raided by them in this area is suggested in the studies made by Smith (1927). He established that subspecies *rubicunda* Emery and *subintegra* Emery occur here, the former common, and that they pillaged the larvae and pupae, chiefly of *Formica fusca subsericea* Say, but also raided the nests of *F. neogogates* Em. and, in one case, that of *Aphaenogaster fulva* Roger. Concerning the latter ant, Smith remarked "the brood they (*sanguinea*) pillage must be eaten shortly afterwards for no one has yet observed a mixed colony of these Myrmicine and Formicine ants."

My contribution on *sanguinea* is divided into two parts,—first an account of a raid observed on July 4, 1944, and second, a number of observations on diverse activities.

I discovered the above mentioned raid in progress near McKinley Hospital at 4:15 P.M. The line of scurrying red workers had not yet reached the *fusca* nest when I came upon it. Without delay they plunged into the entrances and in a very short time the advance individuals reappeared with booty in their jaws and sped on the homeward trip. In a later phase of the first round trip, many of the advanced pillagers had already borne their *fusca* captives home and descended into their subterranean nest, while the hinder part of the column was still approaching home. Then several minutes passed in which it seemed the raid was about to end; where upon the reds again poured from their nest in numbers as large as those that made the first trip I observed. These traversed precisely the same

[1] Contribution Number 243 from the entomological laboratories of the University of Illinois.

course and entered the same *fusca* nest as before. The last individuals to leave the pillaged nest on the second observed trip carried no *fuscas* in their jaws. No evidence of a third assault was seen, hence the raided colony appeared to have lost its entire population of larvae and pupae to their marauding relative. Although only two round trips were observed, it is possible that the raiders had already completed one or more invasions before I came on the scene. This possibility is suggested by the fact that the entrances were not plugged, so the reds entered without delay on the first observed trip.

The distance covered in the two trips was around 636 feet. and the total traveling time was approximately 115 minutes. On this basis, the average speed was about 5.5 feet per minute. The raiding workers pressed on at a maximum rate at all times. They crossed a varied terrain that included a short-cut lawn, a concrete walk, a stretch of crushed gravel and a debris-covered woods floor. Now and then an individual left the main trail but promptly rejoined the racing column after a brief lateral run.

By taking a fixed position along the trail I was able to count 1281 immature *fuscas* carried from their nest. The individuals removed consisted of a few callows and many pupae and larvae, the latter representing various sizes or instars. In general the pupae and larger larvae were transported in the earlier phase of the raid. Toward the end of the second round, many reds bore larvae so small it was not always easy to determine whether they carried booty. However, pupae still appeared in small numbers even near the end of the raid. Since the large majority of the ants carried *fuscas,* the raiding army is estimated to have numbered approximately 650 workers. In the instance reported by Parker, the *sanguineas* transported about 12,800 immature *fuscas* in a total working time of 18 hours distributed over three consecutive days in August.

Diverse Activities of *F. sanguinea*

At 5:30 P.M. of July 24, 1938, more than 100 red workers of a colony near the Old Agricultural Building were seen milling excitedly over the site of a *fusca* nest. This delay in entering the nest may have been due to obstructing plugs which *fusca* was found by Talbot and Kennedy to insert into the entrances.

In late afternoon of July 19, 30 workers of the same colony were discovered spreading in an irregular and, it seemed, planless manner from their nest site. This activity probably represented exploration for *fusca* nests to be raided later.

This colony plundered a nest of *fusca* only eight feet from its home site on July 29. There seemed to be but one entrance to the black nest, and its size did not permit the reds to enter and emerge simultaneously. When a red worker appeared at the exit from within the nest, she pushed her captive *fusca* larva or pupa partly out through the hole. At this instant, the captive was seized, or possibly stolen, by another worker waiting outside, which then carried the *fusca* home. This performance was seen to occur several times. In the scheme of *sanguinea,* the worker is believed usually to do its part in a raid without such aid.

About 650 red workers of the same colony took part in a raid observed on July 24. On the basis of partial counts, I concluded only 30 to 40 per cent of this number found *fuscas* to carry home. Similarly low per cents of the workers returned home without booty also on other occasions. Because the red nest was situated only five to 20 feet from the *fusca* nests known to be invaded, these probably suffered repeated raids that kept their populations reduced to small numbers. The black adults offered only slight, if any, direct resistance to the observed onsets of the reds.

Upon depositing their captives in the subterranean chambers of their nests, some of the red workers reappeared, in a few instances, above the nest site and gathered in small knots among the grasses and a foot or so toward the location of the *fusca* nest lately raided. In 15 or 20 minutes, these groups dissolved and the ants returned into the nest. Are such reappearances to be interpreted as incipient second raids? Had these ants met with other workers still returning home with booty, would they have made another trip to the *fusca* nest?

On August 7, 1938, I discovered an army of red workers loitering and roaming aimlessly over a lawn at Lafayette, Illinois. Their nest was adjacent to the foundation of a house, whose owner had poured hot water on the nest three days earlier. Presumably the reds were out on a raid at the time the nest received this treatment, and were now a homeless wandering band. At one time in the afternoon, they milled slowly near the old nest site, and later were seen travelling indifferently away in a loose file, following a path over which I had seen a red colony make a normal raid in 1935.

Kennedy states the flight time of *sanguinea* has varied, according to recorded cases, from about July 6 to August 3. I saw three winged adults crawling over the site of the colony at the Old Agricultural Building at 2:00 P.M. of July 22, 1938. They were accompanied by four apterous reds and a larger number of worker *fuscas*.

The earliest observed raids of the summer were made on July 4 and 5, 1944, and the latest on September 3, 1940. Invariably the raids occurred on warm sunny days. The nests were situated in regularly-mowed lawns and in direct sunlight.

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The Mechanics of Digestion in the Calliphorid Flies

Cyril E. Abbott, Washington, D. C.

The first thorough description of the digestive system of the Calliphoridae was made by Lowne, who, in 1890, published a two volume work on *Calliphora erythrocephala.* Recently (1934) Graham-Smith has treated the same subject in even greater detail. Wigglesworth, both in a separate paper (1929) and in his recent book on insect physiology (1940) has also discussed this matter, especially with reference to the function of the proventriculus. Others who have contributed to the discussion are Hewitt (1907), Giles (1906), Patton and Cragg (1913), Patton and Evans (1929) and Snodgrass (1944). The bulk of the present paper has been drawn from the work of the authors cited. Some observations of my own on *Lucilia sericata* and *Cynomyia cadaverina* have also contributed to this discussion.

The digestive system of the calliphorid flies is one of the most specialized groups of organs known. Food is ingested, most of it in a liquid form, into a thin-walled tube which extends from the tip of the proboscis to the proximal part of the abdomen, within which it is expanded to form a bilobed pouch capable of considerable distension. This organ, the crop, is exclusively a storage place for ingested food.

Near the anterior wall of the thorax the oesophagus bifurcates: the ventral branch being that continuous with the crop, the dorsal passing almost immediately into the *proventriculus.* Posterior to the proventriculus the digestive tube exhibits a narrow constriction, then widens into the *mid-intestine.* The anterior portion of this mid-gut, which is also its widest part, lies in the thorax, but it continues into the abdomen where it is much coiled. As in other insects, its posterior termination is marked by the attachment of malpighian tubules: four of them in this case. The anterior two-thirds of the *mid-intestine* is is much narrower than the mid-gut, but posteriorly it expands to form the *rectal sack,* a peculiar structure which narrows posteriorly until it terminates in the *anus.*

Before considering the functions of these various parts it is necessary to call attention to some details of structure. Dorsally a short band of muscle connects the proventriculus with the anterior wall of the thorax. The paired *salivary glands,* which are long, coiled, and very delicate, are attached to the sides of the proventriculus. The structure of the proventriculus is too complex for analysis here, but essentially it consists of an invaginated plug perforated by the lumen of the dorsal branch of the oesophagus, and an outer wall which is heavily muscular. The anterior portion of the mid-gut appears almost nodular as a result of the fact that the muscular layer forms a reticulum with recangular interstices through which the epithelial lining protrudes. Posteriorly the muscular layer becomes practically continuous so that the outer wall is smooth. About mid-way of the narrow part of the hind-gut is a valve bearing chitinous spines. The rectal sacks bears four invaginated *rectal papillae* of considerable complexity and richly supplied with tracheae.

Since the oesophagus, crop, and proventriculus are of stomodeal origin, they are lined with a chitinous intima which is continuous with the exoskeleton of the fly. The intima which lines the oesophagus and crop, although very thin and capable of much extension, is practically impermeable, even to molecular solutions. This may be demonstrated by ligating the oesophagus just anterior to the crop when the latter is distended by a sugar solution imbibed by the fly. The excised organ may be immersed in distilled water for several days without exhibiting any shrinkage, and without successive samples of the water giving a positive test for sugar. An excised crop filled with water may be immersed in a molar solution of sodium chloride indefinitely without collapsing. The crop is obviously a storage organ only; so far as absorption is concerned, any material it contains might just as well be outside of the body.

Although efforts have been made to demonstrate that the proventriculus acts as a *valve* between the oesophagus and mid-gut, both Graham-Smith and Wigglesworth are of the opinion that its sole function is that of forming the peritrophic membrane. That a peritrophic membrane exists, and that it is formed in the proventriculus there can be no doubt. This membrane, unlike that lining the crop, is highly permeable, and functions, probably, to protect the walls of the mid-gut from abrasion.

A sphincter is present in the short, dorsal branch of the oesophagus just anterior to the proventriculus. I have observed this sphincter relax at irregular intervals, allowing the passage of material into the mid-gut. Two other oesophageal sphincters are present: one just anterior to the bifurcation, the other posterior to it in the wall of the oesophagus leading to the crop. By closing the valve on the dorsal branch food may be directed into the crop, or, by reverse peristalsis the fly may regurgitate liquid. Constriction of the valve just anterior to the bifurcation, with simultaneous relaxation of the other sphincters, allows food to pass from the crop to the mid-gut.

Unlike those of the crop, the walls of the mid-gut are highly absorptive. This may be demonstrated by dissecting a fly which has fed on dyed sugar solution about twenty-four hours previously. The dyes (methylen blue or phenol red, usually) were often found concentrated in the crop, but never in the surrounding tissues: not only did they deeply color the walls of the mid-gut, but also the tissues adjacent to it.

Whether it is because the anterior region of the mid-gut is more permeable than other parts, or because this part of the digestive tract is long, the dyes seldom reach the posterior part, and even when the anterior third is highly stained, the remaining portion is generally almost free from coloring matter. At the same time, the malpighian tubules and hind-gut may be deeply colored. This indicates that materials in excess, or which are incapable of being metabolized, are often absorbed from the mid-gut only to be deposited in the malpighian tubules. This is, of course, a substantiation of the renal function of the tubules.

The function of the valve in the hind-gut is problematical. Graham-Smith cautiously suggests that it may destroy the remnants of the peritrophic membrane.

Wiggelsworth considers the rectal papillae organs which absorb excess water from the gut, but Graham-Smith doubts this. Another suggestion is that the papillae may oxidize toxic materials. This conclusion is wholly suppositive, and is based upon the rich tracheal supply of the papillae.

In a living fly the digestive organs are in constant motion. The lobes of the crop contract in rhythmic alternation. Waves of contraction pass anteriorly along the oesophagus from the crop to the proventriculus, which expands at intervals, usually concomitantly with the adjacent sphincter. Thus food passes into the mid-gut, along which waves of contraction pass posteriorly. A reverse peristalsis in the narrower part of the hind-gut probably serves to open the valve there. Strong, but irregular contractions occur in the rectal sack. Their effect is to move the rectal papillae inward and backward and then in a reverse direction, not synchronously, but cyclically.

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The Collection of Eggs of Aeschna multicolor (Hagen)

Paul C. Wilbur, San Jose, California

As pointed out by Tillyard [1] and others, the rounded eggs of exophytic species of Odonata are easily collected. On the other hand, eggs of endophytic species have been laboriously obtained by examining masses of water weeds or by watching individual females in the act of ovipositing, and later taking the particular stem in which the eggs are observed to have been deposited.

A much simpler method has been developed by the writer as the result of a chance observation in 1943. During a casual stroll in the latter part of August in Pacific Grove, a copulating pair of *A. multicolor* were captured by hand and without injury. No papers being at hand, the separated individuals were placed in separate breast pockets of a loosely woven shirt. About fifteen minutes later it was noticed that the pocket containing the female glistened with about thirty eggs which had been oviposited through the cloth.

To obtain further eggs, a glass bowl full of tap water was covered with a piece of dish toweling, and the female held by the wing bases so that the tip of the abdomen was brought in contact with the wet towel. A large number of eggs were deposited through the cloth so that they were attached to the cotton fibers on the under side of the cloth by the pedicel and projected into the water at nearly right angles to the plane of the cloth. Nearly all of these eggs hatched between the 10th and 11th day.

During the summer of 1944, another copulating pair of *A. multicolor* was captured with a net. A modified procedure for obtaining eggs was developed which may have general application to endophytic species of Odonata, although it has not been tried on Zygoptera. The method may not be applicable to those species which remain paired during oviposition.

[1] Tillyard, R. J. The Biology of Dragonflies. 1917.

Construct an open-ended non-corrosive metal cylinder of slightly smaller outside diameter than the inside diameter of the vessel in which it is to be suspended. Cover the lower end of the cylinder with a piece of soft loosely woven cotton cloth. Three or four pins may be soldered onto the outside of the cylinder to support it in the vessel. Pour in tap water until the water level in the vessel is established at about 1/8 inch above the cloth.

Clip both pairs of wings of the captured female at about the level of the arculus with a pair of sharp scissors. Most Odonata can fly with all four wings clipped at the nodus. Place the female on the wet cloth. The diameter of the cylinder should be great enough so that freedom of movement is provided. The vertical walls of the metal cylinder must be high enough to prevent escape from the cloth surface. The 1944 specimen of *A. multicolor* treated in this manner deposited several dozen eggs, the majority of which hatched in from 14 to 20 days.

Unfortunately, the emergence of the pronymph was not observed in either of these cases. There seemed to be no effect on the success of emergence whether the cloth with attached eggs was maintained horizontal with eggs above or below, or with the cloth vertical.

Eggs were laid in a formless pattern, sometimes singly, and at others in compact groups. The reason for the difference in hatching rate between the 1943 and the 1944 pair is not known. Possibly it is related to water temperature.

Tillyard (loc. cit.) states that decaying vegetable matter is essential to the rearing of eggs. In both the collections herein described, ordinary city water was used. There was a slight amount of mold growth among the latest hatching eggs, and some may have been killed, but there was a high percentage of emergence. The larvae were active and fed readily on paramecium.

It would appear to be advisable to boil the cloth used, to remove any soluble material which would support mold growth, and to avoid cloth which has been starched or "sized."

Notes and News in Entomology

Under this heading we present from time to time short reviews, notes, news and comments on entomology throughout the world. Contributions from readers are solicited and will be acknowledged when used.

We commonly think of complete digestion occurring in the lumen of the alimentary tract before absorption into the blood. But this is not necessarily the case, and in some cases it seems possible that even proteins may be absorbed unchanged or in various states of degradation—both in insects and mammals. It is well known that numerous pigments occur in insects, and in at least some cases these would seem to be absorbed essentially as found. Lederer [1] in reviewing the distribution of pigments in invertebrates lists carotenoids, quinones, melanins, pterines, flavons (xanthones), bile pigments and chlorophyll derivatives as being found in insects. Although some of these may be formed by the insects, certainly a number of them are obtained from the food. For instance, chrysine (the yellow pigment of beeswax) is found in several plant resins and is probably derived directly therefrom by the bees.[2] And it is well known that the blood of certain caterpillars becomes colored from absorbed chlorophyll.

Particularly favorable material for the study of such absorption is supplied by the blood-sucking insects in which a large part of the ingested protein consists of hemoglobin. Wigglesworth [3] has recently presented a detailed analysis of the fate of hemoglobin in the blood-sucking tropical bug *Rhodnius prolixus* and a preliminary survey of it in various other blood-sucking arthropods.

Wigglesworth finds by exacting microspectroscopic methods that most of the ingested hemoglobin is broken down in the lumen of the gut of *Rhodnius,* the globin being absorbed and used as food, the hematin being excreted as protohematin. But a small amount seems to be absorbed into the blood with-

[1] Biol. Rev., **15**: 273–306. 1940. See also F. Mayer, The Chemistry of Natural Coloring Matters, 354 pp., Reinhold Publ. Corp., N. Y., 1943.

[2] R. Barre, Rev. Can. d. Biol., **1**: 485–490. 1942.

[3] Proc. Roy. Soc., **131B**: 313–339. 1943.

out digestion and circulates as kathemoglobin or some spectroscopically similar form. This circulating form of hemoglobin is taken up by the salivary glands and also by the yolk of developing eggs, both of which become colored red. Some is also taken up by the pericardial cells or nephrocytes, by the epithelial cells of the stomach and intestine, and on injection also by the Malpighian tubules. In these cells the red pigment is subsequently changed to brown, then green (verdohem?) and finally to the bile pigment biliverdin. The pericardial cells become bright green. The gut cells excrete the biliverdin, but free iron accumulates in these cells so that in old insects they are heavily laden with iron deposits.

The story is not the same for all blood-sucking arthropods. Wigglesworth reports that mosquitos and fleas do not absorb any of the blood pigments. They digest the hemoglobin almost completely and leave only a small residue of black protohematin in the feces. In lice (*Pediculus*), the bedbug (*Cimex*), various other Hemiptera, and ticks (*Ixodes, Ornithodorus*) varying amounts of pigments are absorbed but in no other species so readily as in *Rhodnius prolixus.* The bedbug and ticks break the absorbed pigment down to protohematin; only the louse and triatomids carried the breakdown on to the formation of bile pigments. Only in *Rhodnius* and *Cimex* do the salivary glands become colored red, and only in *Pediculus* and *Rhodnius* is hemoglobin transferred to the developing eggs.

These data on hemoglobin breakdown reemphasize the importance of the nephrocytes and especially the epithelial cells of the gut in the intermediary metabolism of insects. In passing we might remind readers that the loss of all of the hematsin would mean losing only 6% of the weight of the hemoglobin because approximately 94% of the weight of the molecule is in the readily utilizable globin. The fate of the hematsin part of the molecule is therefore likely not of great importance to the insect's economy.

Aside from these data presented by Wigglesworth, and the hemoglobins or erythrocruorins found as functional respiratory pigments in some chironomid larvae, hemoglobin has been reported from a peculiarly sporadic listing of species. It is reported in *Gastrophilus* and certain aquatic Hemiptera (*Buenoa, Anisops* and *Macrocorixa*). In all of these, with the exception of the modified hemoglobin of chironomid larvae, the pigment seems to be a functionless inclusion derived from the blood of the host or prey. This explanation is least probable in *Macrocorixa* which is mainly, but not solely, herbivorous.

A. G. Richards, Jr.

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 and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in Entomological News are not listed.

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Notes on Arilus cristatus (Linnaeus) in York County, Pennsylvania and on its Prey (Heteroptera: Reduviidae)

Edwin T. Moul, York, Pennsylvania

While collecting insects during the summers of 1943 and 1944 I have noticed an increase in the local population of the reduviid, *Arilus cristatus* (Linnaeus) commonly known as the Wheel-bug. As specimens were observed in the field, daily notes were made. An attempt was made to collect all feeding specimens with their prey. These specimens were mounted one above the other on the same pin for further study.

I have collected Wheel-bugs in York County, Pennsylvania since 1933, but only a few specimens each year. These were taken chiefly in the wooded areas of the Susquehanna river hills and the Conewago Creek. They were rare enough for me to collect each specimen seen. I have one specimen for 1933, 2 for 1934 and 2 for 1938.

In 1942 these insects first appeared in gardens in central York County, frequently enough to have my attention called to them by neighbors and interested citizens. I have a specimen taken on August 22, 1942 which was feeding on a Japanese beetle (*Popillia japonica* Newn.).

Egg masses were common during the winters of 1943 and 1944. Hexagonal clusters of from 75 to 150 eggs were found on trunks of white pines, branches of apple trees, one on the branch of a quince tree, one on the trunk of a chestnut oak, several on the undersurfaces of cherry limbs and on sides of grape vines. Most of these egg masses were within four (4) feet of the ground, but placed with no apparent regard to protection or cover.

Nymphs were first collected, with prey, on June 3rd. The last adults were collected on October 11th. Leland O. Howard reports the young nymphs as feeding on soft-bodied insects, "such weak, delicate species as plant lice." While some young nymphs were observed feeding on young tent caterpillars, others collected while feeding, had on their beaks the Locust-leaf-mining beetle (*Chalepus dorsalis* Thunb.) and a leaf-bug (Miridae). Several third instar nymphs were observed feeding on a pentatomid nymph, an adult Pentatomid (*Euschistus euschistoides* Vollenhaven) and an adult Membracid (*Ceresa diceros* Say.); one fourth instar nymph was taken with a pentatomid nymph. Last instar nymphs were taken with an adult pentatomid (*Euschistus variolarius* Beauv.) and Japanese beetles (*Popillia japonica* Newn.); adult Wheel-bugs with Japanese beetles, caterpillars and a wasp (Eumeninae).

A complete list of prey follows:

Hemiptera

Miridae—1
Tingidae—1
Pentatomidae
  Nymphs—2
  Adults—2

Homoptera

Atymnus querci Fitch—1
Ceresa diceros Say—1

Arachnids

Spider—1

Coleoptera

Chalepus dorsalis Thunb.—3
Elateridae—1
Weevil—1
Popillia japonica Newn.—13

Lepidoptera

Tent caterpillar—3
Caterpillars—3

Hymenoptera

Eumeninae (wasp)—1

Copulating adults were taken on August 23rd, and August 29th.

The question arises, has this unusual increase in this predatory species been due to an increased food supply during the growing season? From observation, the increase of *Arilus* *cristatus* (Linnaeus) has paralleled the local infestation of *Chalepus dorsalis* Thunb. and *Popillia japonica* Newn. Mr. Guy Boyd, a local insect exterminator, has also observed these Wheel-bugs preying on Japanese beetles consistently and concurs with me in the opinion that their abundance is due to this increased food supply. These two beetles have been the predominant forms taken for food. More evidence is needed and the above report is submitted with the hope that further information will be forthcoming.

Notes on the Odonata of Delaware County, Pennsylvania

John Gillespie, Glenolden, Pennsylvania

During the five years that I have been studying dragonflies, most of my collecting has been done in the Delaware County region, the majority of it at ponds and streams within four or five miles of Glenolden. A number of interesting captures have been made during this five-year period, which, in the case of a few species, have established extensions of their known ranges.

Many Delaware County records are mentioned in Dr. P. P. Calvert's Catalogue of the Odonata of Philadelphia, of 1893. None of these records, or more recently published ones by Dr. Calvert are given here, except for the mention of four interesting species not in the list below. These are *Erythrodiplax berenice, Sympetrum corruptum,* and *Argia tibialis* (Calvert, Cat. Odon. Phila.), and *Cordulegaster diastatops* (Calvert, Ent. News XLIX: 251, 1938). There are, however, a number of unpublished records that Dr. Calvert has kindly given me, some of which are included here in order to make the data as complete as possible. Our combined notes bring the number of species reported in Delaware County to eighty-three. This shows that a small and thickly populated district like Delaware County can still yield an interesting variety of dragonflies.

Only some of the less common species, for which previously published records from the Philadelphia area are either very meager, or lacking entirely, are mentioned in this paper. Those marked with an asterisk (*) have not been previously reported from Delaware County or Philadelphia. A double asterisk (**) indicates new Pennsylvania records, but it is very likely that some of these species occur commonly in some part of the state, and have been overlooked because of the wide gaps in our knowledge of Pennsylvania Odonata. Two species which have been taken just outside of the county are included for the sake of completeness.

The collecting area at Holmes deserves special mention. It consists of several swampy ponds with a total area of about an acre. The swamp is apparently produced by springs, and at the end of a very dry summer, as in 1943, it may almost dry up. In spite of this semi-temporary condition the swamp always swarms with dragonflies throughout the summer. Forty-five species have been taken or observed there as a result of some twenty odd collecting trips during the last four years. Many of these species are of particular interest, and Holmes is mentioned frequently in the list of species which follows.

Hagenius brevistylus Selys. Cheyney, June 17, 1934, 1 ♀ (P. P. Calvert). One female in a field near a small brook flowing into the Springfield Reservoir, June 25, 1940.

Gomphus plagiatus Selys. Ridley Twp., Aug. 30, 1894, 1 ♀ (P. P. Calvert).

G. spiniceps Walsh. Chester Creek, Glen Riddle, July 16, 1908, 1 ♂ and 1 ♀ just transformed, their exuviae, two other exuviae (A. S. Calvert, coll. P. P. Calvert). Crum Creek above Strathaven, July 28, 1908, 1 ♀ dead in water, 27 exuviae collected along banks, other exuviae seen (P. P. Calvert).

G. lividus Selys. Common along the Munckinipattus Creek. Several records for Chester, Ridley, and Crum Creeks (May 10–June 21).

Lanthus albistylus Hagen. Castle Rock, June 16, 1901, 1 ♀ (Daecke, det. by P. P. Calvert).

Gomphaeschna antilope (Hagen). A female was clinging to the outside of the screen on my window at 7:30 A.M., May 22,

1941. Another female was taken on a screen door the following year, early in July. On several dates during a two-week period before the May 22 female was taken, a small aeschnid with a bluish abdomen was seen flying and hovering in sunny parts of the Munckinipattus Creek, low over the water. It was very likely a male of this species, but repeated efforts to catch it were in vain.

**Basiaeschna janata* Say. Sycamore Mills, Ridley Creek, May 14, 1942, 1 ♂. Several others seen there and on Chester creek on the same date.

Anax longipes Hagen. Cheyney, Smithson's Pond, July 9, 1936, 1 ♀ dead, decomposing on water's surface (P. P. Calvert). Holmes, June 19, 1941, 1 ♂. (Sight record.) It captured a small dragonfly (*Sympetrum* or *Pachydiplax*), and spent at least ten minutes devouring it while at rest in a tree. On another occasion, on Marthas Vineyard, Massachusetts, I saw this species capture a smaller dragonfly. *Longipes* seems to be more voracious than its much commoner relative, *junius*.

***Aeshna constricta Say.* A male was netted in our garden, Sept. 19, 1943. Two males taken in a large field, about half a mile from the edge of Tinicum marshes. After flying about, low over the ground, they lit on grass stalks, just a few inches from the ground. Sept. 26, 1943. Two males captured while flying slowly, very near the ground in a wide grassy lane at the edge of Tinicum marshes. Sept. 29, 1944. Except for a male that I took at Cape May, N. J., Sept. 25, 1944, this seems to be the southernmost record for this species.

Ae. tuberculifera Walker. Holmes, Sept. 1, 1941, 1 ♂ One male taken in large field, as above, Sept. 26, 1943. On this date the three species of *Aeshna* mentioned here, plus *umbrosa*, were collected in about twenty minutes time, and within a hundred-yard stretch along the edge of the field. Moore Lake, Sept. 12, 1944, 1 ♂.

Ae. verticalis Hagen. Holmes, Sept. 12, 1941, 1 ♀. One male taken in large field, as above. It first lit on my shirt, then flew off and lit on shrubbery, six feet from the ground. Sept. 26, 1943. One female in the garden, Sept. 20, 1944.

Glenolden Park, Oct. 2, 1944, 2 ♂. Flying and hovering over two of the small ponds there. Another male seen over a pond. Probably this species (1 ♂) at Holmes, Oct. 10, 1944.

Cordulegaster erroneus Hagen. Smedley Park, Media, Aug. 20, 1942, 1 ♂. Flying slowly along a tiny brook which trickled down a steep, heavily wooded hillside.

Macromia illinoiensis Walsh. Castle Rock, July 22, 1900, one nymphal exuvia (P. P. Calvert).

Didymops transversa (Say). Crum Creek above Strathaven, July 28, 1908, one exuvia on bank (P. P. Calvert). Chester Creek, May 14, 1942, 3 ♂; Sycamore Mills, Ridley Creek, same date, 1 ♂.

Epicordulia princeps Hagen. Westtown Lake, Chester County, July 2, 1941, 1 exuvia 1½ feet above water on a reed. One male flying over the lake on July 24 and 26, 1941.

Somatochlora tenebrosa (Say). Glenolden, Sept. 2, 1940, 1 ♀. Single individuals seen on a few occasions flying in somewhat shaded clearings in Glenolden during the latter part of August for the three following years.

***Celithemis martha* Williamson. Holmes, Aug. 2, 1941, 2 ♂.

***Erythrodiplax connata minuscula* (Rambur). Holmes, Aug. 11, 1943, 1 ♂. It was surprisingly wary. Lit mostly near or on the ground. This is the northernmost record for this species.

**Ladona julia* (Uhler). Ridley Lake, July 1, 1944, 1 ♂. It was flying swiftly, far out over the water, close to the surface, quite un-Libellula like, and quite different from my observations of it in New Jersey.

***Libellula auripennis* Burmeister. Field near Tinicum marshes, July 7, 1940, 1 ♀.

***L. flavida* Rambur. Cheyney, Smithson's pond, July 20, 1933, 1 ♂ (P. P. Calvert). Cheyney, June 28, 1941, 1 ♀.

**L. incesta* Hagen. Several individuals at Ridley Lake, July 29, 1940, and at Holmes, July 10, 1941.

L. vibrans Fabricius. Munckinipattus Creek, Aug. 10 and 11, 1942, 2 ♂. Several of both sexes along and near the same creek, Aug. 6, 14, and 17, 1943. Crum Creek, Aug. 20, 1942, 2 ♂.

***Sympetrum ambiguum* Rambur. Seen only in 1944. About a dozen specimens taken and seen near the Munckinipattus Creek, Aug. 12 to 25. Most of them were along a swampy ditch in rather deep woods. Holmes, Aug. 15, 5 ♂. They kept exclusively in the shade of small willows. One male at edge of Tinicum marshes, Aug. 25. Crum Creek, Sept. 5, 1 ♂.

**S. obtrusum* Hagen. Folsom, Sept. 17, 1897, 1 ♂ (P. P. Calvert). Pond in Glenolden, Sept. 12, 1943, 1 ♂. Holmes, Aug. 15, 1944, 2 ♂. Pair taken at edge of Tinicum marshes, Aug. 25.

**Leucorrhinia frigida* Hagen. Holmes, July 3, 1944, 1 ♂. In company with *intacta*. This is the southernmost record.

Pantala hymenaea (Say). Cheyney, Smithson's Pond, Aug. 28, 1937, one recently transformed (P. P. Calvert). Sight records: Holmes, July 9 and 10, 1941; Glenolden, Aug. 10, 1943.

Lestes eurinus Say. Holmes and a small pond one mile west of Rose Valley, June 19, 1941, 2 ♂. Holmes, July 10, 1941, 1 ♀. Holmes, July 3, 1944, 1 ♂ taken, several others seen.

**L. congener* Hagen. Glenolden, Aug. 12, 1944, 1 ♀. Along a path in the woods, near the Munckinipattus Creek.

**L. unguiculatus* Hagen. Cheyney, Smithson's Pond, Sept. 27, 1935, fairly abundant (P. P. Calvert). Holmes, Aug. 11 and Sept. 4, 1943; July 3 and Aug. 15, 1944, quite common. Pond in Glenolden Park, Aug. 22, 1944, several males.

**L. vigilax* Hagen. Pond in Glenolden, Aug. 15, 1942, 1 ♂. Holmes, Aug. 11, 1943, 1 ♀.

Argia moesta (Hagen). Aston Mills, Chester Creek, June 25, 1940, 1 ♂.

A. sedula (Hagen). Beaver Valley, along the Brandywine Creek, Delaware, Sept. 4, 1944, 1 ♂. The exact locality where this specimen was taken is just a small fraction of a mile from the Delaware County border.

**A. translata* Hagen. Chester Creek at Glen Riddle, July 16, 1908, 3 ♂ on rocks in mid-stream (P.P. Calvert).

Nehallenia irene Hagen. Glenolden, near the Munckinipattus Creek, July 2, 1944, 2 ♂. Holmes, July 3, a small number present. Pond at Addingham, July 18, 1940, 2 ♂.

**Chromagrion conditum* (Hagen). Aston Mills, Chester Creek, June 25, 1940, 2 ♂, 1 ♀. Holmes, May 29, 1941, 1 ♀. Cheyney, June 3, 10, 17, 1934 (P.P. Calvert).

Enallagma divagans Selys. Observed along the Munckinipattus and Crum Creeks in small numbers in the early part of summer. Probably occurs on other streams also.

**E. hageni* Walsh. Holmes, July 3, 1944, 1 ♂.

***E. cyathigerum* (Charpentier). Small pond one mile west of Rose Valley, June 19, 1941, 1 ♂. Just one male and one female were seen, most of the time paired. The pair were amazingly active and wary. *E. aspersum* was quite tame and could be taken by the netful here, but nearly an hour was spent trying to capture *cyathigerum.*

**E. geminatum* Kellicott. At various ponds and lakes, but nowhere common.

***E. traviatum* Selys. Moore Lake, July 10, 1940, 1 ♂. Ridley Lake, July 1, 1944, 1 ♂, 1 ♀ (pair). Several others seen.

Ischnura ramburii Selys. Moderately common at Ridley Lake, 1943 and 1944. A small number at Holmes, Aug. 15, 1944.

Anomalagrion hastatum (Say). Rather numerous at Holmes. A pair taken in the garden, Oct. 16, 1943. Cheyney, Smithson's Pond, a number of records by Dr. Calvert.

The Feeding Habits of Uranotaenia lowii Theobald (Diptera: Culicidae)

(*Continued from page 37*)

Charles Remington, Medical Department,

Army of the United States

Bufo woodhousii fowleri (Hinckley). Fowler's Toad was only slightly less common than *B. valliceps.* In the several comparative biting tests conducted, *U. lowii* fed as readily on

B. w. fowleri as on *B. valliceps*. The mosquitoes attacked the hind femoral and caudal area of both toads.

Desmognathus fuscus auriculatus (Holbrook). The southern Dusky Salamander was the only species of Caudata found in the field during this study, and the single specimen was hidden in the remains of a rotten log. Although the secretive habits of the salamander may keep it out of reach of the mosquitoes usually, the results of the biting test are of interest.

The salamander was placed in the cage and ten *U. lowii* were released therein. For many minutes the salamander was very active. *U. lowii* quickly found it and endeavored to bite, but just as feeding began the creature always moved rapidly away, and mosquitoes trying to bite were roughly thrown aside. The salamander showed a distinct reaction to the bites. It appeared from these few observations that, of the several types of amphibians attacked by the mosquitoes, only the salamander showed this reaction when bitten.[3] The *U. lowii* persisted in trying to feed on the salamander, and within 15 minutes after it became quiet, four *lowii* had fed to repletion and staggered away. Five had begun tapping the skin and probably would have fed soon. The remaining mosquito was injured during the first thrashings, when it had tried to bite the salamander, and it soon died. All feeding on the salamander was from the tail.

Invertebrate animals. While the first biting tests were being conducted, a few attempts were made to explain the source of the pale fluid found in so many wild-caught *lowii*. One possibility was the blood of invertebrate animals. This seemed unlikely in the light of the known hosts of other mosquitoes, most of which are vertebrate animals.[4] A few common soft-skinned

[3] The above observations are meager, and it would be desirable to carry on experiments adequate to prove whether salamanders in general are actually disturbed by the bites and whether toads and frogs are not generally affected. It should be determined whether the latter have built up a resistance to the saliva. Burrowing toads may be found to react more like salamanders than like toads.

[4] Edwards (1941) describes the amazing habits of members of the mosquito genus *Harpagomyia* deMeij., considered a relative of *Uranotaenia*. These tiny day-flying mosquitoes found in Africa and Asia feed

invertebrates were tested, nevertheless. In three tests, in each of which twenty *U. lowii* were used, the mosquitoes declined even to approach, respectively, several large earthworms, a large terrestrial snail which was moving about freely, and two large land slugs. The lack of mosquito response in each of three tests increased the doubt that invertebrates are attacked, and in all further tests vertebrate animals were used.

Applications of Findings

In considering the results of the above studies, certain applications appear. First, *Uranotaenia* should be investigated as of possible significance in the development and transmission of blood parasites found in reptiles and amphibians. The sporozoan blood parasites of the family Haemogregarinidae are known to have stages in a vertebrate and an invertebrate host, much like the malaria parasite, *Plasmodium.* Members of *Haemogregarina* Danilewsky are common in amphibian and reptile blood. One species, *H. stepanowi* D., is known to undergo schizogony in a turtle and sexual reproduction in a leech which attacks the turtle. Another haemogregarine, *Karyolysus lacertarum* D. has asexual stages in a lizard and sexual reproduction in the digestive system of a mite. Invertebrate hosts of most species of haemogregarines are, however, unknown as yet.

Second, *Uranotaenia* can be utilized in studying the mechanics of mosquito mouthparts in action. *Aedes aegypti* (L.) was used by Gordon and Lumsden (1939). These authors examined the mouthparts of biting mosquitoes through the thin web of the foot of a frog. However, *A. aegypti* does not normally attack amphibians, and some difficulty was experienced in inducing it to bite the frog web. *Uranotaenia* may prove to be a more suitable subject.

by thrusting the proboscis between the mandibles of an ant and imbibing the fluid presented by the ant, which gives "an alms to the beggar, passing on a moment or two later just as if it had met a friend."

Summary

1. Published information on the feeding habits of members of the mosquito genus *Uranotaenia* is sparse. Observations of the biting of these mosquitoes are indefinite and questionable, the few remarks merely indicating that certain species probably do not bite man. Precipitin tests are said to have revealed chicken blood in an African species.

2. *Uranotaenia lowii,* while feeding, frequently rests beside the host, rather than upon it. The parts of the body of the host from which feeding is done are usually those farthest from the head, i.e., the tail, hind legs, and lower back. Since the hosts are insectivorous, the mosquito contributes to its self-preservation, intentionally or not, by thus avoiding the head. In the limited observations of a few species, no toads or frogs showed a reaction to the bites, but a single salamander tested was clearly disturbed.

3. Abdomens of most wild-caught females contained a pale fluid. When a meal was taken in the laboratory, blood was ingested until the pale juice had been forced from the abdomen by the blood being drawn from the host. It has long been known that both male and female mosquitoes feed on plant juices, and they have been kept in the laboratory for long periods of time, fed on raisins and various vegetable fluids. However, I find no records of the observation of the replacing of these juices by blood.[5]

4. The readily accepted hosts of *U. lowii* are amphibians. *Bufo valliceps, B. woodhousii fowleri, Rena sphenocephala, Hyla c. cinerea,* and *Desmognathus fuscus auriculatus* were all attacked by *U. lowii.*

It is doubted that reptiles are hosts of *lowii. Terrapene carolina, Anolis carolinensis,* and *Leiolopisma laterale* were all of no perceptible interest to *U. lowii.*

Invertebrates probably are not hosts of the *Uranotaenia.*

[5] A single drop of fluid is often excreted by an engorged mosquito immediately before the proboscis is withdrawn from the man being bitten, and it has been designated "intestinal fluid" in various writings.

Earthworms and shelled and shell-less terrestrial Gastropoda were not attacked when exposed to *U. lowii.*

In a single test, *lowii* refused to bite man. In the light of the findings of Davis and Philip (1931) in Africa, it is regretted that no birds were tested.

5. Among the possible applications of the results of these studies are: 1) investigation of *Uranotaenia* as a vector of blood parasites of amphibians; 2) use of *Uranotaenia* for studies of mosquito mouthparts in action.

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The Wasmann Collection of Ants

By PHIL RAU, Kirkwood, Missouri

Occasionally, one runs across articles in the daily press and in the weekly magazines that are of sufficient importance to deserve a permanent place in a scientific journal. An item of entomological interest recently appeared in the weekly magazine "Time" (Nov. 20, 1944, p. 88), in reference to the whereabouts of the remarkable collection of ants made by the famous student, Erich Wasmann.

The war-correspondent, Lewis Gannett, himself an amateur formicologist, reports to his paper that the Wasmann collection, formerly at Maastricht in Holland, was forcibly removed to Berlin by a certain Dr. Bischoff, curator of the Zoological Museum at the University of Berlin.

The article goes on to say that the collection was the work of the late Jesuit Father, Erich Wasmann, who was known as the "Fabre of the Ants." He had gathered specimens of most of the 3500 species of ants, and when he died in 1931, he left his collection to another Jesuit entomologist, Father Schmitz, who added to it his own collection of phorid flies. In October, 1942, on the demand of Dr. Bischoff, the collections of ants and phorid flies were given up, "the professor carrying them off to Berlin after ostentatiously signing a receipt." *

As for Father Schmitz, when last heard from he was in the Tyrol "collecting phorid flies, and had already collected 1000 (*sic*) species."

The professor mentioned is evidently none other than the noted Dr. H. Bischoff of the University of Berlin, author of the 600-page book "Biologie der Hymenopteren" (1927), which by the way is the best and most complete work on the biology of hymenopterous insects in existence. In spite of this episode, I for one will never be able to picture him as anything other than a mild-mannered man.

* Incidentally, as if one atrocity is not enough, the editors of the magazine captioned the article "The Rape of the Ants."

Notes on Some Microlepidoptera

By Emlen P. Darlington, New Lisbon, Burlington County, New Jersey

The observations herein presented serve to amplify what has already been recorded and call attention to observational differences. As larval habits often vary under artificial conditions, rearing records have been carefully checked against field observations in an endeavor to eliminate assumptions as much as possible. Except when stated to the contrary, all notes refer to records and observations made in vicinity of New Lisbon, New Jersey.

The references given are those that seem most pertinent to the text, irrespective of their sequence.

Reared material of all species cited is in the collection of the Academy of Natural Sciences, Philadelphia.

Olethreutidae

Polychrosis liriodendrana Kearfott and *Polychrosis magnoliana* Kearfott

Lectotypes in the Am. Mus. Nat. Hist.

Heinrich says, "I have examined the types of Kearfotts' two species carefully and can see no real difference between them, genitalic or otherwise." A series reared from both food plants failed to reveal any larval differences and it might be possible by pinning leaves back to back to transfer from one food plant to the other; I have transferred them thus on magnolia. At New Lisbon, N. J., the species is common on magnolia in certain localities but was not observed on *Liriodendron tulipefera* until the fall of 1943 when it was abundant. In 1944 none could be found on these same trees.

Starting near the base on the under side of a leaf the larva feeds upward and outward, covering the area with a fine tenacious web, under which, along the midrib, is a fine silken tube into which the larva retreats when disturbed. The midrib is often tunneled for a short distance causing it to turn brown. On *Liriodendron* a lateral rib may also be tunneled, and larvae were found feeding in an unusual manner between two leaves webbed flatly together. Mature larvae measure 11 mm. and have a bluish cast in reflected light, due to the contents of the gut tract. Immature larvae are greenish. Caged larvae will pupate under an oval flap 12 to 13 mm. across, cut and hinged from the edge of a leaf and tightly fastened to cover a naked pupa; they also pupated in the trash at the bottom of the cage, naked or encased. Normally pupation is not on a leaf; I have examined hundreds of magnolia leaves upon which *P. liriodendrana* have fed and never found a pupa on a leaf; also I examined every leaf from a small but heavily infested tulip poplar and found no attempt at pupation on the leaves nor any pupa on the ground, the assumption being that the larvae crawled away to where some debris had accumulated.

Moths released in a cage over a magnolia shoot would not oviposit but those released unrestricted oviposited on leaves close to the ground, with larval work noticeable July 5th. Both mature and young larvae can be found in the open on *Magnolia virginiana* by July 20th.

Regarding a spring brood recorded by Kearfott as feeding on the flowers, I can find no substantiating evidence, my belief being that they feed only on leaves near the ground. I have seen magnolia shoots with every leaf harboring a larva, without evidence of work on overhanging branches. Moths emerged from reared pupae May 28 to June 15, which is late for tulip poplar flowers and I have never found them in magnolia flowers; besides, "Rose chafers" and other *coleoptera* that frequent the flowers would make life impossible for *P. liriodendrana*.

Kearfott, Trans. Am. Ent. Soc., XXX, 1904, p. 293; Trans. Am. Ent. Soc., XXXIII, 1907, p. 6.
Heinrich, U. S. N. M. Bull. 132, 1926, p. 89.

Endothenia hebesana Walker and *Endothenia daeckeana* Kearfott

After examining considerable reared material the question arises, are they different species or only food variants. They are general feeders in the seed capsules of various plants and differ in size and coloration depending upon the amount of food available, but in all material examined the maculatory pattern was the same. They are abundant on cultivated iris and the imagos differ in no way from those reared on pitcher plant (*Sarracenia purpurea*), and described by Kearfott as *daeckeana;* while those reared from *Baptisia tinctoria* varied only in averaging a little smaller. Two reared from blackberry lily (*Gemminia chinensis*) approximate more closely those labeled *hebesana* in collections.

A large series reared from pine barren gentian (*Gentiana porphyrio*) average a little smaller than those reared from *Sarracenia,* and are lighter in color, with less black and more tan and less blue in the fascia. They seem to represent Walker's *hebesana.*

Walker, Cat. Lep. Heter. Brit. Mus., XXVIII, 1863, p. 342.
Kearfott, Trans. Am. Ent. Soc., XXXIII, 1907, p. 12.
Heinrich, U. S. N. M. Bull. 132, 1926, p. 103, 104.
Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 458.

Exartema sericoranum Walsingham

The food plant is recorded as *Myrica* and I have reared it on *M. carolinensis,* webbing the tips, pupating between leaves or in dead leaves at bottom of cage. *Imagos* July 1 to 7. I have also reared it on *Leucothoe racemosa,* and while the pattern is the same it differs from the typical *sericoranum* in that the interrupted fascia is brick-red instead of rust-orange and is definitely outlined with black; there is also a deeper purple in the stria separating the brick-red areas. Larvae and pupae in rolled leaves. Imagos July 1 to 7.

Evidently there are food variations in this genus that might be confusing.

Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1923, p. 466.
Heinrich, U. S. N. M. Bull. 132, 1926, p. 152.

Gypsonoma fasciolana Clemens

A spectacular species of 16 mm. expansion, with a black basal patch, followed in fresh specimens by a purple-white fascia, then an irregular black fascia and another purple-white fascia less clearly defined. Tip and adjacent cilia black. No food plant heretofore recorded. I have reared it on *Comptonia asplenifolia;* in webbed tips. Imagos June 1.

Heinrich, U. S. N. M. Bull. 123, 1923, p. 163.

Gwendolina concitatricana Heinrich

Two specimens, determined by Heinrich as this species, were reared on black walnut (*Juglans nigra*). Imagos, June 28.

Heinrich, U. S. N. M. Bull. 123, 1923, p. 189.

Anchylopera platana Clemens

Very common where the sycamore grows. The larva draws the leaf into a pucker along a rib on the under side by means of a stout web. It hibernates during the winter outside of the feeding area, in a turned-over edge of a leaf, or in a crumpled old leaf, without much protection. Imagos, June 1 to 13, and can be taken on the wing all summer.

Ancylis comptana Frohlick and *Ancylis floridana* Zeller, Differentiated

Heinrich says there are no genitalic differences in the synonymized species. J. B. Smith gives the first complete life history of *A. comptana;* complete except as to how the winter is spent. The larva does not pupate in the fall as originally supposed but remains dormant in a curled or rolled edge of a dried leaf until nearly spring.

A. floridana is described by Zeller as a distinct species and no doubt should remain so; it feeds on Uva-ursi or bearberry and I have not been able to induce the moth to oviposit on strawberry. In a normal season moths are on the wing at Whitesbog, Burlington Co., N. J., by April 20, at which time pupa and overwintering larvae can both be found in the old dead leaf tips. The moth deposits an egg on or near the tip of a young imbricated shoot and the larva bores its way into the developing tip.

Young larvae can be found on or before May 15th. Imagos by June 1st. Pupation is in the dead tip of the feeding area killed by the larva, generally in a loose web on the under side of a leaf, and if not protected by a closely pressed adjacent leaf the pupal leaf will be slightly curled. There are over-lapping broods until autumn, the last wintering as dormant larvae in the dead tips, going down the stem on warm days to feed openly on the evergreen leaves; this, if nothing else, will distinguish it from *A. comptana* as there are no green strawberry leaves upon which to feed during the winter, and if deprived of this winter feeding *A. floridana* dies.

Like *A. comptana* it does not pupate until spring and fresh specimens can be definitely differentiated by maculation, the basal patch in *A. floridana* is darker and larger and the question mark always found in *A. comptana* is absent in *A. floridana.*

At Whitesbog, N. J., strawberries and Uva-ursi are growing in close proximity. Both are heavily infested, the Uva-ursi nearly 100 percent, yet there is no evidence of cross breeding.

Heinrich, U. S. N. M. Bull. 123, 1923, p. 244, etc.
McDunnough Check List, Microlep. U. S. and Can., II, 1939, No. 7193.
Smith, N. J. Agri. Exp. Stat. Bull. 149, Feb. 27, 1901.
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(*To be continued*)

A Simple Method for Mounting Lepidoptera

By V. R. Damerell, Western Reserve University, Cleveland, Ohio

After experimenting for a number of years with many methods of mouting butterflies and moths the author has finally evolved one that appears to be simpler, and to require less handling of the specimen than others that he has tried. The method makes use of an insect pin sharpened at both ends. The relaxed insect, with closed wings, is grasped at the thorax with pliers, or with the fingers, and the pin is then accurately pushed through the under part of the thorax until it protrudes about a millimeter through the back. To expand the wings a pair of long nose pliers are used, being opened between the wings so as to force them apart. At the same time the insect is put on its back on a grooved drying board, or one having glass plates, as in the figure, and the protruding end of the pin forced into the wood to hold the body in place. The wings are then expanded in the usual manner, using glass plates, paper strips, etc. When they are set the insect is removed and mounted by pushing the other sharpened end of the pin into the cork sheet of the mounting cabinet.

This method has a number of advantages. The pin is put through the insect once and left there. It is much easier to put it through from below than to attempt to push it in between the wings, or to push it in from below and then reverse it after the wings are set. Thus handling of the insect is at a minimum. The method permits setting the wings while the insect is on its back. This automatically prevents sagging of the abdomen and antennae, and overcomes the tendency of the wings to spring up in specimens which are difficult to relax. Finally, the point of the pin coming up from the back is almost invisible in the mounting cabinet, so that the insects appear more lifelike.

The one disadvantage is that in the mounting cabinet pins must be pushed into the cork layer by using pliers placed below the specimen, rather than pushing on the head of the pin. However, this method is generally advocated anyway as being least likely to injure the specimen.*

Notes and News in Entomology

Under this heading we present from time to time short reviews, notes, news, and comments on entomology throughout the world. Contributions from readers are solicited and will be acknowledged when used.

Recent events have stressed our lack of knowledge of many of the fundamental aspects of the study of insects. This is per-

* Spreading upside down can also be done without removing the head of the pin. One inserts the pin in the usual manner and then has Plasticene or other material soft enough to allow inserting the pin head in the groove of the mouting board. THE EDITORS.

haps especially true of insect physiology, and no branch of that field has been more neglected than the study of insect hormones. Entomologists have generally been content to take over and modify concepts developed in vertebrate physiology and in only a few instances, as in the case of the "gene hormones," has work with insects preceded that done with other animals.[11]

For some years it has been known that color changes,[11] moulting and metamorphosis [14] of insects are under the control of hormones. The brain was the first organ suggested as a source of an insect hormone.[7] More intensive work on small glands located close behind the brain in most insects, the corpora allata, turned the attention of workers to these interesting organs, but more recently the nervous system has been reconsidered.[12, 1] It has been suggested that the ventral glands and pericardial glands of *Dixippus* may have an endocrine function.[10] An as yet unverified report from Japan that the prothoracic glands of Lepidoptera are also a source of hormones,[6] together with work on the corpora cardiaca, will serve to show how little we know even about the morphology of the endocrine glands. It has been shown that the enigmatic ring gland of Diptera is the combined corpus allatum and corpora cardiaca,[5] but a more recent note from China is not quite in agreement with these results.[15] Something is known of the sequence of cytological changes in the neurosecretory cells of cockroaches,[12] but complex cytological changes in the corpora cardiaca, though observed, have yet to be carefully studied. Nothing is yet known regarding the chemical nature of insect hormones.

The classical endocrinological methods of extirpation and transplantation, in spite of the small size of insects, have yielded valuable results. An interesting series of papers by Vogt [13] has suggested that the ring gland plays a fundamental rôle in the maturation of the ovaries in *Drosophila*. If larval ovaries from one species are transplanted into the body cavity of another they will not develop unless a ring gland from the first species is transplanted simultaneously. Among vertebrates hormones have generally been thought to be non-specific, even between

Classes. But it appears that in *Drosophila* the hormone may actually be specific to the species. The relation between the development of larval salivary glands and ring gland secretion has been investigated by Bodenstein.[2] If larval salivary glands were transplanted into the body cavity of adult male *Drosophila,* they ceased to grow. If ring glands from the larvae were transplanted simultaneously, however, the salivary glands developed and finally underwent metamorphosis. The ring gland factor is in this case not species specific. In fact, specificity may be the exception, for the corpora cardiaca of the cockroach have been shown to contain comparatively large amounts of a hormone affecting the red chromatophores of the crayfish.[3] While extirpation of the ring gland of flies [4] and the corpus allatum of grasshoppers [9] prevents the development of eggs, it has been suggested that the action is not the result of a sex hormone, but through general metabolic processes.[4] There is nevertheless a close relationship between the ovaries and the corpora allata, as is shown by several reports of hypertrophy of the latter gland after castration.[4, 9] However, insects appear to live normally after the corpus allatum has been removed.

Another phenomenon formerly attributed to hormones is found in the development of castes of the primitive California termite, *Zootermopsis.* Light [8] has shown that if soldiers are removed, new soldiers develop from nymphs which would never had become nymphs if the original soldiers had been permitted to remain in the colony. Neoteinic reproductives develop after removal of the true king and/or queen. These observations, and others, suggest that a direct inhibitive action is exerted by these castes. While there is as yet no proof of the existence of "ectohormones" formerly invoked to explain this inhibition, an alternative explanation has yet to be found.

It will be seen from this brief review of a few recent developments that many significant biological principles may still be expected to be discovered as a result of studies in the field of insect hormones. M. F. Day.

[1] Bodenstein, Cold Spring Harbor Symposia on Quart. Biol. **10**: 17–26, 1942.
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[11] Scharrer, Phys. Rev., **21**: 383–409, 1941.
[12] Scharrer, J. Comp. Neur., **74**: 93–108, 1941.
[13] Vogt, Biol. Zbl., **60**: 479–484, 1940; ibid., **61**: 148–158, 1941.
[14] Wigglesworth, J. Exp. Biol., **17**: 201–222, 1940; Naturwiss., **29**: 80–81, 1941.
[15] Zee and Pai, Amer. Nat., **78**: 472–477, 1944.

Types from the New England Museum of Natural History

The types of insects formerly at the New England Museum of Natural History (The Boston Society of Natural History) have been transferred to and are now part of the collections of the Museum of Comparative Zoology at Harvard College, Cambridge, Massachusetts. NATHAN BANKS.

THE GENUS CONOTRACHELUS DEJEAN (COLEOPTERA, CURCULIONIDAE) IN THE NORTH CENTRAL UNITED STATES. By Herbert F. Schoof. Illinois Biological Monographs. Vol. 19, No. 3, 170 pages including 9 plates with 109 figures.

While this monograph, which appeared in Dec. 1942, is confined to those species of *Conotrachelus* occurring in Illinois, Wisconsin, Iowa, Missouri, Kentucky and Indiana, because of the nature of some of the material presented and of the general distribution of the species treated in the eastern half of the United States, it will be of interest and use to a much wider field.

The author defines as his objectives: the preparation of workable keys to and the adequate descriptions of the species of the area under study, the study of the morphology of the male genitalia and the determination of their taxonomic significance, and finally the evaluation of the morphological characters used in the past and the indication of additional ones.

There is a review of the taxonomic literature followed by a chapter on materials and methods used including an account of the author's technique in the removal, study and preservation of the male genitalia.

The next chapter is devoted to a discussion of the morphological characters of taxonomic importance and is divided into four sections: 1. Body regions and their appendages; 2. Coloration and vestiture; 3. Characters for sex determination; 4. The male genitalia with a full discussion of the male genitalia of *C. nenuphar* (Hbst.) and the relative taxonomic value of the various parts.

In treating the genus four groups are designated with a key to these groups. Under each group there is a key to the species of the group. The external morphological structures and the male genitalia of each species is then described in detail, special characters being given as diagnostic. Each description is followed by a brief discussion of the distribution, biology, phylogeny or nomenclature of the species treated. Approximately two to five pages are devoted to each species. Twenty-eight species are covered, of which five are new.

A glossary, list of literature cited, nine excellent plates and an index conclude this well-organized and executed piece of work. E. J. F. Marx.

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 and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—**Bitancourt, A. A.**—Distribuicao teorica de lesoes em folhas ou frutas, causadas por insetos e outros animais ou por agentes infecciosos transmit idos por vetores. [14] 14: 243–52. 1943 [with English abst.]. **Bruner, Lawrence.**—Biographical note. [104] 12: 222–226, ill. **Burmeister, German.**—Biographical note. [104] 12: 159–65, ill. **Carpenter, G. D. H.**—Birds and butterflies. [31] 154 (3905): 304. **Chambers, V. H.**—British bees and windborne pollen. [31] 155: 145. **Dowdy, W. W.**—A preliminary report on the Arthropoda of the oak-hickory forest of Missouri with special reference to stratification (abst.). [Bull. Ecol. Soc. Amer.] 25 (3): 20. **Fisher, R. C.**—Wood-boring insects in beech furniture. [31] 155: 116. **Flint, W. P.**—Obituary. [59] 37: 130–31, port. **da Fonseca, filho.**—Arthur Neiva. [15] 16 (2): 153–62. **Mello & Cuocolo.**—Alguns aspetos das relacoes do Habronema muscae (Carter, 1861) com a mosca domestica. [14] 14: 227–34, ill. 1943 [with English abst.]. **Metcalf, Z. P.**—The center of origin theory and its importance to ecology (abst.). [Bull. Ecol. Soc. Amer.] 25 (3): 19. **Miles, H. W.**—Wireworms and food production. [31] 155: 136–38. **Travassos, L.**—Atuacao cientifica de Arthur Neiva no campo da biologia. [111] 40 (1): i–vi, portrait. 1944.

ANATOMY, PHYSIOLOGY, MEDICAL—**Balch & Bird.**—Disease of the European spruce sawfly, Gilpinia hercyniae, and its place in natural control. [Sci. Agriculture] 25: 65–80. **Chapman, R. K.**—Interesting occurrence of Musca domestica larvae in infant bedding. [4] 76: 230–32. **Cook, E. F.**—Morphology of the larval heads of certain Culicidae. Morphology of the larval head of a sp. of Chironomus. [117] 9: 38–68, 69–77, ill. **Crombie, A. C.**—Sensillae of the adults and larvae of the beetle Rhizopertha dominica. [107] 19: 131–32. **Crowson, R. A.**—Further studies on the metendosternite in Coleoptera. [36] 94: 273–310, ill. **Fedotov, D. M.**—On the 2 types of regress of organs in the ontogenesis of insects. [99] 44: 123–25. **Ferris, G. F.**—On certain evolutionary tendencies in the head of insects. [117] 9: 78–84, ill. **Ford, E. B.**—(See under Lepidoptera.) **Jackson, H. W.**—Method for observing and staining live insect blood under oil immersion. [Turtox News] 23: 12–14, ill. **Keene & Light.**—Results of feeding ether extracts of male supplementary reproductives to groups of nymphal termites. [Calif. Univ. Pub. Zool.] 49: 283–90. **Milne & Milne.**—Selection of colored lights by night-flying insects. [70] 24: 21–86. **Mohammed, A. H.**—Notes on the toxins of Egyptian scorpions. [Biochem. Jour.] 38: 284–85. **Oliver & Anderson.**—Effect of rematings on the fecundity of an infertile female. [90] 79: 89–94. **Thorpe, Crombie, Hill & Darrah.**—Food finding of wireworms (Agriotes spp.). [68] 155: 46–47. **Wellington, W. G.**—Effect of ground temperature inversions upon the flight-activity of Culex sp. [4] 76: 223. **Zee & Pai.**—Corpus allatum and corpus adiacum in Chironomus sp. [90] 78 (778): 472–77, ill.

ARACHNIDA AND MYRIOPODA—Baker, E. W.—Five mites of the family Ereynetidae from Mexico. [91] 35: 16–19, ill. (*). **Hoff, C. C.**—Notes on 3 pseudo-scorpions from Illinois. [59] 37: 123–28. **Hoffmann, A.**—Los ectoparasitos de los murcielagos Mexicanos. [Univ. Nac. Mexico, Fac. Cien. Dept. Biol.] 150 pp., ill. (*). Un nuevo acaro parasito de murcielagos. [112] 15: 185–89, ill. (S). **Mohammed, A. H.**—(See under Physiology.) **Stebbins, R. C.**—Lizards killed by a millipede. [119] 32: 777–78. **Williams, R. W.**—Bibliography pertaining to the mite fam. Trombidiidae. [119] 32: 699–712.

THE SMALLER ORDERS—Auguston, G. F.—Further report on a chigoe-like flea from California with a discussion of the true chigoe, Tunga penetrans. [38] 43: 119–21, ill. **Castle, G. B.**—Termites in Montana. [Northwest Sci.] 18: 64. **Klots, E. B.**—Notes on the Protodonata and Protozygoptera of the Lower Permian of Kansas. Gomphus consanguis. Notes on the Gomphinae with descr. of n. sps. (Odonata). [40] nos. 1258, 1259, 1260. **Lima, A. da C.**—Insetos do Brasil. IV. Panorpatos Suctorios, Neuropteros, Trichopteros. 141 pp., ill. **Sweetman, H. L.**—Ecology of the silverfish, Lepisma saccharina L., molting among the Thysanura (absts.). [Bull. Ecol. Soc. Amer.] 25 (3): 29.

ORTHOPTERA—Drake, Decker & Tauber.—Observations on oviposition and adult survival of some grasshoppers of economic importance. [81] 19: 207–23. **Piran, A. A.**—Catalogo sistematico y zoogeografico de Tettigonioideos Argentinos. [104] 12: 190–95. **Teale, E. Way.**—Insect appetite Number One [Mantis]. [Fauna] 6 (3): 73–76, ill. from photos. **Uvarov, B. P.**—New name in Acrididae. [108] 13: 144.

HEMIPTERA—Beamer, R. H.—New sp. of Dorydiella from Kansas (Cicadell). [103] 18: 48. **Bergamin, J.**—Metodos de laboratorio para observacao e criacao de Diatraea saccharalis (Fabricius, 1794) a broca da cana. [14] 14: 351–54, ill. 1943. **Caldwell, J. S.**—Notes on some less common gen. of tropical Cixiidae. [43] 44: 252–54 (*). **Hawboldt, L. S.**—History of spread of the beech scale, Cryptococcus fagi, an insect introduced into the maritime provinces. [Acadian Nat.] 1: 137–46, ill. **Knull, D. J.**—Descr. of 6 Typhlocybas from U. S. [43] 44: 269–72, ill. (*). **Knowlton, G. F.**—Observations on the feeding of some predacious hemiptera. [Proc. Utah Acad. Sci. A. & L.] 21: 57–59. **Lepage, H. S.**—A escama vermelha dos citrus em Sao Paulo, Aonidiella aurantii (Maskell) (Coccoidea). [14] 14: 311–30, ill. 1943 [very brief English abst.]. **Lepage & Giannotti.**—Notas coccidologicas (with English abst.). [14] 14: 331–50, ill. 1943. **Monte, O.**—Tingitideos americanos (S*). [14] 14: 263–72, ill. 1943. **Morrison, H.**—Mealy bug gen. Heterococcus and some of its relatives (Coccid). [91] 35: 38–55, ill. (*k). **Penner, L. R.**—Genus Laccocera (Delphac). [103] 18: 30–47, ill. (*). **Russell, L. M.**—New gen. and 12 n. sps. of Neotropical white flies (Heyrod). [91] 35: 55–65, ill. (*k). **Snow, W. E.**—Pictinus aurivillii. [59] 37: 129. **Trautman, M. A.**—Ovipositor studies of the leafhopper gen. Erythroneura (Cicadell). [43] 44: 265–68, ill. **Tuthill, L. D.**—Contributions to the knowledge of the Psyllidae of Mexico. [103] 18: 1–29, ill. (*k).

LEPIDOPTERA—Blevins, H. M.—Some butterflies of Sequoia Nat. Park. [38] 43: 122–23. **Bourquin, F.**—Metamorfosis de Perizoma impromissata (Geomet). [104] 12: 166–72, ill. **Carpenter, G. D. H.**—(See General.) **Chermock, F. H.**—Some new N. Amer. Lycaenidae. [4] 76: 213–16. **Comstock & Dammers.**—Brief notes on the early stages of 3 California moths. [38] 43: 113–18, ill.

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DIPTERA—**Alexander, C. P.**—New nearctic crane-flies. Part XXII. [4] 76: 217–22. New sp. of crane flies from the U. S. and Canada. [13] 36: 89–94. **Callan, E. McC.**—(See under Hymenoptera.) **Collin, J. E.**—Notes on some recent work on the Pipunculidae. [8] 81: 1–6. **Cook, E. F.**—(See under Anatomy.) **Correa & Ramos.**—Os anofelinos de Ilha de Santo Amaro. [94] 9: 9–16, ill. **Dickinson, W. E.**—Mosquitoes of Wisconsin. [Bull. Pub. Mus. Milwaukee] 8: 269–305, ill. **Goffe, E. R.**—Generic names of Meigen 1800 and the genotype of Zelima (Syrph). [8] 80: 284–86. **Hardy, D. E.**—New Asilidae and Mydaidae in the Snow collection. [4] 76: 226–30, ill. **Matheson, R.**—Mosquitoes of No. Amer. Their structure and habits: study and identification: how they carry disease: methods of control. 2d edition. 313 pp., ill. **Mello & Cuocolo.**—(See General.) **Smart, J.**—Notes on Simulidae II. [108] 13: 131–36 (*). **Vargas, L.**—Culicoides diabolicus en Mexico, caracteres del macho. [56] 5: 163–70, ill. **Zee & Pai.**—(See Anatomy.)

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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.

Coleoptera—Will exchange mounted and labeled specimens from North America. All groups except Rhynchophora. G. P. Mackenzie, 1284 Sherwood Road, San Marino, Calif.

Lepidoptera—Should like to hear from collectors interested in species from central Alberta and Saskatchewan. Would collect other Orders. Paul F. Bruggemann, R. R. 1, Furness, Sask., Canada.

Lampyridae of U. S. and Canada wanted from the South and West, especially Photinus and Pyractomena for revisional study. Buy or exchange. J. W. Green, R. D. 2, Easton, Pa.

Lepidoptera—Would like to exchange Californian butterflies, noctuids, geometrids, etc. for eastern specimens. Glenn E. Pollard, 500 Clark Drive, San Mateo, Calif.

Lepidoptera—Am still collecting here and have only fine specimens for exchange. H. W. Eustis, Woodbine Rd., Augusta, Ga.

Wanted—Viennese Entomological Printing Press, for printing 3, 3½ and 4 type data labels. Kent H. Wilson, 430 Ridgewood Road, Fort Worth 7, Texas.

Wanted—Heteroptera from all parts of the world, all families except Miridae. Will buy, exchange or determine. S. and C. Amer. species esp. desired. John C. Lutz, 6623 Lansdowne Ave., Philadelphia 31, Pa.

Wanted—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

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ENTOMOLOGICAL NEWS

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Could the Widespread Use of DDT be a Disaster? [1]

By E. H. Strickland, University of Alberta

By popular report, the potentialities of DDT as an insecticide are so great that it is postulated that its employment may result in the termination of most of our insect tribulations. Such scientific investigations as have as yet been possible hardly support the sweeping claims of the popular articles, but they do point to a very real danger, if the reported results of one moderately large "field" experiment approach accuracy.

It has been stated that, in Pennsylvania, the treatment of a 20-acre tract of forest-land with DDT resulted in the almost total destruction of many forms of insect life in this area. If there is any truth to this statement, it would appear to be most fortunate that the experiment was limited to 20 acres.

The factors which maintain the equilibrium between the abundance of the vast majority of plant-feeding insects and their predatory and parasitic insect enemies are so delicately, and yet so satisfactorily, adjusted that man is in serious danger of producing disastrous consequences for himself if he attempts to interfere, other than to a very limited extent, with the "centre of balance." If he succeeds in deflecting it seriously, the "rebound" is liable to be very unpleasant, if not disastrous, for him during the next few years.

In this connection, it must be constantly borne in mind that the correct *density* in population, both of host and of parasite, is as rigid a requirement of a stable equilibrium as is their *relative abundance*.

[1] See Conant, No Joy in an Insect-Free World. Ent. News, 55: 258–259, 1944.

Fortunately, the occasions on which man has found it to be necessary for him to make widespread and intensive attempts to assume the role of nature in maintaining some kind of an equilibrium normally occur only when vagaries in the weather have permitted a temporary swing towards the super-abundance of some particular insect which is detrimental to his interests.

Such attempts as he then makes to reduce the surplus are all to the good since, to a certain extent, he is assisting in the re-establishment of a normal density of population among the host insects in addition to affecting a better ratio between their numbers and those of its enemies. Even at such times, however, it is owing to the fact that he has been only partially successful in exterminating the pest that its all-important enemies retain their ability to increase once more and, ultimately, to re-gain their ascendancy over it.

It is the unremitting decimation, by their enemies, of the hundred-and-one foliage feeding insects which inhabit every wood-lot that prevents each of them from becoming a pest of similar magnitude to other insects, such as the gypsy moth, whose only crime against the residents of America is the fact that it arrived in this Country minus its own complement of special enemies. Every native foliage feeder possesses just about the same potentialities for increase and destructive ability when it is given an opportunity to escape from the attentions of its ever-present enemies.

Fortunately, the complete elimination of any plant-feeding insect, by control measures, from small, more or less scattered, areas has little effect upon their subsequent abundance. Such small vacua are quickly re-invaded, not only by the plant-feeder itself but also by its enemies, and the slight "jolt" which may have been given to equilibrium in such areas is hardly appreciable.

Suppose, however, that the application of DDT to fairly large areas, such as several square miles, in connection with the control of some particularly injurious insect which was, at the time, occurring in outbreak numbers did result in the elimination of, let us say, a dozen additional plant-feeders, all of which, when in a state of equilibrium with their enemies, are to all intents and purposes innocuous. It would matter little whether, at the same time, it directly killed their parasites as well as themselves. The elimination of their hosts for a single season would assure, in addition, as complete an elimination of the parasites unless some alternative host of sufficient similarity to their normal one to meet their requirements had somehow escaped the general devastation among the plant-feeders.

It could, however, be but a matter of a few years thereafter that the flying adults of one or more of these evicted natives, aided possibly by favourable winds at the time of their flight, reinvaded the cleared area from surrounding unaffected territory. It is almost impossible to visualize the possibility that a suitable number of their parasites, since they are on the wing at entirely different seasons of the year, will accompany them and thus be capable of re-establishing equilibrium without delay. Any which were unfortunate enough to re-enter the area at any time before the return of their hosts would, of course, "die without issue."

For this reason, any efforts which were made to eliminate a really injurious pest from a large area could not be relied upon to give permanent respite from it. Not only might they entail subsequent ultra-severe infestations from the pest itself but, at the same time, there is a very real danger that they would inaugurate temporary outbreaks of many another insect which, in so far as man is concerned, has always been in a sufficiently stable state of equilibrium with its parasites never to have occurred in sufficient numbers to constitute a menace of any kind.

Were this to occur, the only method man could adopt, unless he were prepared to accept and to live through the "outbreaks" which he had brought on himself, would be to repeat the treatment every few years thereafter. He would, thus, assume the laborious and expensive task of an annual reduction in the population of many an insect which, but for his interference, would have been assured, free of cost and human labour, by natural equilibria.

The regularly recurring outbreaks of the Forest Tent Caterpillar are due largely to the fact that, by the end of all such outbreaks, their parasites have become so excessively abundant that, in the year following the last in which the "outbreak" occurred, they caused a 100% mortality among the few survivors and, in consequence, they themselves are eliminated from vast areas. It is only in some subsequent year, when, from some area beyond the limits of the earlier outbreak, and where normal equilibrium has been maintained, some of the moths fly, or are carried by high winds, back into the freed area that we realize the tragedy of the fact that the earlier complete elimination of the pest resulted in an inevitable disappearance of its enemies. Very soon thereafter the caterpillar population has been built up to outbreak proportions and it is usually only after about three years of almost complete defoliation of the trees that the parasites, which are now able to reinvade the territory successfully, finally bring them once more under subjection.

In the meantime, to the obvious damage to the trees must be added the human discomfort of armies of countless hungry caterpillars which swarm over the countryside and are no respecters of houses, inside as well as out, in their search for food.

How much more severe troubles may man be storing up for himself if he employs DDT on a widespread scale and it approaches in effectiveness the claims which are made for it?

The place for its invaluable employment is surely confined to relatively small areas, such as the inside of 'planes or buildings or in gardens and orchards in which its use can not seriously affect the "balance of nature" throughout large tracts of land. It is somewhat gratifying to realize that its efficiency as a universal exterminator of insect life may prove to be somewhat less pronounced than many people believed it might be but, should it even approach its claimed toxicity to plant-feeding insects in general, its *widespread* employment over large connected areas might constitute an entomological disaster of the first magnitude.

Notes on Some Microlepidoptera

By EMLEN P. DARLINGTON, New Lisbon, Burlington County, New Jersey

(*Continued from page 74*)

Tortricidae

Peronea trisignana Robinson

Larva dull green; head and cervical shield black; black warts on prothorax; fore legs black. Skeletonizing leaves of white birch (*Betula populifolia*), also reared on river birch (*B. nigra*). The larva generally folds a white birch leaf at the midrib and feeds under this fastened down protection. It also feeds between two firmly attached leaves. Pupa in the area of last feeding, usually near the base of the leaf and attached by a few silken threads at the caudal end, otherwise naked. Naked pupae also in the trash of fallen leaves. Pupation in October. Imagos, October 25 to November 17.

Robinson, Trans. Am. Ent. Soc., II, 1869, p. 282.
McDunnough, Can. Jour. of Research, II, 1934, p. 314.
Forbes, Memoirs 68, Cornell Univ. Agr. Exp. Sta., 1923, p. 483.

Gelechiidae

Recurvaria robiniella Fitch

Larva between two leaflets of locust (*Robinia pseudacacia*). "Fitch collected his leaves in the autumn." It is best to delay gathering them until late in October, when they are about ready to fall; even then some larvae will be immature. It is well to remember that a locust branch sheds its leaves readily when caged. Pupation is between two leaflets, in a slight silken web, or in tightly curled dead leaves, naked, or surrounded by a loose web of silk and soil. Imagos, June 1 to July 16.

Busck, Proc. U. S. N. M. XXV, 1903, p. 812.

Gelechia argentipunctella Ely

Larva from Beltsville, Md., feeding on arbutus leaf. Pupa in folded over leaf. Imago, April 28.

Stegasta bosquella Chambers

Food plant recorded as *Cassia chamaecrista robusta,* a large flowered sensitive pea or Prairie Senna. A sizable series was reared by L. J. Bottimer at Lake Alfred, Florida, feeding in the flower heads of *Kuhnistera pinnata.* Imagos in November. I did not see the larvae but the imagos check with *S. bosquella.*

Busck, Proc. U. S. N. M. XXV, 1903, p. 864.

Anacampsis agrimoniella Clemens, *Anacampsis lupinella* Busck, and *Anacampsis tristrigella* Walsingham

Very likely but food variants of the same species. I have reared on *Baptisia tinctoria* four specimens, combining the characteristics of *A. agrimoniella* and *A. lupinella.* They have the dark bronze coloring, the reddish eyes, the needle-like palpi, the annulate antenna, and one has the white fascia as in *A. agrimoniella,* but less clearly defined; it also has the three brown spots that are sometimes seen on *A. agrimoniella,* one near the base, one in the fold and one at end of cell. In another specimen the fascia is absent as in reared specimens of *A. lupinella.* The other two have fascias indicated and incomplete. 14 mm. The larva has a pale brown head and cervical shield and very black tubercles. Food, *Baptisia tinctoria* at Hicksville, Long Island. Larvae taken by L. J. Bottimer. Imagos, June 20.

I can see no justification for the erection of a new species, based solely on the discovery of a new food plant.

Busck, Proc. U. S. N. M. XXV, 1903, p. 850.
Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1924, p. 279.

Compsolechia kearfottella Busck

In the Academy collection is a specimen of *Compsolechia* (or *Anacampsis*) *kearfottella* Busck, reared by F. M. Jones on *Azalea viscosa.*

Busck, Proc. U. S. N. M. XXV, 1903, p. 842.

Dichomeris bipunctellus Walsingham

As no food plant has been recorded I will mention that I have reared it on sweet fern (*Comptonia asplenifolia*), the larva in a webbed nest in the tips. Imagos, July 3 to 9.

Walsingham, Trans. Am. Ent. Soc., X, 1882, p. 186.

Gracillariidae

Lithocolletis trinotella Braun

An underside miner on red, norway, and possibly other species of maple. The larva is active in the small oval mine until late in October. Pupation in the puckered mine. Imagos, May 15 to June 1. They can be taken on the wing by May 1. Braun says, "In the apical portion (of fore wing) there are two costal white wedge-shaped streaks and a similar dorsal one just before the tornus, opposite the first costal streak." Forbes says, "there are three white costal streaks and two dorsal streaks," and according to my reared material this is correct. Distinguished from *L. quercialbella* Fitch, by rearing.

Braun, Ent. News, XIX, 1908, p. 99.
Forbes, Memoir 68, Cornell Univ. Agr. Exp. Sta., 1923, p. 189.

Lithocolletis crataegella Clemens

Have reared it as an underside miner on apple. Mine near base, along midrib and confined between two lateral veins. Larva hibernates for a time in the brown puckered mine. Pupation late in November under a silken cover in the mine. Frass in a ball in center of mine. Imagos, early May and on. Clemens observed that the larva would desert one mine and form another. I have observed the same behavior.

Clemens, Proc. Acad. Nat. Sci. Phil. 1859, p. 324; 1860, p. 208.
Braun, Trans. Am. Ent. Soc., XXXIV, 1908, p. 301.

Gracillaria packardella Chambers

As stated by Chambers, "the larva soon leaves it [the mine] (which is hardly noticeable) to feed on the under side of the leaf." It pupates, usually in the trash on the ground; in the rearing cage, on a leaf or on sleeve of cage. I have reared it on sugar and Norway maple.

Imagos, early May into June. On the wing all summer.

Parasite, *Zootrephes scapulatus* Davis.

Chambers, Can. Ent., IV, 1872, p. 27; Cin. Quart. Jn. Sci., II, 1875, p. 227.

Phyllocnistis liriodendronella Clemens and *Phyllocnistis magnoliella* Chambers

I have specimens reared on *Liriodendron tulipifera* and on *Magnolia virginiana* and cannot distinguish between them. Their larval work and method of pupation is the same. The mine is a long, tortuous tract, on the under side of the tender leaves of tulip poplar and magnolia, "starting near the outer margin and continuing until a large portion of the under epidermis is detached, giving the area a bluish-white cast." Pupation is naked in a small pocket-like case, made by turning under the edge of a leaf for not more than 10 mm., and fastening the flap loosely. It is usually on the edge of the leaf furthest from the mine. Pupae are plentiful on *Magnolia virginiana* but on *Liriodendron tulipifera* the pupal cases are usually empty, giving rise to the belief that magnolia is the natural food and that eggs are deposited on Liriodendron leaves by moths matured on Magnolia.

Similar mining was observed on sweet gum (*Liquidambar*). Pupal cases were made but never occupied. I have never found them again on sweet gum.

Clemens, Proc. Ent. Soc. Phil., II, 1863, p. 13.
Chambers, Can. Ent., III, 1871, pp. 185, 206.

Pyralidae

Phlyctaenia tertialis Gũenee

Merely to call attention to the records that would indicate it to be a general feeder.

Larvae taken in webbed leaves of elder (*Sambucus*) October

25, hibernated in any sheltered area until June 10. Imagos, June 22 to 26, all dark form.

Balduf, W. V., Proc. Ent. Soc. Wash., XXXII, 1930, pp. 31, 36.

Pyrausta pertextalis Lederer

Seems to be a general feeder. F. M. Jones reared it at Martha's Vineyard, Mass. on *Clethra alnifolia,* the moths emerging July 27 to Aug. 11. At New Lisbon, N. J., I reared it webbing the terminal shoots of *Chenopodium album* (lamb's quarters), the moths emerging Aug. 10.

New Jersey Light-trap Versus Human Bait as a Mosquito Sampler

By Robert M. Stabler, Department of Zoology, University of Pennsylvania and Delaware County (Pa.) Mosquito Extermination Commission

Introduction

Those interested in determining the extent and variety of an adult mosquito population in a given area have long sought sampling methods which would give an accurate cross section of the insect concentration. Inspection of diurnal rests and baiting with horses, cattle, goats, chickens and rabbits, are among the methods tried with varying success. The fact that many insects are attracted to light was the basis for the development of the New Jersey mosquito trap, which was devised in an effort to establish a sampling device free from the many objectionable features inherent in some of the other procedures.

The New Jersey trap has been a boon to mosquito workers. It has not proven a panacea, however, and its catches are still being contrasted with those obtained by the other methods, in an effort toward further evaluation. Although Carpenter (1942) felt that the trap compared favorably with hand collection methods for measuring imago densities of *Anopheles quadrimaculatus,* Huffaker and Back (1943) concluded that this method did not serve as a good indicator of concentrations of this species. They state further that they are convinced that the New Jersey trap does not catch a representative sample of a mixed mosquito population.

In order to secure data which might further elucidate the bait-versus-trap controversy, the writer spent considerable time during July and August of 1944 allowing himself to be bitten, as a control on a New Jersey trap which was operating a short distance from his bite site. The results are given below.

Method

On 22 occasions in July and 23 in August, the light trapping and baiting were done on the same evenings. Each location was at a fixed spot, 82 feet apart. The light trap was in plain view of the baiting site.

The baiting costume was designed for the greatest collecting efficiency. A coat prevented biting on areas which were difficult to reach, and the wearing of shorts insured a generous feeding area. Sitting on a low stump, the baiting was begun at approximately 8:45 P.M., Eastern War Time, and continued for 30 minutes. At this time of day the light had faded to a point where it was just possible at the beginning of operations to catch the first few mosquitoes with the unaided eye. A flash light, shaded so that it gave only very weak illumination, was used as darkness increased.

A vial, with chloroform as the killing agent, was placed over each feeding mosquito until she was immobilized. It is the writer's belief that practically every individual which alighted to feed during the whole 1,350 minutes of baiting was successfully taken. On rare occasions, when feeding was heaviest, a female would engorge and fly off before she could be caught.

The light trap, operating with a 25 watt, white frosted bulb, was turned on as baiting commenced, and continued to run throughout the night. It was switched off at about 7:00 A.M.

Only female mosquitoes are considered in these analyses. Also, whereas it is known that several species of *Culex* were taken (*C. pipiens, C. salinarius, C. apicalis,* and probably *C. restuans*), these are lumped together in the computations be-

TABLE

Mosquito Species	Total catch	*Culex* species	*Aedes vexans*	*Aedes canadensis*	*Aedes cantator*	*Aedes sollicitans*	*Aedes trivittatus*	*Aedes taeniorhynchus*	*Anopheles punctipennis*	*Mansonia perturbans*	*Uranotaenia sapphirina*	*Psorophora confinis*	*Psorophora ciliata*	*Orthopodomyia signifera*	*Culiseta inornata*
Light Trap Alone															
Number	467	318	94	2	2	7		1	27		1	4		2	1
% of catch		68.1	20.1	0.43	0.43	1.5		0.21	5.7		0.21	0.85		0.43	0.21
Bait Catch Alone															
Number	1104	888	102	1	60		1	1	47	2			1		
% of catch		80.4	9.2	0.09	5.4		0.09	0.09	4.3	0.17			0.09		
Trap and Bait Catches Combined															
Total number	1571	1206	196	3	62	7	1	2	74	2	1	4	1	2	1
% taken by trap	29.7	26.4	48.0	66.7	3.2	100	0	50.0	36.5	0	100	100	0	100	100
% taken by bait	70.3	73.6	52.0	33.3	96.8	0	100	50.0	63.5	100	0	0	100	0	0

cause of the difficulty in satisfactorily separating the females of these species.

Observations

On examining the table it is seen that a total of 1571 mosquitoes was taken, 476 (29.7 per cent) by trap, and 1104 (70.3 per cent) by bait. It is noted at once that, at least with the particular bait individual employed, baiting was numerically considerably more efficient as a mosquito attractant than was a 25 watt lamp. The 1104 specimens caught feeding means that a mosquito was taken for each 1.2 minutes of the entire 1350 minute bait period.

Briefly considering the bait collection alone (1104 females), we find that most of the mosquitoes were *Culex* (888 specimens), with *Aedes vexans* next in order (102 specimens). These, then, comprised nearly 90 per cent of all biters. *Aedes cantator,* a fierce biter, was represented by 60 individuals (5.4 per cent), while *Anopheles punctipennis,* which bred generally in the area, accounted for 47 (4.3 per cent).

Compared with these data, the light trap catch (467 females) likewise had *Culex* (318 individuals) and *A. vexans* (94 individuals) constituting nearly 90 per cent of the total. The trap attracted *A. punctipennis* in about the same percentage (5.7 per cent; 27 individuals) as did the bait, but was strikingly ineffective for *Aedes cantator* (2 specimens; 0.43 per cent). The other species listed were taken by one method or the other in numbers too small to warrant comparison.

Even more interesting are the figures obtained when both attraction methods are considered together. The general superiority of the human bait over white light (25 watt) has already been noted. Baiting is obviously of no value, however, where males and non-biting species are concerned. Of 1205 *Culex* mosquitoes caught, almost three-quarters of these purely pest types responded to bait (73.6 per cent). *Aedes vexans,* the other pest species present in fair numbers (196 females), was taken approximately equally by both methods. The anopheline, *A. punctipennis,* found bait more attractive than light by a ratio of somewhat less than two to one.

The greatest divergence was again noted for *Aedes cantator.* Of the 62 females taken, 60 were biters, only 2 (3.2 per cent) going into the trap.

Discussion

In the survey reported here there are a number of points to be noted. First, the two attraction sites were not very far apart (82 feet). In a study made in Puerto Rico, Pritchard and Pratt (1944) found that bait (horse, calf) near a light attracted abnormally high numbers of anophelines. When moved to a position 200 feet from the light there was a sharp decline in the baited catch. What the baiting results would have been in the present experiment, had the bait site been further removed from the trap, we of course do not know.

Also, there is known to be a marked difference in attractability among human beings. Weathersbee (1944), in testing this point on Puerto Rican *Anopheles albimanus,* found horses over twenty times more efficient than men, with individual equines being relatively uniform in attractiveness, while different human beings varied considerably in this respect. Although not tested in this experiment, the writer knows from past experience that among human beings he appears to be a better than average attraction. It is possible, therefore, that had a different bait-subject similarly exposed himself to the ravages of these insects, the attraction rates might have varied from the present figures.

The baited catches in the present report were made during the 30 minute period beginning at dusk. For most local forms this is certainly the time of greatest activity and food-seeking, a fact which was fully appreciated by the baitee. In this connection, it was pointed out by Huffaker and Back (1943) that from an activity peak reached at dusk, most species of mosquitoes decline in this respect during the first three hours thereafter. The decline in activity was most noticeable after the first hour. *Anopheles quadrimaculatus,* on the other hand, they found to be an exception, since there was an increase in its activity until midnight at least.

From the above discussion it can be seen that the light trap catch may have suffered somewhat, first by its nearness to the bait station, second by the fact that baiting was done during a period of great mosquito activity, when food seeking was at its height, and possibly also because an apparently attractive individual did the baiting. On the other hand, the baiting lasted only 30 minutes, whereas the light trap ran all night, thus being in operation during the dawn period of revived activity. The trap partly compensated, too, by taking numerous engorged mosquitoes.

There is also the question as to whether or not the New Jersey trap catches a representative sample of a mixed mosquito population. Huffaker and Back (1943) felt that it did not. Because of the smallness of the present totals, the data are hardly more than suggestive. However, it appears that, for the few species with sufficient numbers for comparison, the trap attracted roughly the same percentage as the bait. The striking exception was the exceedingly homophilous *Aedes cantator*.

Finally, from the point of view of overall efficiency, this particular bait certainly eclipsed the light trap by about 2.5 to 1. If this ratio were adjusted to compensate for the great discrepancy between the operating times of the respective attracting forces, the difference would be still greater. As compared with the trap catches, the bait take for *Culex* (mainly *pipiens* and *salinarius*) was almost 3 to 1, for *Anopheles punctipennis* it was something less than 2 to 1, for *Aedes vexans* about 1 to 1, and for *Aedes cantator* just short of 100 per cent.

Summary and Conclusions

1. For 45 nights during July and August (1944) the writer exposed himself to the bites of mosquitoes for 30 minutes, beginning at dusk (approximately 8:45 to 9:15 E.W.T.).

2. A New Jersey light trap (25 watt, white frosted lamp) was operated during the baiting period and throughout the night. The sites were 82 feet apart.

3. A total of 1571 mosquitoes was caught (females only are included). 70.3 per cent were attracted to the bait, 29.7 went to the trap.

4. Individually, the *Culex* species (1206) preferred the bait (73.6 per cent) to the trap (26.4 per cent) ; *Aedes vexans* was about equally attracted; of 74 *Anopheles punctipennis,* 27 went to the light while 47 bit; and *Aedes cantator* was quite bloodthirsty, for of 62 taken, 60 were caught feeding. Several other species were taken in numbers too small for comparison.

5. Roughly speaking, the human bait and light trap attracted about equal percentages of the more numerous types of mosquitoes (*Aedes cantator* was the exception). For sheer numbers, on the other hand, the particular bait individual used proved a much better attractant than the 25 watt lamp.

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Another European Entomologist Safe

Mr. H. E. Woodcock of Chicago writes that M. Stempffer of Paris has recently written him. M. Stempffer is one of the best-known Lepidopterists in France, being particularly interested in the little blues of the genus *Lycaena.* A veteran of the first World War, he volunteered again but was held at his position in the Bank of Paris until the Germans took that city. He had joined the Free French and so had to flee, but he managed to return to Paris in 1940 and from then on played a role in the propaganda against the invaders of his country. Being fortunate enough to escape detection he is now free and apparently trying to renew his old entomological friendships.

Nomenclature and Semantics

By George Steyskal, Detroit, Michigan

The publication of Mayr's recent book [1] has more sharply brought out the need for the universal recognition of the subspecies. Mayr has adequately defined the category and shown the need for codical regulation concerning it. Linsley's article in this journal [2] outlines what to my belief is a thoroughly desirable solution of the problem and further stresses the point that the subspecies, altogether similar to the species *nomenclatorially,* is the only infraspecific [3] category that should receive names of codical status.

It is my intention here to point out the help that the relatively new science of semantics or semasiology, the study of the "meaning of words," can contribute to biological nomenclature. Much is said in nomenclatorial discussions about "concepts," but little about "referents." It is a clear understanding of the relationship of the concept to its referent (its basis in the external world) and its reference (name), which is of value both to the biologist and to the semasiologist, to the former in providing knowledge of the nature and "life-history" of concepts and the handles they bear called names and to the latter in providing source material for the study of the most orderly and deliberate method man has devised for making contact with the "outside world." A sound and at the same time interesting approach to semantics may be made with Chase,[4] Ogden and Richards,[5] and Hayakawa,[6] at least one of which should be required reading for any biologist, whether or not he is interested in nomenclature.

[1] Mayr, E. 1942. Systematics and the origin of species. Columbia Univ. Press, N. Y.

[2] Vol. LV (no. 9): 225–232, Nov., 1944.

[3] The hyphen after infra- is unnecessary, *v.* dictionaries.

[4] Chase, Stuart. 1938. The Tyranny of Words. Harcourt, Brace and Co., N. Y.

[5] Ogden, C. K., and Richards, I. A. 1936, rev. ed. The Meaning of Meaning. Harcourt, Brace and Co., N. Y.

[6] Hayakawa, S. I. 1939. Language in Action. Harcourt, Brace and Co., N. Y.

The frequent use of the term "changing concepts" in regard to organisms which are named suggests an erroneous conception of the relationship between concept and referent. The concept of a species (or subspecies or lower category) does not change from the time of its original description (possibly based on a referent consisting in a single poor specimen) but rather *grows* as more is learnt concerning it and other members of the group of individuals comprising the whole referent. The name (reference) remains fixed, the referent remains fixed except for evolutionary changes, but the concept grows as the combined human mind through investigation and publication acquires knowledge concerning the referent. It is inherent in the scientific method that reservations as to the completeness of new concepts are held, that the definiteness of the concepts is in direct proportion to the knowledge available concerning the referents. To cite a hypothetical example: *Alpha beta* Smith 1944, known from a single incomplete female, is the reference to a very vague concept, while *Alpha alpha* J. Doe 1864, known from thousands of specimens, considerable observation, some experimentation, and the subject of many pages of print, is immensely more definite and "grown-up" as a concept. The concept will continue to grow as long as mankind studies its referent, but the reference, its name, will remain identical once the prior one is established. The independence of phonetic and emotional considerations and the universality of biological names make them practically unique from a semantic point of view.

On the other hand, a concept can also die. *Alpha gamma,* described as a species, may later be proven to be no more than a phenotypical variation of *Alpha alpha*. The concept therefore is erroneous, has no referent, and dies. It becomes part of another concept, that of "phenotypical variation of *Alpha alpha*."

Names of organisms cannot express or even imply any other relations beyond that of the subspecies to the species and the species to the genus. There is nothing in the name of the genus (except the familiotype [7]) which has anything to do with the

[7] There is a need for a term analogous to genotype (generitype) for the genus upon which a family name is based. I propose the term "familiotype" (from Latin *familia* + *typus*).

family or any other supergeneric category. There is an extremely large number of groupings, super- and infraspecific, and it should be obvious that inclusion of them into nomenclature is highly impractical. They are the subject of synopses, phyletic charts, tables, and more extended discussion. The fluidity of these group concepts, the difficulty or even impossibility of acquiring real knowledge concerning their referents (which include a time factor) precludes such simple reference to them as names.

Because a species may be named *Alpha gammoides* implies no more relationship to an organism or group named *gamma* than one named *Alpha mohawkana* would have to a Mohawk Indian. Probably the coined names, arbitrary combinations of letters, are best.

Notes on Some Hesperiidae, with New Records for the United States (Lepidoptera, Rhopalocera)

By H. A. Freeman, Pharr, Texas

Aguna asander (Hew.)

While examining some specimens collected by Mrs. E. J. Kelso at Pharr, Texas, a fresh male *asander* (Hew.) was found. There was no date on this specimen and the only information imparted to the writer by the collector was that the specimen was collected in her yard at Pharr. This is the first record of this tropical American species having been collected in the United States. Previous records reveal this species to occur from Mexico to southern Brasil and at least in some of the West Indies.

Astraptes hopfferi (Ploetz)

There seems to be considerable uncertainty as to the exact relationship existing between *creteus* (Cramer) and *hopfferi* (Ploetz), as some students of the hesperioidea consider *hopfferi* to be a form of *creteus*. Mr. E. L. Bell believes that *hopfferi* is sufficiently distinct superficially to be kept apart for the present, at least.

The writer collected a female *hopfferi,* October 21, 1944, at Pharr, Texas. This is the first time that this species has been recorded for the United States. This specimen was visiting jasmine blossoms along with *Astraptes fulgerator* (Walsh), which occurs commonly at Pharr, during October, November and December.

Spathilepia clonius (Cramer)

This tropical American species occurs over a comparatively wide range south of the border of the United States. A male specimen was collected at Pharr, Texas, November 12, 1944, by the writer. It was feeding on zinnias in one of the flower gardens in the city limits. This is the first time that this species has turned up in the United States.

Lerodea edata (Ploetz)

Information received from Mr. E. L. Bell reveals that this species previously was found from Mexico to Venezuela and Guiana. The writer collected 2 males and 8 females of this species, at Brownsville and Pharr, Texas, during May, August, September, November, December and January 1944–45. About half of the specimens were very fresh indicating that this species is breeding in this section of Texas. This is the first record of this species occurring in the United States. Mr. Bell kindly compared two of my specimens with those in the American Museum of Natural History and informed me that they were the same as specimens they have under the name *edata* (Ploetz). There is considerable variation exhibited among my ten specimens as to size and number of spots on the primaries. The writer has seen several specimens from various localities in Mexico and the same variability was present in all of these.

Godmania malitiosa (H–S.)

Two males of this species were collected at Pharr, Texas, one specimen, October 14, 1944 and the other October 15, 1944, by the writer. This is the first time that this species has been collected in the United States, or any member of the genus *Godmania* Skin. & Rams., for that matter.

The writer sent one of the specimens to Mr. Bell for examination and he said it compared fairly well with Cuban specimens (type locality) of *malitiosa* but differed from Godman's figure of that species. Godman records *malitiosa* from Mexico to Costa Rica but apparently he was as confused and uncertain about his identifications in this genus as most everybody else is at the present time. Mr. Bell states that it is very difficult to get sufficient material in this genus to do scientific revisional work. Apparently specimens of all of the species are subject to considerable variation.

Perichares phocion dolores (Reakirt)

Since recording this species for the United States,[1] based on a specimen collected by Mrs. E. J. Kelso, at Pharr, Texas, the writer has collected a fresh male specimen at Pharr, December 9, 1944. This specimen was feeding on petunias around 5:30 P.M.

Spurious Veins in the Wings of Exoprosopa fasciata Macq. (Diptera)

By S. W. Frost, The Pennsylvania State College

It is well known that the number and position of the veins of the wings of insects generally are constant for a species. Seldom is the contrary true. Upon this fact the nomenclature of wing veins has been based. At most, the degree of divergence of veins or the position of certain of these may vary slightly. In the more specialized Diptera such as the Muscidae, Tachinidae, etc. these variations are exceedingly slight and venation is considered a constant character. The venation of *Exoprosopa fasciata* Macq. shows quite a different situation with remarkable variation in the number and position of extra veins.

Sixty specimens of *Exoprosopa fasciata* Macq., collected in the vicinity of State College, Pa., were examined. Only 22 of

[1] Ent. News, vol. 56, p. 5, Jan. 1945.

these * show what might be considered normal venation. More than fourteen distinct variations are described.

Those who have studied the Bombyliidae realize that they generally show numerous spurious veins. *Exoprosopa fasciata* Macq. is probably more variable than other species. Some variations might be expected, for the Bombyliidae are primitive Diptera with a rather well developed system of wing veins. This could be said of other families such as the Asilidae.

Some of the variations do not show in the table. The base of R2 + 3 may be gently curved or distinctly angulate. The same is true of the median cross vein and of R4. Often spurs are present when the veins are angulate at these points. The spurs

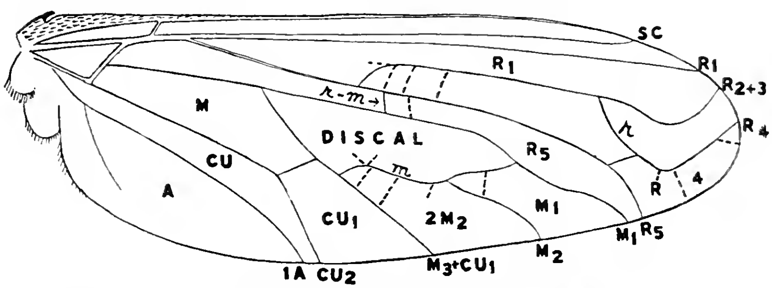

Figure 1. Composite wing of *Exoprosopa fasciata* Macq. showing the variation in the position of the base of R2 + 3 and the spurious veins.

from the angle of the median cross vein may extend basad or cephalad. Generally the position of the base of R2 + 3 is the same in both wings but in five specimens this is not so, the base of R2 + 3 being distad or opposite the radio-median cross vein in one wing and basad or opposite in the other. In one specimen it is distad in one wing and basad in the other.

There is some variation in the color of the wings. In a few cases the wing veins are more broadly darkened. The clear area at the forking of M1 + 2 from M3 is usually confined to the distal end of cell M but often extends into the basal corner of the distal cell.

* Although 33 specimens show the normal position of the base of R2 + 3, 11 of these show other variations.

Most of the variations occur in both wings, that is the wings with such variations are symmetrical. This is particularly true of the position of the base of R2 + 3 and the branching of R4 at its tip. As indicated in the figure and in the table, R2 + 3 usually arises basad of the radio-median cross vein and this is taken to be the normal type of venation. It is interesting to note that most of the variations occur near the center of the wings.

Summary of spurious veins in *Exoprosopa fasciata* Macq.

Character	Present in both wings	Present in right wings	Present in left wings
Base of R2 + 3 basad of r − m	33	1	2
Base of R2 + 3 distad of r − m	14	1	2
Base of R2 + 3 opposite r − m	7	3	3
Vein R4 branched at tip	3		
Cu2 and 1A converging at margin of wing			1
Vein M2 incomplete			1
2 r − m cross veins			1
Extra vein between R2 + 3 and R5			1
Cell R4 divided by extra vein			1
Cell M1 divided by extra vein		1	
Cell 2M2 divided by extra vein		3	
Spur from angle of m into discal cell	3	6	7
Spur from angle of m into 2M2		1	3
Spur at base of R2 + 3	1	1	1
Spur from R4 into cell R4		1	1
Total Variations	28*	18	24

* Not including 33 specimens with base of R2 + 3 basad of r − m which is taken to be the normal condition.

Changes in Editorship

Various events are forcing changes in the editorial staff. Authors are requested to note that Dr. R. G. Schmieder is assuming managing editorship beginning now, and all manuscripts and communications pertaining thereto should be addressed to him at the address given on the inside of the front cover.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

A peculiarity of many insects is that they regularly possess certain bacterial symbionts which live *inside the cells* of their body. Usually these intracellular bacteria are found in only certain tissues and cells and have a rigid cycle of development and definite mode of transmission *through* the egg. For instance, in a cockroach (*Blatella germanica*) they are found in all eggs in a definite position; as the egg develops into an embryo the symbionts migrate along definite paths to definite parts of the eggs; and finally at the end of a complicated route they become localized in the adipose (fat) tissue and ovaries. In some cases (certain beetles) they are not inherited through the eggs but occur on the *outside* of the egg and infect the larva when it hatches. Bacteria, symbiotic or otherwise, have been reported from the tissues of many insects: *e.g.* cockroaches, various bugs, aphids, coccids, beetles, lice, mosquitoes and ants. The specific identity of the bacteria, or bacteroids as they are sometimes called, is uncertain. Attempts to culture them for study have given controversial results and some authors do not think anyone has been really successful with the truly intracellular forms.[1]

Numerous speculations have been made concerning the possible role of these microorganisms. One of these suggestions has been that the bacteroids play some role in nutrition, possibly furnishing some growth factors. It is well-known that insects commonly require vitamins of the B group and sterols related to vitamin D.[2] Recently it has been possible to prove that at least some of these bacterial symbionts furnish B vitamin to their insect hosts. Fraenkel and Blewett [3] first pointed out that those

[1] Gier, Biol. Bull., 71: 433–452, 1936.

[2] See *e.g.* Fraenkel, Reid & Blewett, Biochem. Jour., 35: 712–720, 1941; Wigglesworth, Principles of Insect Physiology, 1937; Heilbrunn, An Outline of General Physiology, 1943.

[3] Biochem. Jour., 37: 692, 1943.

species of grain beetles that have such symbionts have lower B vitamin requirements than those which do not. Then they succeeded in proving this correlation by eliminating the symbionts and showing that the B vitamin requirements increased and indeed that the deflorated beetles needed types of B vitamins that were completely superfluous to infested beetles.[4]

Tribolium confusum and *Ptinus tectus* lack intracellular symbionts and require thiamin, riboflavin, nicotinic acid, pyridoxine and pantothenic acid. *Lasioderma serricorne, Sitodrepa panicea* and *Silvanus surinamensis* possess bacterial symbionts and have lower B vitamin requirements. Normal *Lasioderma* requires no B vitamins, normal *Sitodrepa* needs only thiamin, but normal *Silvanus* requires riboflavin, nicotinic and pantothenic acids. Deflorated specimens of these species require all five of the B vitamins, i.e. have the same requirements as the species that normally lack these symbionts. Since it was possible to show that the B vitamins requirements are the same for all of these species and that the seeming differences are due to the symbionts, it follows that the symbionts of different insect species furnish different fractions of the insect's needs. Some of the bacterial symbionts furnish all of the insect's B vitamin requirements; others are less efficient in this respect and furnish only some of those needed.

Obtaining deflorated beetles for verification of the hypothesis was relatively easy since in these cases the bacteroids are on the outside of the egg and contaminate the larva at the time of hatching. The eggs were simply sterilized by immersion for two minutes in 5% chloramine in 70% alcohol, and thereafter handled with precautions to prevent recontamination. Defloration would be difficult (impossible?) in insects which have the symbionts inside the egg.

Although the symbionts play this big role in furnishing B vitamins, they seemingly contribute nothing usable for the insects' sterol ("vitamin D") requirements.

A. G. Richards, Jr.

[4] Proc. Roy. Soc. London, 132B: 212–221, 1944.

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 and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Carpenter, M. M.—Bibliography of biographies of entomologists. [119] 33 (1): 1–116. **David, W. A. L.**—Insecticidal sprays and flying insects. [31] 155: 204–205, ill. **Hemming, F.**—Recent work by the International Commission on Zoological Nomenclature. [4] 76: 189. **Henderson, William Williams.**—Obituary note. [120] 5: 23–24, port. bibl. **Rohwer, S. A.**—Post-war entomological problems. [12]: 37: 830–35. **Sanborn, Charles Emerson, 1877–1944**—Obituary. [12] 37: 857–58, photo. **Sanderson, Dwight, 1878–1944**—Obituary. [12] 37: 858–59, photo. **Weiss, H. B.**—Thomas Jefferson and economic entomology. [12] 37: 836–41.

ANATOMY, PHYSIOLOGY, MEDICAL—Ahmad, M.—Morphology and biology of Rhogas testaceus, a braconid internal parasite of spotted bollworms of cotton. [123] 5: 189–205, ill., 1943. **Coon, B. F.**—Effects of paralytic insecticides on heart pulsations and blood circulation in the American cockroach as determined with a fluorescein indicator. [12] 37: 785–89. **Crowson, R. A.**—(See under Coleoptera.) **Deoras, P. J.**—On the comparative morphology and evolution of adult Trichoptera. [123] 5: 177–88, ill., 1943. **Flanders, S. E.**—Bisexuality of uniparental hymenoptera, a function of the environment. [90] 79: 122–41. **Ford, E. B.**—(See under Lepidoptera.) **Frings, H.**—Loci of the olfactory end-organs in the honey bee, Apis mellifera. [42] 97: 123–34. Gustatory rejection thresholds for the larvae of the cecropia moth, Samia cecropia. [92] 88: 37–43. **Hovanitz, W.**—Physiological behavior and geography in control of the alfalfa butterfly. [12] 37: 740–45. **Husain, Lahore & Mathur.**—Influence of temperature on the growth in weight and size of the hopper (Schistocerca gregaria). [123] 5: 107–16, 1943. **Kvicala, B.**—Selective power in virus transmission exhibited by an aphis. [31] 155: 174–75. **Mathur, C. B.**—Site of the absorption of water by the egg of the desert locust. [123] 5: 35–40, 1943. **Mukerji & Chaudhuri.**—On the anatomy of the alimentary system of the termite T. redemanni. [123] 5: 59–88, ill., 1943. **Park, Ginsberg & Horwitz**—Gene affecting body-color and fecundity of Tribolium confusum. [23] 18: 35–51. **Pradhan & Aren.**—Anatomy and musculature of the mouth-parts of Scirpophaga nivella (Pyralidae), with a discussion on the coiling and uncoiling mechanisms of the proboscis in Lepidoptera. [123] 3: 179–95, ill., 1941. **Rakshpal, R.**—On the structure and development of the male genital organs of Tetrastichus pyrillae (Chalcid). [123] 5: 143–50, ill., 1943. **Rosenstiel, Ferguson & Mote.**—Some ecological relationships of Cnephasia longana. [12] 37: 814–17. **Russell, Knipe, Rao & Putnam.**—Some experiments on flight range of Anopheles culicifacies. [42] 97: 135–64. **Sen, S. K.**—Method of cutting sections of ticks and insects. [123] 3: 51–54, 1941. **Shrader, F.**—Regular occurrence of heteroploidy in a group of Pentatomidae. [92] 88: 63–70. **Smith, K. M.**—Transmission by insects of a plant virus complex. [31] 155: 174. **Zukel, J. W.**—Some effects of phenothiazine, phenothiozone and thionol on Periplaneta americana. [12] 37: 796–808.

ARACHNIDA AND MYRIOPODA—Baker, E. W.—Mites of the gen. Tenuipalpus (Trichadenid). [10] 47: 33–38, ill. (*). **Chamberlin, R. V.**—Two millipeds from S. California. [95] 57: 113–16, ill. **Ewing, H. E.**—Notes on the taxonomy of the trombiculid mites. [95] 57: 101–104. **Hoff, C. C.**—New pseudoscorpions of the subf. Lamprochernetinae. [40] 1271: 12 pp., ill. (S). Hesperochernes canadensis, a new chernetid pseudoscorpion from Canada. [40] 1273: 4 pp., ill. Pseudoscorpion gen. Albiorix. [40] 1277: 12 pp., ill. (Sk). **Thorp & Woodson.**—Black widow, America's most poisonous spider. [Univ. N. Carolina Press] 222 pp., ill.

THE SMALLER ORDERS—Eichler, W.—Mallophagen-synopsis, III. Gen. Laemobothrion. [100] 137: 52–63. **Holland, G. P.**—Notes on some northern Canadian Siphonaptera, with the descr. of a n. sp. [4] 76: 242–46, ill. **Ricker, W. E.**—Some Plecoptera from the far north. [4] 76: 174–85, ill. **Walker, E. M.**—Nymphs of Enallagma calusum and E. boreale. [4] 76: 233–37, ill.

ORTHOPTERA—Ander, K.—Revision der Orthopterensammlungen Zetterstedts. [Lunds Univ. Arssk.] N. F., Av. 2, Bd. 38 (7): 23 pp. (1942). **Barnes, O. L.**—Time schedules of grasshopper surveys in Arizona. [12] 37: 789–95. **Deoras, P. J.**—Internal anatomy and descr. of Hemimerus deceptus v. ovatus, with remarks on the systematic position of Hemimeridae. [123] 3: 321–33, ill., 1941. **Henderson, W. W.**—Four devastating melanopli found in Utah. [120] 5: 1–22, ill. **Tanner, V. S.**—European earwig found in Provo, Utah. [120] 5: 22.

HEMIPTERA—Fennah, R. G.—New Neotropical Fulgoroidea. [40] 1265: 9 pp., ill. New Dictyopharidae from the New World (Fulgorid). [95] 57: 77–94, ill. (k). **Plummer, C. C.**—New Membracidae from Central Amer. [10] 47: 39–44, ill. **Rakshpal, R.**—On the post-embryonic development of the male genital organs in Aleurodidae. [123] 3: 1–12, ill., 1941.

LEPIDOPTERA—Bowman, K. Additions and corrections to the check-list of the macrolepidoptera of Alberta. [4] 76: 191–92. **Ford, E. B.**—Studies on the chemistry of pigments in the Lepidoptera, with reference to their bearing on systematics. 4. The classification of the Papilionidae. [36] 94: 201–23. **Freeman, T. N.**—New psychid from Quebec. [4] 76: 186–7, ill. **Hovanitz, W.**—(See under physiology.) **McDunnough, J.**—New Arizona Hydriomena. [4] 76: 173–4. Two new races of Theclinae from south. Brit. Columbia. [4] 76: 190–91. Notes on Chambers' coleophorid types in the Museum of Comp. Zool. Cambridge, Mass. [4] 76: 237–41. **Rosenstiel, Ferguson & Mote.**—(See under physiology.) **Travassos, L.**—Ctenuchidae de Monte Alegre. Interessante anomalia em um Cosmosoma teuthras. [77] 4: 29–36; 17: 187–96, ill. (S).

DIPTERA—Olson & Keegan—The mosquito collecting program of the seventh service command. [12] 37: 780–85. **Fluke, C. L.**—Melanostomini of the Neotropical Region (Syrphid). [40] 1272: 29 pp., ill. (*k). **Pennak, R. W.**—Notes on mountain midges (Deuterophlebiidae) with a descr. of the immature stages of a n.sp. from Colorado. [40] 1276: 10 pp., ill. **Stone, A.**—Mosquito synonym. [10] 47: 38–39. **Cooper & Rapp.**—Check list of the Dixidae of the World. [4] 76: 247–52.

COLEOPTERA—Bernhauer, M.—Neue Staphyliniden aus Kostarika. [100] 138: 1–27 (1942). **Blake, D. H.**—Five new flea beetles from the West Indies. [91] 35: 89–92, ill. **Brundin, L.**—Zur Kenntnis einiger in die Atheta-untergat. Metaxya gestellten Arten (Staphylid). [Lunds Univ. Arssk.] N. F. Av. 2, Bd. 39, (4): 37 pp., ill. (1943). **Crowson, R. A.**—Further studies on the metendosternites in Coleoptera. [36] 94: 273–310, ill. **Fiedler, C.**—Sudamerikanischen Arten der gat. Gasterocerus (Curculion). [100] 140: 221–47 (*). Neue Arten der gen. Acalles u. Rhyssomatus aus Sudamerika (Curculion). [100] 140: 203–19 (1942). **Hatch & Fender**—Notes on Zacotus matthewsii. [4] 76: 188. **Strohecker, H. F.**—New sps. of Endomychidae. [40] 1275: 3 pp., ill. (S).

HYMENOPTERA—Bohart, R. M.—New sp. and subsp. of Rygchium from N. Amer. (Vespid). [10] 47: 45–49, ill.

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4.—Canadian Entomol. 10.—Proc. Entom. Soc. Washington. 12.—Journal Economic Ent. 31.—Nature, London. 36.—Trans. R. Entom. Soc. London. 40.—Amer. Museum Novitates. 42.—Jour. Experimental Zool. 77.—Papeis Avul. Dept. Zool. Secret. Agr., S. Paulo. 90.—American Nat. 91.—Jour. Washington Acad. Sci. 93.—Biological Bulletin. Proc. Biolog. Soc. Wash. 100.—Zoolog. Anzeiger (Reproduced by Alien Prop. Custodian). 119.—Amer. Midland Nat. 120.—Great Basin Nat., Provo. Utah. 123.—Indian Jour. Entom.

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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.

Coleoptera—Will exchange mounted and labeled specimens from North America. All groups except Rhynchophora. G. P. Mackenzie, 1284 Sherwood Road, San Marino, Calif.

Lepidoptera—Should like to hear from collectors interested in species from central Alberta and Saskatchewan. Would collect other Orders. Paul F. Bruggemann, R. R. 1, Furness, Sask., Canada.

Lampyridae of U. S. and Canada wanted from the South and West, especially Photinus and Pyractomena for revisional study. Buy or exchange. J. W. Green, R. D. 2, Easton, Pa.

Lepidoptera—Would like to exchange Californian butterflies, noctuids, geometrids, etc. for eastern specimens. Glenn E. Pollard, 500 Clark Drive, San Mateo, Calif.

Lepidoptera—Am still collecting here and have only fine specimens for exchange. H. W. Eustis, Woodbine Rd., Augusta, Ga.

Wanted—Viennese Entomological Printing Press, for printing 3, 3½ and 4 type data labels. Kent H. Wilson, 430 Ridgewood Road, Fort Worth 7, Texas.

Wanted—Heteroptera from all parts of the world, all families except Miridae. Will buy, exchange or determine. S. and C. Amer. species esp. desired. John C. Lutz, 6623 Lansdowne Ave., Philadelphia 31, Pa.

Wanted—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

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Supplemental Notes on the Ecology of Odonate Larvae

By Philip P. Calvert, Cheyney, Pennsylvania

I. Kellicott's Odonate Nymph from a Thermal Spring

In the compilation [1] of a summary of physical, chemical and biological features of waters of the world in which Odonate larvae have been found, the late D. S. Kellicott's article,[2] bearing the title quoted above, was studied. In it are described four larvae "from a hot spring, forty-three miles west of Reno, Nev., in Lassen County, Cal." They were not identified farther than the "Family Libellulidae."

Although this article has been quoted by a number of authors,[3] it does not appear, from the literature, that the further identification of the larvae has been attempted. A final note to Kellicott's article, states that "The type specimens are preserved in the Museum of the Cincinnati Society of Natural History, being entered in the Accession Catalogue as Nos. 9315 and 9316. J. L." [Probably Dr. Joshua Lindahl, who sent the larvae to Kellicott, as mentioned in the first line of the article, and who was director of the Museum at Cincinnati 1895–1906, according to Who Was Who in America 1: 731, 1943.] In reply to an inquiry as to the existence of these specimens, Mr. Ralph Dury,

[1] Limnological Society of America, Research in progress by members, List 1, May, 1944. Mimeographed, p. 1.

[2] Journ. Cincinnati Soc. Nat. Hist. 19 (2): 63–65, 2 figs., March 24, 1897.

[3] *E.g.,* Abstract in Journ. R. Micr. Soc. Lond. 1897: 280. Issel, R. Atti Soc. Ligustica Sci. Nat. geog. (Genova) 17: 6–8, 1906. Tillyard, R. J. Biology of Dragonflies, Cambridge, Engld.: 367, 1917. Brues, C. T. Proc. Amer. Acad. Arts & Sci. 59 (15): 411, Nov. 1924.

Director of the Cincinnati Museum of Natural History, wrote to me, on September 5, 1944: "I have been with the Museum for 26 years and have gone over all the collections in that time. I have not found the specimens in question. Most of our alcoholic specimens were dried up when I became director."

Erythemis simplicicollis (known also as *Mesothemis simplicicollis*) has been reported as associated with, or in, warm to hot water in the Western United States.[4] The records naturally suggested the idea that Kellicott's larvae might be *simplicicollis* and a comparison of his description with known exuviae and larvae of this species supports this identification. The dimensions given by Kellicott are larger than those of my alcoholic larvae, but not larger than those given by Needham [5] and by Bick in his recent study of the life history of this dragonfly.[6] Kellicott says that the "wing-covers reach the ninth abdominal ring." Garman [7] notes that this is the case in alcoholics, but that in older specimens the wing-cases reach to the middle of the seventh segment, which is the case in larvae from North Carolina and Pennsylvania which I examined; Bick [8] reports them as extending to the sixth abdominal segment in the last larval instar. The feature in Kellicott's description which is most characteristic for *simplicicollis* is: "the lower laterals [abdominal appendages] are broad, with stout decurved apex"; his only negative datum is: "upper margin of prothorax quite deeply bilobed," which I do not find in *simplicicollis*.

[4] Kennedy, Proc. U. S. Nat. Mus. 52 (2192): 600–601, 623, 1917, near Calistoga, Napa County, California, and Golconda, Nevada. Brues, C. T. Proc. Amer. Acad. Arts & Sci. 63 (4): 170, 1928, nymphs at Hot Springs, New Mexico, Convict Lake, California and Denio, Oregon. Op. cit. 67 (7): 234, 1932, Yellowstone Park, five localities in Nevada and Hansen, California. The range of water temperatures for this species as measured by Brues is 30.8°–43.0° C. Notice also his interesting remark: "Nymphs of the widespread *Mesothemis simplicicollis* invade water of 43°, which seems to be the highest record not open to suspicion for any dragonfly." IV Internat. Congr. Ent. 2: 239, 1929.

[5] Bull. N. Y. St. Mus. 47: 527, 1901.

[6] Annals Ent. Soc. Amer. 34 (1): 220, 1941.

[7] Bull. Conn. St. Geol. & Nat. Hist. Surv. 39: 265, 1927.

[8] Annals Ent. Soc. Amer. 34 (1): 227, 1941.

Kellicott's description, as far as it goes, runs to *Erythemis* in the recent keys to larvae by Byers,[9] Needham & Fisher,[10] and Wright & Petersen.[11]

It is possible that Kellicott's larvae may have been *collocata* Hagen, placed as a subspecies of *simplicicollis* Say by Calvert,[12] Ris,[13] and Whitehouse,[14] but which Williamson,[15] Kennedy,[16] and Walker [17] regarded as a distinct species, all these opinions being based on imaginal characters only. I am not aware that any attempt to distinguish *simplicicollis* from *collocata* larvae has appeared in print.

II. Professor Pearse's Odonata from Beaufort, North Carolina

In 1936 Prof. A. S. Pearse published a paper on the Estuarine Animals at Beaufort, North Carolina.[18] For the identification of the Odonata included therein I am responsible. On comparing the list of species which I furnished to Prof. Pearse with his printed text, I find that the latter has indicated "nymph" for only one species, *Anax junius* (p. 200). After deducting two duplications (*Agrion maculatum* Beauvois for *Calopteryx maculata* Beauvois and *Pachydiplax longipennis,* entered twice) and *Anthax* [sic] *sinuosa* Wied. [*Anthrax sinuosa* Wied.?, a Bombyliid fly], not an Odonate, and adding one species, *Tramea carolina* or *T. lacerata,* omitted from his paper, there remain 20 other Odonata. According to my memoranda, only the following 7 species, in the sequence of his list, were represented by larvae examined by me:

[9] Ent. News 47: 60–64, 1936.
[10] Trans. Amer. Ent. Soc. 62: 113–114, 1935.
[11] Ohio Jour. Sci. 44 (4): 151–166, 1944.
[12] Biol. Centr.-Amer. Neur.: 332, 1907; 409, 1908.
[13] Coll. Zool. Selys-Longch. 13: 600, 1911.
[14] Amer. Midl. Nat. 26 (3): 544, 1941.
[15] Misc. Publ. Univ. Mich. Mus. Zool. 11: 10, 1923.
[16] Ibid.: 21.
[17] Bull. Provinc. Mus. Nat. Hist. Victoria, Brit. Col.: 13, 1927.
[18] Jour. Elisha Mitchell Sci. Soc. 52 (2): 174–222.

**Ischnura posita* (Hagen), Open Ground Ditch, June 20, July 2.

**I. ramburii* (Selys), Mullet Pond, April 30, July 11.

**I. verticalis* (Say), Open Ground Ditch, June 20.

**Erythemis simplicicollis* (Say), Mullet Pond, April 30, June 18.

**Pachydiplax longipennis* (Burm), Mullet Pond, April 30; Open Ground Ditch, June 20.

Tramea (*Trapezostigma*) *carolina* or *T. lacerata,* Core Creek, July 20.

Coryphaeschna ingens (Ramb.), Carteret Lodge Pond, June 20. Locality omitted in the printed list.

With *Anax junius,* mentioned above, this gives 8 species.

Species starred here were represented also by imagos, seen by me. Twelve of Prof. Pearse's species were represented by imagos only and these are in my memoranda. The first of his list, "*Enallagma* sp., juv.," is not in my memoranda.

Summing up the Beaufort list in another way: imagos taken 17 spp., larvae taken (including *Enallagma*) 9? spp., both imagos and larvae 5 spp.

I have thought it worth while to separate these records of larval and imaginal occurrence, while the data are accessible, because one is not justified in assuming that the presence of imago dragonflies at a given body of water indicates that their corresponding larvae live in the same body of water. The larvae, to be sure, *may* exist there, but they are more difficult to find and until they are found the assumption is not proof. This has been emphasized in different ways by the writer,[19] Geijske,[20] Geissbühler,[21] and doubtless others.

Consider, in this connection, the case of Walnut Lake, Michigan, as reported by Hankinson [22] and by Needham.[23] Hankin-

19 Proc. Acad. Nat. Sci. Phila. 1908: 460.

20 Tijdschrift v. Ent. 78 (3/4): 266, 1935.

21 Mitt. Thurgau. Naturf. Ges. 31: 34–35, 1938. I shall be glad to receive additional references on this topic. P. P. C.

22 Rept. State Board Geol. Surv. Mich. 1907: 233–234, 1908.

23 Ibid., 263–265.

son writes: "While adults of many species of these graceful and showy insects [Odonata] were numerous about the margins of the lake, larvae were never found abundant. The few specimens of the latter collected came chiefly from the muddy bottoms in shallow water, as at stations 7 and 41. The larvae, however, were often found in the stomachs of rock bass and blue-spotted sunfish, less frequently in those of the common sunfish."

Needham, listing the Odonata of this same survey, enumerates 34 species of imagos and perhaps 17 species of larvae or exuviae. The proportions of imago-species to larva-species here is very nearly the same as in the Beaufort list, 2:1.

Neopaniasis, New Name for Paniasis Druce 1890 (Lepidoptera)

By William F. Rapp, Jr.

Recently the author found that *Paniasis* Druce (Proc. Zool. Soc. London, 1890, p. 500) is a homonym of *Paniasis* Champion (Biol. Centr. Amer., Zool., Col., vol. 4 (pt. 1), p. 208, 1886). Therefore, the new name *Neopaniasis* is proposed to replace *Paniasis* Druce, 1890. When Druce erected this genus on a new species *aleoptera,* he placed it in the family Melameridae, which is now included in the family Dioptidae. However, in a personal communication from Mr. Hahn W. Capps of the Division of Insect Identification, U. S. Department of Agriculture, the author learned that the species *aleoptera* is not a dioptid, but a Geometrid.

Type: *Eupaniasis aleoptera* (Druce).

Type Locality: Interior of Colombia.

At present there are two species included in this genus. The type and *E. tritoniaria* (Schause) which was originally placed in the genus Melanchroia by Dr. Schause.

I wish to acknowledge my indebtedness to Mr. Hahn W. Capps for the great amount of help he has given me.

Notes on the Behavior of Certain Ants *

By Phil Rau, Kirkwood, Mo.

Camponotus herculeanus subsp. *pennsylvanicus* DeGeer. I was amazed to see several ants of this species carry away piecemeal, several newly dead black widow spiders, *Latrodectus mactans,* which I had thrown out of the window. These spiders are regarded as poisonous, and one wonders what effect they might have on the young ants when used as food. An undetermined red ant was likewise carrying away bits of this plunder.

This ant also likes to attack living cockroaches, and once a cockroach trap in the laboratory with several *Blatta orientalis* unintentionally served as bait for the ants and caught about fifty of them. This seemed to be a natural experiment in the power of communication in ants, or the lack of it, for obviously, when an ant became prisoner, it could not communicate the whereabouts of food stores to its companions at home. Therefore, one can safely conclude that the fifty odd ants so caught found and entered the trap by means other than that of communication, perhaps that of odor.

Some years ago I recorded (Trans. Acad. Sci., St. Louis, 28: 207–215, 1934) the war-like behavior of these ants to members of their own species, but probably from rival colonies. The war took place on the floor of my laboratory, July 10, 1926. This "civil-war" behavior probably occurs frequently among members of this species, for the identical behavior was again observed on the cement walk under the window of the same laboratory on August 21, 1943.

Camponotus castaneus Latr. About a dozen winged ants of this species were taken at the lights at Kirkwood, October 26, 1940.

Formica fusca var. *subserica* Say. Among the various items of food of this omnivorous ant are ants of other species. On May 23, 1935, I found an ant of this species making off with a living

* All of the ants mentioned in this paper were kindly identified by Mr. M. R. Smith.

ant of the species *Lasius umbratus mixtus* var. *aphidicola* Walsh, which in turn had in its own mouth a living *Lasius niger* var. *americana* Emery ant. Other insects are also carried into the nest. I once saw several ants in concerted action drag into the nest a dead housefly. They also like to store seed-pods of the American Elm. Every year in early May there is a veritable shower of seed-pods in our yard, and thousands of ants may then be seen conspicuously transporting them to the nests.

Lasius (*Acanthomyops*) *claviger* Roger. Several winged ants of this species taken at the lights at Kirkwood, Mo., July 21, 1934.

Prenolepsis imparis var. *testacea* Emery. A hundred or more of these ants were shaken out of a fungus plant, *Russula* sp. at Ranken, Missouri, on September 24, 1934. The ants entered the cap by two small openings in the hollow stem, which they themselves evidently had made.

Prenolepsis imparis Say. A winged queen of this species was seen at Kirkwood, April 30, 1940, and also a dozen winged individuals were picked off the automobile windows at Ranken, Missouri, April 6, 1941.

Tetramorium cespitum L. Hundreds and hundreds of piles which looked very much like very fine coffee grounds were observed in a fifty acre plot in the central part of St. Louis. Close inspection proved them to be piles of dead ants, which later were identified by Mr. M. R. Smith as *T. cespitum.* The ants had evidently died in the nests during the winter and were later carried out by the workers. Portions of this field are used as a neighborhood dumping ground, and many piles of the dead ants were found on top of pieces of rusty tin or other refuse, but most of them were found on small patches of barren ground, with, however, a sprinkling in the short grass. There were from 500 to 1200 dead ants in each pile, and the number of piles was enormous—far beyond my ability to even estimate them. I never before saw so many ants in any one place. I am at a loss to offer an explanation for this enormous mortality. The date when the observations were made is June 20, 1939.

Leptothorax curvispinosus Mayr. A nest of this ant containing only larvae was found in a hollow stem of the trumpet-vine at Kirkwood, Missouri, May 12, 1935.

Pogonomyrmex occidentalis Cress. The most conspicuous objects of the landscape in the semi-arid regions of Kansas are the large gravel covered mounds of the harvester ant, *P. occidentalis.* In motoring through the state, the temptation is great to stop sufficiently long to study the habits of this ant. However, only a few desultory notes were made at a few points—near Kanopolis, Dodge City and Salina.

The mounds are large, they appear to be abundant, and are usually made up of small bits of gravel; a large space around each nest is always clean and is kept clear of vegetation. It was at first thought that the gravel was brought from below in the course of mining operations, but close observation proved that the ants picked up the bits from the surface elsewhere and deposited them on the mound. The gravel seemed to be of a very uniform size, and this was probably due to the fact that an ant brought in only such bits as she could conveniently carry. They not only brought in gravel, but in one mound they were seen bringing in shiny bits of broken glass, and in a nest in the yard of a schoolhouse, they were bringing in bits of black coal which they picked up in the shed twenty feet away.

In one mound, when I scratched away the surface on July 5, 1942, I found many winged ants. In a nest later, I found several ants carrying out the shedding skins of an unknown larval insect.

While *P. occidentalis* are regarded as harvesters, I found several of them bringing in insects, two of which were identified as the adult beetle, *Calendra parvulus* Gyle (det. L. L. Buchannan), and the adult wasp, *Lyroda subita* Say (det. H. K. Townes).

Pogonomyrmex barbatus var. *molefaciens* Buckley. Ants of this species are found in the same regions of Kansas as *P. occidentalis,* but the nests are not quite so abundant, at least not along the highway. Their mounds are also composed of tiny bits of gravel. Neither are the mounds so conical, being much flatter than those of *P. occidentalis.* These ants and their mounds were also seen along the highway on a trip to Mexico in July 1940. At Waco, Texas, some were seen carrying out soil from a nest, while others were carrying in small seeds of grass.

At McAlaster, Oklahoma, winged adults would often come to the openings of the nests but never flew into the air; a few days later, however (July 11, 1940), at Iguala, Gro., Mexico, winged individuals were often seen in flight. The ground around these nests is almost always clean and barren, but at Teothuacan, Mexico, there were very distinct runways in the grass around the nests.

This ant is a desert loving creature, and the mounds were abundant in the desert country of Mexico along the highway from Renosa to Monterey.

Crematogaster laeviuscula var. *clara* Mayr. An old mud-dauber's nest harbored a colony of this ant at Corliss, Kansas. The nest was on a shelf in a small, very dark out-building, and when taken on July 4, 1942, had about 250 adults and larvae plus only a few pupae. There were no eggs. According to Wheeler (Ants, p. 209, 1910), these ants often occupy old woody galls on oaks.

This species also abounds on my premises at Kirkwood and one summer caused me much annoyance by destroying the larvae of Polistes wasps in unguarded orphan nests, upon which I was carrying out experiments.

Solenopsis molesta Say. Three newly dead mining bees, *Anthophora abrupta,* at the foot of a clay bank at Kirkwood, were entirely covered with hundreds of this tiny thief ant on June 12, 1935.

Monomorium minimum Buckley. Many of these ants came to the saucers of honey I had placed in the grass for bees in the latter part of June.

Biological Notes on Atypus Bicolor Lucas (Arachnida) *

By Martin H. and Katharine E. Muma

Tarantulas of the genus *Atypus* Latreille are known commonly as purseweb spiders. Several workers including F. Enock,[1] H. C. McCook[2] and M. Ehlers[3] have studied the habits of different members of the genus. However, a search of literature showed that there was no published information on the biology of *Atypus bicolor* Lucas, a species living on the eastern sea coast of the United States. The following notes on this species have been collected during the past several years through observation and experimentation on three colonies located at College Park and Berwyn, Maryland. Thirty-three webs were located and utilized during the study.

The Web. This tarantula builds a leathery, tubular web placed nearly upright or perpendicular against a tree, stone or bank. Occasionally the web is suspended from a clump of tall grass or weeds. About sixty percent of the length of the tube is situated below the surface of the ground. Webs of adult females measure one to one and one-quarter inches in diameter and vary from fifteen to twenty inches in length. All of the webs located in this study were in low, more or less sandy, situations. Seventy percent of the webs studied had a southern exposure. No other striking preference for placement of the web was noted.

In building the web the spider first builds a short, horizontal, irregular tube on the surface of the ground. Working from the inside of this web she then builds a small section of the upright aerial portion of the typical tube. Next she begins excavating and building the subterranean part of the web. Soil excavated is formed into pellets a quarter of an inch in diameter which are carried by the spider in her front legs up into the aerial part of the web and pushed out through a slit that is almost always present near the top. The spider by-passes obstacles such as roots or stones encountered during excavation by extending the

* Contribution No. 1968 of the Maryland Agricultural Experiment Station. Miscellaneous Periodical No. 33. (Department of Entomology.)

web laterally for a short distance before continuing downward. Working alternately on the upper and lower portions the spider continues building until the web is complete. Under natural conditions particles of soil and bits of debris are incorporated with the web causing its color to blend with that of the tree or bank by which it is supported. In white sand under laboratory conditions particles of sand were used. Single strands of silk attach the web to the support. Webs are constantly under repair during the summer months. With the exception of the natural opening near the top of the web all holes or slits are patched with a fresh layer of silk. Patches often do not contain the foreign matter incorporated in the original web. When the aerial part of the web is torn down by wind, rain or other forces the spider rebuilds by cutting through one side of the old web at ground level and spinning a new upright. Webs in the field often exhibit two or three tabs of old web. In the laboratory, webs that did not reach to the bottom of holes provided in plaster molds were extended to do so.

The Egg and Young. Eggs were found in only one instance. They were in a spherical, loosely spun egg case suspended on the inside, near the bottom, of a web taken on June 30, 1942. The eggs remained in good condition until August 1 when they began to decompose. As young have been found in the webs in the late fall it is probable that eggs laid in the summer do not hatch until early fall. The eggs were spherical, about one-eighth of an inch in diameter, and pale yellow in color. The case contained approximately two hundred eggs.

Five tubes collected in the early winter contained newly hatched spiderlings. In each case the spiderlings were clustered around the mother on the inside walls at the base of the tube. Counts were made on two of the groups of spiderlings; one totalled 163, the other 278. Under laboratory conditions the young emerge from the webs at or near the top, climb upward "following the leader" and develop heavy bands and threads of silk with their drag lines. Dispersal is accomplished by the young spiders ballooning on strands of silk. Emergence of spiderlings from each of two confined webs took place on two separate occasions; part of them leaving in January, the remainder in February. Under natural conditions the silken trails have been observed late in March and early in April. All attempts at rearing the newly hatched spiderlings were unsuccessful. On one occasion tubes a half inch in length were built by three spiderlings before they died. Although diligent search has been made none of these tiny webs has been located in the field. The smallest web seen under natural conditions was a quarter of an inch in diameter, and the aerial part measured two inches in length.

The Adult Female. In the field the female apparently spends her entire life within the web. At no time during the study, day or night, was a female observed outside of the web. The longevity of these spiders was not determined in this study. However, since webs of adult females have been kept under observation for three years, it seems likely that the life cycle is of considerable length. Laboratory observations were made on seven mature females. Two of the confined females were removed from their webs for study. The remaining five were left in the tubes and used for observation and test purposes.

Mature females are reluctant to leave the web, clinging to it even while feigning death. After removal the spider continues to "play 'possum" if not disturbed and often remains quiescent for several minutes. If irritated by tapping with a teasing needle or similar object the spider will attempt to avoid trouble by moving away. The walking gait is clumsy, due apparently to the short legs, heavy body and unaccustomed horizontal position. Repeated tapping or prodding is necessary to induce the spider to bite. The bite, or more correctly strike, is accomplished with lightning speed. On the first strike the fangs are clamped tightly around the teasing instrument for several seconds. Succeeding strikes by the same individual are not as swift and release of the instrument is immediate. As this tarantula is sedentary, remaining within its web at all times, and as it is reluctant to bite outside of the web no attempt was made to determine the toxicity of its venom.

Inside the web the female remains at or just below the surface of the ground while waiting for prey. At the first sign of an approaching meal she stalks cautiously into the aerial part of the tube. In this advance she faces outward away from the support and in a position to strike. Signal of the presence of prospective food seems in some cases to be telegraphed by the support lines or guys that extend an inch or more from the tube on each side. When the prey climbs over the surface of the tube the spider makes a final rush, striking through the web. She then pulls the prey into the web, repairs the damage and retires below the surface of the ground to eat. After feeding she takes the remains of her prey to the top of the web and fastens it there. An analysis of these remains shows the spider to be a general feeder on ground inhabiting fauna. In collections from five different webs in the late summer, parts of ground beetles (Coleoptera), crickets and cockroaches (Orthoptera), true bugs (Hemiptera) and millepedes (Diplopoda) were found. Fecal matter is ejected through the opening at the top of the web with force enough to carry it three to four inches. The spider is well adapted to its precarious existence since it can survive starvation periods of one to two months.

The cocoon of a large hymenopterous parasite was taken from one web. An attempt to rear the insect failed due, it is believed, to the inability to maintain proper humidity.

Three females retained in their webs moulted after producing eggs and young.

The Male. Traps were set and many hours of search were made but no males were found. As males of this species have been found wandering in the open by other workers it appears that young males, upon moulting to maturity, leave their webs in search of females with whom to mate.

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3. Ehlers, M. 1937. Neues über Vorkommen und Lebensweise der markischen "Vogelspinne," *Atypus affinis* Eichw., und über die Unterscheidung der deutschen *Atypus*—Arten. "Markische Tierwelt." Bd. 2, Heft. 4. Berlin pp. 257–276.

Undescribed Species of Crane-Flies from the Western United States and Canada (Dipt.: Tipulidae). Part III

By Charles P. Alexander, Massachusetts State College, Amherst, Massachusetts

The preceding part under the above title was published in Entomological News, **54**: 253–258; 1943. At this time I wish to define three further species of the genus *Tipula* Linnaeus from Idaho, Washington and California, based on materials taken by Dr. A. L. Melander and by Mr. Anthony Downs. Except where indicated to the contrary in the text, the types of the novelties are preserved in my collection of Tipulidae. I am very deeply indebted to both collectors for their kindness in permitting me to examine large series of these flies in their possession.

Tipula (Bellardina) sacajawea n. sp.

Belongs to the *subcinerea* group; male hypopygium with the arm of the basistyle uniformly yellow, including the denticles; outer dististyle narrow, the apical yellow setae relatively long; inner dististyle only moderately dilated, at its apex with a group of at least twenty large blackened spines.

♂. Length about 16–17 mm.; wing 19–20 mm.; antenna about 3.4–3.5 mm.

Frontal prolongation of head dark brown, gray pruinose above; nasus elongate; palpi dark brown, the third segment a trifle paler. Antennae with scape and pedicel brownish yellow, flagellum dark brown; verticils long and conspicuous. Head light gray, patterned with dark brown, including a central vitta on vertex and more or less distinct lateral lines bordering the gray posterior orbits, the whole darkening more or less interconnected to form a trident.

Pronotum gray, with three brown spots. Mesonotal praescutum conspicuously patterned with light brown, black and gray, the disk chiefly occupied by light brown and gray stripes with broad brownish black centers; ground color of interspaces brownish black, more pruinose near suture; intermediate black stripes narrow, their pale lateral borders broader, the narrow median vitta gray pruinose; lateral stripes brownish gray with black centers; humeral and lateral portions of praescutum light gray pruinose; posterior sclerites of notum gray, patterned with dark brown, including areas on scutal lobes, a capillary dark line on scutellum, and three darkenings on mediotergite. Pleura and pleurotergite gray, with a very conspicuous dark brown dorsal stripe extending from the cervical region across the propleura and bases of fore coxae, the broad anepisternum to the wing-root, slightly involving the dorsal pteropleurite; a smaller dark spot on dorsal sternopleurite; metapleura chiefly pale yellow. Halteres black, the base of stem restrictedly yellow, with a small black spot on membrane at its base. Legs with coxae light gray, the bases of the fore and hind pairs narrowly infuscated; trochanters brown, light gray pruinose; femora and tibiae fulvous, the tips narrowly blackened, especially on the latter; basitarsi passing into black; claws (male) with a small obtuse tooth. Wings relatively narrow, heavily patterned with light and darker brown on a cream-colored ground; the dark pattern exceeds in area the pale markings except on proximal third of wing; the darkest pattern includes the stigma with a confluent seam over the cord and smaller spots beyond arculus and over origin of *Rs;* dark marginal spots at ends of outer veins, alternating with cream-colored marginal spots in the centers of the cells; the paler brown pattern involves most of the remaining cells, alternating with ground areas of about the same size; veins brown, paler in the more yellowed costal field. Venation: *Rs* a little more than twice *m-cu;* R_{1+2} entire; cell 1st M_2 relatively small, narrowed at outer end; *m-cu* on M_4 shortly beyond base.

Abdomen with basal tergite dark brown, bordered by light gray; succeeding tergites broadly orange medially, with conspicuous brown sublateral stripes, the lateral borders broadly gray, widest on the more proximal sclerites, the posterior margins more narrowly pale; sternites obscure fulvous, more or less pruinose, especially on the basal segment, the outer segments with broad paler margins; hypopygium chiefly brownish black, the lobe of the basistyle and the outer dististyle paler. Male hypopygium with the caudal margin of the ninth tergite subtransverse, the rounded median lobe small and dark; sublateral points small, conical. Basistyle produced caudad into a long arm, as in the group, this provided with a few teeth or points on the mesal face. Outer dististyle a little shorter than the arm of the basistyle, relatively narrow, the greatest width not exceeding one-fourth the length, at its tip with a few long yellow setae. Inner dististyle only moderately dilated as compared with allied forms; apex with a group of at least twenty conspicuous blackened spinous points.

Holotype: ♂; Moscow Mountain, Idaho, June 26, 1920 (Melander); in Melander Collection. *Paratopotypes:* 4 ♂♂, June 24, 1919; June 26, 1920 (Melander). Dr. Melander has supplied me with detailed notes on the type locality, of which the following is a digest. "Moscow Mountain, altitude about 4500 feet, is indicated on the maps as 'Cedar Mountain of the Thatuna Hills.' The north side is cool, with large cedar trees on the slope, toward the top the vegetation becoming dense, including mountain ash and alder, with patches of *Veratrum.* A favorite collecting ground of the entomologists from Pullman, Washington, and Moscow, Idaho, including Aldrich and Melander."

Named for *Sacajawea,* "The Bird Woman," Shoshone Indian, wife of the French trader Charbonneau, who, in 1805–1806, guided Lewis and Clark across the Rockies and beyond to the Pacific Ocean. Her papoose, Baptiste Charbonneau, was born on the expedition, February 11, 1805. Sacajawea died on April 9, 1884, at the age of nearly 100 years and is buried in the Shoshone Reservation cemetery near Fort Washakie, in the eastern foothills of the Wind River Range, Wyoming.

The species is well distinguished from the other members of the group, *T. (B.) subcinerea* Doane and *T. (B.) rastristyla* n. sp., by the hypopygial structure, as above described. In *subcinerea,* the median tergal lobe is yellow and conspicuous, the arm of the basistyle provided with blackened teeth and long yellow setae, and the inner dististyle is unusually flattened and expanded, the apical spinous points so reduced in size as to be visible only under relatively high magnification.

Tipula (Bellardina) rastristyla n. sp.

♂. Length about 18 mm.; wing 20 mm.; antenna about 3.1 mm.

Characters generally as in *sacajawea* n. sp., as described.

Frontal prolongation of head dark brown on either side, the middorsal line gray. Antennae relatively short. Posterior vertex with the median dark brown line but without lateral infuscations. Thoracic pattern virtually identical in both species. Wings a trifle wider, with cell *1st* M_2 larger, subequal in length to cell M_1.

Abdominal tergites with a very conspicuous yellow or orange-yellow median stripe, the sublateral portions dark brown or brownish black, the yellow becoming obsolete on tergite six; tergites seven to nine black, the eighth concealed beneath the seventh; lateral tergal borders broadly, the posterior margins very narrowly, grayish white; sternites chiefly obscure orange, gray pruinose, the outer segments more heavily pruinose and with yellow posterior borders, this coloration extending through segment eight; sternite nine uniformly blackened except for the lobe of the basistyle and the dististyles which are obscure yellow. Male hypopygium generally as in *sacajawea* but with all details quite distinct. Ninth tergite with the median region between the sublateral lobes more evidently emarginate; median tubercle conspicuous, low and broad, with abundant setae. Basistyle with the most proximal point a long fingerlike tubercle. Outer dististyle narrow, its width across midlength approximately one-fifth the total length; setae at apex unusually short and inconspicuous for a member of the *subcinerea* group, continued down the inner edge of style. Inner dististyle narrowed just beyond base, widely expanded outwardly, the spines large, black and very conspicuous, forming a compact group on the margin at the most expanded portion of the blade, about three of these spines larger and more powerful.

Holotype: ♂; Snoqualmie Pass, between King and Kittitas Counties, Washington, June 29, 1924 (Melander); Alexander Collection, through courtesy of Doctor Melander.

Tipula (Lunatipula) cladacantha n. sp.

Allied to *bifalcata;* general coloration of thorax yellow, the praescutal stripes scarcely defined; nasus lacking; antennae black, the scape, pedicel and most of the first flagellar segment yellow; male hypopygium with the beak of the inner dististyle obtuse; posterior spinous appendage stout, terminating in a long spine, with a second smaller spine a short distance back from the tip.

♂. Length about 17–18 mm.; wing 19–20 mm.; antenna about 5–5.2 mm.

Frontal prolongation of head light yellow, without nasus, the dorsal surface weakly pruinose; palpi with basal three segments yellow, terminal segment blackened. Antennae with scape, pedicel and proximal two-thirds of first flagellar segment yellow, the remainder of flagellum black; segments moderately incised, a little exceeding their longest verticils. Head above yellow, sparsely pruinose, with a capillary dark median vitta.

Thorax chiefly yellow, the praescutal stripes ill-defined, somewhat clearer yellow than the ground. Pleura yellow, very sparsely pruinose; dorsopleural membrane clearer yellow. Halteres with stem obscure yellow, clearer yellow at base, knob brownish black. Legs with coxae light yellow; remainder of legs yellow, the tips of the femora, tibiae and basitarsi narrowly infuscated; outer tarsal segments more darkened; claws (male) toothed. Wings with a strong yellowish brown tinge, clearer yellow on basal half, particularly in the prearcular and costal fields; stigma very small and inconspicuous, pale brown; obliterative area before cord moderately conspicuous, especially across cell *1st* M_2, barely entering cell M_3; veins brown, more brownish yellow in the brightened fields. Venation: *Rs* somewhat less than twice *m-cu;* petiole of cell M_1 subequal to or a little exceeding *m.*

Abdomen yellow, clearest on the basal segments, becoming more obscure outwardly, on the outer segments with indications of a very slightly darker sublateral stripe; lateral borders and the very narrow posterior margins paler; hypopygium castaneous. Male hypopygium with the ninth tergite transverse, the dorsal surface with a deep median furrow; caudal margin with a narrow median notch, on either side of which is an obliquely truncated lobe, the latter more or less sclerotized but not blackened, the margin of the truncated edge microscopically crenulated. Ninth sternite with the appendage large, the convex upper portion with a dense fringe of long yellow setae, the lower end produced into a smaller lobule that bears a pencil of very long reddish setae. Basistyle entire, not produced. Outer dististyle expanded on more than the outer half, the latter more or less bent backward, as in *bifalcata.* Inner dististyle complex, the main body with the rostrum obtuse, the dorsal crest triangularly produced backward, the face of the crest above the beak with very conspicuous, parallel ribs; lower beak blackened, its tip narrowly obtuse to subacute; outer basal lobe a flattened foot-shaped lobe; at base of last with a still further arm, as in *bifalcata* and allied forms, this appearing as a flattened blade or rod, its tip extended into a long reddish spine, on outer margin before apex with a smaller similar spine; the entire arm but especially the outer margin and apex with very long yellow setae. Phallosome including two sets of paired blades, one pair short, terminating in small curved hooks, the second pair long and slender. Eighth sternite sheathing, the apical lobes separated from the body of sclerite by pale membrane; the lobes include elongate lateral structures, their inner margins fringed with long setae from strong tubercles, two near the apex very large and powerful, fasciculate, bent strongly mesad just beyond their base, decussate at median line; a low depressed median cushion is similarly fringed with long yellow setae.

Holotype: ♂; Wawona, Mariposa County, California, altitude 5000 feet, June 6, 1939 (A. Downes). Paratopotypes, 4 ♂♂.

Although evidently allied to both *Tipula* (*Lunatipula*) *biarmata* Doane and *T.* (*L.*) *bifalcata* Doane by the structure of the male hypopygium, the present fly is well distinguished by the lack of the nasus and in various details of structure of the male hypopygium, particularly of the inner dististyle, as the obtuse beak and the very stout, branched posterior arm. The affinities of this particular group of flies remain somewhat obscure. The presence of a third lobe or spine on the inner dististyle, additional to the apparent outer basal lobe, sets these flies off as somewhat distinct. It should be noted that within this subgroup some species have the nasus whereas in the present fly it is quite lacking.

The Status of Stål's Oedipoda venusta, 1861 (Orthoptera, Acrididae, Oedipodinae)

By James A. G. Rehn, The Academy of Natural Sciences of Philadelphia

In 1861 the Swedish orthopterist Carl Stål described an oedipodid locust from San Francisco, California as *Oedipoda venusta.*[1] This species is a well-known form of the Pacific area, which has variously been referred to the genera *Sphara-gemon* and *Dissosteira,* but under present concepts properly should be placed in the latter. Unfortunately eight years earlier Fieber used the conbination *Oedipoda venusta* for a species then described by him from Greece,[2] and in consequence Stål's specific name is preoccupied and must fall. Both species have, of course, long been removed from the old blanket genus

[1] Kongl. Svenska Freg. Eugenics Resa, Zool. 5, p. 344.

[2] Lotos, III, p. 123, (1853).

Oedipoda, Fieber's species having been placed in *Scintharista* by Saussure in 1884, and finally in *Mioscirtus* by the same author in 1888.

The next name which is available for the Californian species is *Dissosteira pictipennis* Bruner, described from a single female said to have been taken in "California, probably in the vicinity of Indio." [3] The unique type of this species in the Hebard Collection ex Bruner is now before me. The differences given by Bruner in his key to the species of *Dissosteira* in the Biologia, to separate *pictipennis* from Stål's *venusta,* are seen to be of no value when a series of the species from a considerable number of localities is examined. With such a representation before me it can also be stated that Bruner's assumption that the type of *pictipennis* came from the Indio area is unwarranted.

The species for which the name *pictipennis* must be used is a coastal and west slope Sierran type, and it does not occur anywhere in the Colorado or Mohave Deserts, and definitely is not found about Indio, where I have collected Orthoptera on a number of occasions between 1907 and 1937. While *pictipennis* can be found in the west slope of the San Gorgonio Pass, but a few dozen miles west of Indio, it, and a number of other Orthoptera similarly distributed, most certainly does not inhabit the pronounced Colorado Desert environment about Indio. When the relatively small type specimen of *pictipennis* is compared with a series of some hundreds of individuals from over the entire known range of the species, it is found to agree fully in a number of local characteristics, of which size is one, with material taken in the Monterey peninsula area, and from correlated and confirmatory evidence of other material similarly labelled, and taken by the same collector (Leon La Forge), I feel that general region is the one in which the type of *pictipennis* was collected. The type specimen, while faded and bleached, still shows the characteristic rose colored disk of the wings.

[3] Biol. Cent.-Amer., Orth., II, pp. 162, 163, (1905).

Tempo and Mode in Evolution, by George Gaylord Simpson, New York, Columbia University Press, 1944, pp. xviii, 237, $3.50. In recent years renewed interest has developed in the subject of evolution due at least in part to the development of a new subdivision of genetics, population genetics, which permits of an experimental attack in a field which heretofore has been largely based on logical deductions from observable facts. This new book represents a survey of these modern theories by a paleontologist. Accepting and applying the mathematical and experimental analyses of population genetics to paleontological data, the author finds that insofar as the data from the two fields can be compared paleontological history can be made consistent with interpretation by population genetics. Some of the book is speculative but the author distinguishes clearly between facts and interpretations and between probable truths and guesses. Unfortunately for the layman, the book seems to be a treatise for specialists. It presupposes considerable familiarity with scientific names, terms and thought. For ready reading it should be preceded by at least some knowledge of elementary statistics, paleontology, general zoology, genetics and population genetics. Of course a serious novice could read it with profit but it is not easy reading even for one fairly familiar with the subject.

The author discusses in sequence the rates of evolution, determinants, micro-, macro- and mega-evolution, low rate versus high rate lines, inertia, trends, momentum, the environment and finally modes. In his last chapter he summarizes his views on evolution through the ages:

"The same general forces are operative throughout the whole of evolution, and they bring about similar processes and sequences wherever and whenever they occur. Their predominance, balance, and interaction do, nevertheless, vary greatly, and quite different sorts of evolutionary patterns may result. These patterns are protean. Their seemingly infinite variety is so bewildering that generalization appears impossible at first. Yet through them all there run three major styles, the basic modes of evolution." These modes he terms speciation, phyletic evolution and quantum evolution.

Speciation is given as the local differentiation of two or more groups *within* a more widespread population following means worked out by population genetics. Speciation is shifting, erratic, not typically either linear or adaptive, and is greatly influenced by the size of the interbreeding population (moderate, not large, size most favorable). Phyletic evolution is the term applied to slow, sustained, directional shifts of the average characters of an *entire* population. Phyletic evolution is highly adaptive and is represented by the common paleontological series (e.g. horses). Quantum evolution is the term applied to the relatively rapid shift of a population to one or more *new lines.* Quantum evolution involves loss of genetic equilibrium, a preadaptive shift and then establishment of an entirely new equilibrium. Paleontological evidence suggests that quantum evolution accounts for major changes (phyla, etc.) and that these occur rapidly; population genetics offers a possible mechanism. Each of these three modes may occur at any evolutionary level and may occur in combination but the tendency is for lower taxonomic categories (species, etc.) to arise by speciation, intermediate categories by phyletic evolution (genera, families, etc.), and higher categories by quantum evolution (phyla).

The evidence presented is cogent and the book one to be recommended as presenting material and ideas not available elsewhere. A. G. Richards, Jr.

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 and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).
Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—**Bethune-Baker, G. T.**—Obituary. [21] 57: 35–36. **Bridarolli, A.**—Excursion al Ignazu, Argentina. [101] 2: 50–62, ill. **Dallas, Ernesto D.**—Bibliografia del. [101] 2: 15–20. **Hincks, W. D.**—Problem of a changing nomenclature. [8] 71: 40–42. **Poulton, Edward Bagnall.**—Obituary. [Obit. Note. Fellows R. Soc. Lond.] 4: 655–80, bibl., port. **Stewart, M. A.**—Professional training in entomology. [55] 21: 1–10. **Wainwright, C. J.**—Nomenclature again (Diptera). [8] 71: 39–40. **Williams, C. B.**—An insect-catching grass. [9] 78: 37–38.

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62–70. **Ewing, H. E.**—Trombiculid mites (chigger mites) and their relation to disease. [17] 30: 339–65, ill. **Eyles, E. D.**—"How does a fly land on the ceiling?" [107] 20: 14–15. **Falconer, D. S.**—On the behavior of wireworms of the genus Agriotes in relation to temperature. On the movement of wireworms on the surface of the soil and their sensitivity to light. [33] 21: 17–32; 33–38. **Goldschmidt, R., et al.**—A study of spontaneous mutation. [Univ. Cal. Publ. in Zool.] 49 (10): 291–550. **Henry, G. M.**—Reflex bleeding in Sathrophylla rugosa (Orthoptera). [Ceylon J. Sci.] B, 22: 187–88, ill. **Holst, E. von**—Untersuchungen über Flugbiophysik. I Messungen zur Aerodynamik kleiner schwingender Flügel. [110] 63: 289–326 (1943). **v. Jascke, P.**—Bemerkungen zum Bau der alokosternalen Cicindelinenelytren. [100] 141: 231–34, ill., 1943. **Kinder & Süffert**—Über den Feinbau schillernder Schmetterlingsschuppen vom Morpho-Typ. [110] 63: 268–88 (1943). **Kühn & Engelhardt**—Über zwei melanistische Mutationen (At und ni) von Ptychopoda seriata. [110] 63: 251–67 (1943). **MacGill, E. I.**—On the biology of Dysdercus howardi. III The effect of temperature and humidity on the life cycle. [22] 35: 301–08. **Ulrich, H.**—Über den Einfluss verschiedener, den Ernährungsgrad bestimmender Kulturbedingungen auf Entwicklungsgeschwindigkeit, Wachstum und Nachkommenschaft der lebendgebärenden Larven von Oligarces paradoxus (Cecid., Dipt.). [110] 63: 109–42 (1943). **Vargas, L.**—Accion del DDT sobre algunos arthropodos domesticos. [35] 5: 229–35. **Vogt, M.**—Zur Produktion und Bedeutung metamorphosefördernder Hormone während der Larvenentwicklung von Drosophila. [110] 63: 395–446 (1943). **Weiser, J.**—Zur Kenntnis der mikrosporidien aus Chironomiden Larven. II. [100] 141: 255–64, ill., 1943. **Williams, C. B.**—Notes on the fat contents of two British migrant moths. [107] 20: 6–13. **Wundsch, H. W.**—Metamorphose von Demeijerea rufipes (Tendip.). [100] 141: 27–32, ill., 1943.

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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.

Lepidoptera—Would like to exchange Californian butterflies, noctuids, geometrids, etc. for eastern specimens. Glenn E. Pollard, 500 Clark Drive, San Mateo, Calif.

Lepidoptera—Am still collecting here and have only fine specimens for exchange. H. W. Eustis, Woodbine Rd., Augusta, Ga.

Wanted—Viennese Entomological Printing Press, for printing 3, 3½ and 4 type data labels. Kent H. Wilson, 430 Ridgewood Road, Fort Worth 7, Texas.

Wanted—Heteroptera from all parts of the world, all families except Miridae. Will buy, exchange or determine. S. and C. Amer. species esp. desired. John C. Lutz, 6623 Lansdowne Ave., Philadelphia 31, Pa.

Wanted—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

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Tracking Dragonfly Nymphs

By James G. Needham, Cornell University

There is a place on the eastern shore of Lake Placid in Highlands County, Florida, where I like to go collecting for dragonflies. It was there that I found the big *Didymops floridensis* common, and there that I learned the simple trick of tracking Progomphus nymphs.

The place is called Bear Point. A low ridge of the land ends in a jutting cape that curves out and around a little bay. On the inner side of this cape, sheltered from the waves, are banks that slope abruptly into deeper water with fringing mats of tangled floating grasses, where collecting for nymphs is difficult. But on the outer side, that is fully exposed to a mile-long stretch of open water, the beach is shelving, and nearly bare, and one may walk far out on it and collect anywhere. There are alternating stretches of bare sand and patches of stunted bottom-rooting sedges: sedges whose creeping rootstocks interlace and hold against the waves.

I first found this collecting ground on March 4th, when Mr. Richard Archbold of the Archbold Biological Station took me with a swimming party to this beach. The party swam and fished; he and I collected dragonfly nymphs.

Cast skins of the big *Didymops floridensis*, left at emergence by the adults, hanging to stubby sedge clumps above the water line, first attracted our attention. Unlike the northern *D. transversa*, this *Didymops* climbs the first available support that is broad enough to accommodate its flat venter and widely outspread legs. It makes use of a tangle of stems or of several stems that stand close together, and transforms usually within a foot of the water's surface. It does not go out on land and climb trees. We found plenty of exuviae, but no nymphs. Apparently its season of emergence was already passed.

We raked and sifted the sand wherever there was an opening among the sedges wide enough to permit the use of our rake-net, and soon were finding many nymphs of *Progomphus*, mostly less than half grown. Then we began finding their trails on the surface of the sand, and using them for guidance in our raking.

Anyone who has collected dragonfly nymphs carefully will have noticed the winding tracks of these burrowing Gomphine nymphs—so like clam-trails in miniature. The Progomphus nymph burrows like a mole spreading the sand to right and left with inturned fore and middle feet, and lifting the roof with its head. But unlike the mole, the nymph then cleaves that roof with his upturned tail and leaves a groove down the middle of it. The anal respiratory opening at the tip of the tail is thus kept in contact with clear water.

For some time we found only small nymphs, but just before leaving Mr. Archbold found near shore a single well-grown specimen that I conveyed eagerly to a rearing cage. I returned on March 10th to see if I could not get some more big ones. This time I began by observing the trails more carefully. In some of the shore pools, sheltered from wave action, there were veritable labyrinths of them, winding and twisting, crossing and recrossing. That they were made by nymphs of different sizes was evidenced by the unequal width of the trails. I found a single isolated one that I could follow for a distance of about thirty feet—the length of burrow, many times that distance—and lo! the nymph that made it was still working forward under the sand at the end of it. This was the clue I needed.

It so happened that on the morning of that March 10th there was a light on-shore breeze that had erased the old trails, and fresh ones were being made. What I had to do to find the well-grown nymphs was to pick out the wider trails and follow them to the end. The end was easily recognized if it lay in smooth sand; for there the median groove stopped and the bordering ridges came to a rounded confluence. Following this clue, this hint from nature, I soon had all the big nymphs of *Progomphus* that I cared to take away, and that with very little use of the net. If only the tracking be done understandingly, the collecting of these nymphs may be done neatly with a kitchen strainer big enough to sift a cupful of sand, or even, but more clumsily, with bare fingers.

A Cat That Eats Cicadas

By Nicholas L. Cuthbert and Mabel J. Cuthbert

At dusk one hot summer evening (July 8, 1944) in a small park in Kirksville, Missouri, we witnessed what was to us an unusual sight. A small house-cat was there catching something in the grass. We made him spit out the object he had just taken into his mouth and it proved to be the fully developed nymph of a cicada *Tibicen linnei* (S. & G.). We followed the cat on his hunting expedition through the park and in the next twenty-eight minutes he caught exactly twenty-eight cicada nymphs, swallowing each one instantly after a few crunching bites. As soon as one was finished he was on the alert for another, looking intently in all directions and with his ears pricked up. Several times he located one about four yards away and went running for it; at other times he walked deliberately toward his prey. Once he caught a nymph after it had crawled about two feet up the trunk of a tree. In the dusk we were unable to see the cicadas in the grass but the cat evidently made use of his keen ears and eyes to detect them as they emerged from the ground. We left the park after about forty minutes but the cat remained although by this time his search for cicada nymphs had slackened considerably.

On several other days one of us went at dusk to this same park. On each occasion the same cat was present and as before was industriously hunting cicada nymphs. At one time eight nymphs were located, caught, and eaten in four minutes. In all, the cat was observed on four different evenings for a total of seventy-seven minutes and during that time he ate sixty-six cicada nymphs.

Forficuline Dermaptera from the Southern Cameroons

By James A. G. Rehn, The Academy of Natural Sciences of Philadelphia

A considerable portion of the insect records from the Cameroons to be found in scientific literature lacks exact geographic information as to the place of capture of the material on which they are based.

The marked difference in faunal characteristics which exists between the northern grassland and savanna portion of the Cameroons and the southern (Lower Guinea) rain-forest region makes it desirable, in view of this lack of definiteness in much of the more historic material, that exact localities be recorded whenever available. This is particularly important to the zoogeographer weighing the very marked contrast and possibly different derivation of the life of these closely situated but exceedingly dissimilar areas. Similarly these data are essential to the specialist in any field studying his problems in a broadly analytic and evolutionary fashion.

Some years past the Carnegie Museum at Pittsburgh placed in my hands a small but interesting collection of Dermaptera from five localities in the present French Cameroons. All the specimens bore detailed information as to their capture, and the purpose of the present paper is to place on record for future usefulness the information on the Forficulina of this series, with such comments as seem desirable at this time. The material belonging to the Hemimerina has already been critically studied in a recent revision of that suborder.[1]

For summaries of the distribution of a considerable number of species of Dermaptera which occur in the Cameroons, reference should be made to my "Synonymic Catalogue of the Dermaptera of the Belgian Congo." [2]

[1] "A Study of the Genus Hemimerus (Dermaptera, Hemimerina, Hemimeridae)." By James A. G. Rehn and John W. H. Rehn. Proc. Acad. Nat. Sci. Phila., LXXXVII, pp. 457–508, figs. 1–47, (1936).

[2] Bull. Amer. Mus. Nat. Hist., XLIX, pp. 401–413, (1924).

The series here listed comprises 127 specimens, representing nine species, from five localities. All of the latter are in the Lower Guinea forest area of the southern Cameroons, their approximate positions being:

Batanga (Great Batanga), on coast about 10 miles south of Kribi. Approximate position 2° 45′ N., 9° 52′ E.

Edea, on Sanaga River about 50 miles from its mouth. Approximate position 3° 42′ N., 10° 20′ E.

Efulen, inland and due east from Kribi about 25 miles. Approximate position 2° 45′ N., 10° 40′ E.

Lolodorf, inland and due east from mouth of Nyong River about 60 miles. Approximate position 3° 10′ N., 10° 50′ E.

Metet, a large mission station 200 miles east of Kribi. This information, kindly furnished by the late Dr. Hugo Kahl, would place Metet near the upper Ja River, a tributary of the Sanga.

Pygidicranidae

Dicrana biaffra (Bormans)

Lolodorf; IX, 1926; (A. I. Good); 1 ♂. Edea; IX, 1923; (J. A. Reis); 1 ♀.

The Edea female fully agrees with a "Cameroons" female in the Hebard Collection.

Echinosoma afrum (Palisot de Beauvois)

Lolodorf; V, IX and XI 6, 1926; (A. I. Good); 6 ♂, 9 immature individuals.

The immature individuals, which represent the two instars preceding maturity, are referred to *afrum* with some slight question, but the males are fully typical.

Echinosoma occidentale Bormans

Lolodorf; V and IX, 1926; (A. I. Good); 2 ♂, 1 immature ♂. Efulen; XI, 1912; (J. A. Reis); 1 ♂. Batanga; II and IV, 1914; (F. H. Hope); 1 ♂, 1 immature ♀.

The Batanga immature female is in the instar preceding maturity.

LABIDURIDAE

Labidura riparia (Pallas)

Lolodorf; II, 1921, V, 1914 and 1925, IX, 1913, XII 23, 1920; (A. I. Good); 11 ♂, 6 ♀, 6 immature individuals.

This series represents both light and dark forms, the bulk of the material being intermediate in tone. Both sexes show marked size variation, and one quite small male lacks the usual internal median tooth on the forceps.

APACHYIDAE

Apachyus murrayi Dohrn

Lolodorf; IX, 1925 and 1926, X 22, 1914; (A. I. Good); 2 ♂, 3 ♀, immature ♂. Batanga; IV, 1926 and IX, 1913; (F. H. Hope and A. I. Good); 3 ♀.

LABIIDAE

Labia curvicauda (Motschulsky)

Lolodorf; V, 1923, XI, 1926; (A. I. Good); 1 ♂, 2 ♀. Batanga; (A. I. Good); 1 ♂.

The Lolodorf individuals are uniformly quite small, while the Batanga male is very appreciably larger (length of body, including forceps, 5.62 mm.).

CHELISOCHIDAE

Chelisoches flavipennis (Fabricius)

Lolodorf; I 15 and 30, 1919, II 7, 1918 and III 15, 1919; (J. A. Reis); 5 ♂, 5 ♀: same locality; II, 1914, V, 1923, IX, 1925, X 24, 1922, XI 30, 1913 and XII, 1914; (A. I. Good); 4 ♂, 5 ♀, 3 immature individuals. Edea; IV, 1922; (J. A. Reis); 1 ♂, 1 ♀. Efulen; IV, 1921, XI 17, 1922; (H. L. Weber); 1 ♂, 1 ♀. Batanga; IV 15, 1920 and IX, 1913; (A. I. Good); 3 ♂, 2 ♀, 1 immature individual.

This series shows marked size variation in both sexes, in the Lolodorf series alone the extremes (in millimeters) being as follows:

	Length of body, with forceps	Length of forceps
♂	16.4	4
♂	24.9	7.1
♀	18.5	4.8
♀	22.7	7.4

The males in the series show a very considerable range in forceps development, from a quite marked cyclolabic extreme, one of which is the minimum for the sex given above, to a distinctly macrolabic alternative, typical of which is the maximum here measured. In both types the proximal lamellate section is similar in size and character, the plasticity being in the degree of development and relative robustness of the arcuate distal portion.

The pale antennal band is found on the eleventh or twelfth article, and may involve one whole segment and halves of the preceding and following ones.

Euenkrates variegatum (Kirby)

Batanga; IV 15, 1920; 6♂, 4♀. Metet; XII 12, 1919; (A. I. Good); 1♂.

Two Batanga specimens (one of each sex) are depauperate individuals and quite small, the male with generalized forceps, yet both with fully developed tegmina and wings. The males have been compared with a male from Bitje, on the Ja River, in the southern Cameroons, already recorded.[3] The following measurements (in millimeters) show the range in size seen in the present series.

	Length of body, with forceps	Length of forceps
♂, Metet	17.2	5.9
♂, Batanga	14.6	5.4
♂, Batanga	11.8	3.8
♀, Batanga	16.8	3.8
♀, Batanga	12.6	3.3

[3] Rehn, Entom. News, XXXVIII, p. 149, (1927).

Forficulidae

Diaperasticus erythrocephalus (Olivier)

Edea; IX, IX 4 and X, 1923; (J. A. Reis); 5 ♂, 4 ♀.

Lolodorf; I and III, 1925, IV, 1923, V, 1923, X, 1925; (A. I. Good); 5 ♂, 4 ♀, 1 immature ♀: same locality; I 30, 1919; (J. A. Reis, Jr.); 1 ♂, 2 ♀. Batanga; II–IV, 1914; (F. H. Hope); 3 ♀: same locality; IX, 1913; (A. I. Good); 1 ♂.

One female from Batanga and another from Lolodorf have no evident wings. The Lolodorf specimen is exceedingly small, measuring but 9.4 mm. in total length, although that from Batanga is hardly at all under the average dimensions of other Cameroons females. The Lolodorf female measured is the smallest specimen of the species in a series of over one hundred and twenty individuals from a wide range of localities, now before me in the series of the Academy of Natural Sciences of Philadelphia.

Papilio mylotes Bates (Lepidoptera: Papilionidae)

By Kent H. Wilson, Fort Worth, Texas

In the summer of 1937 the author captured a specimen of *Papilio mylotes* at his home in Fort Worth, Texas. The specimen, however, was destroyed in the author's absence abroad.

The presence of *Papilio mylotes* in the United States has been very doubtful in the past. Holland in his *The Butterfly Book* stated it as being "extremely doubtful." He failed to find any "record of its occurrence north of the Rio Grande." McDunnough did not mention it in his *Check List of the Lepidoptera of Canada and the United States*, 1938. Dr. W. J. Showalter in *Our Friends and Foes and Spiders* (excerpts from the National Geographic Magazine) said, "Occasionally members of the species wander as far north as our Gulf coast."

A New Species of Paranomada with Notes on Melecta Thoracica Cresson

By E. Gorton Linsley, University of California, Berkeley

The following notes are based upon material very kindly submitted for study by Mr. P. H. Timberlake, of the Citrus Experiment Station, Riverside, California.

Paranomada californica new species

Female.—Color black, shining; integument almost impunctate; pubescence white. *Head* with occiput clothed with long, pale hairs; upper frons and vertex subglabrous; antennae with a rosette of long, plumose, white hairs about bases, scape clothed with moderately long, white hairs; clypeus shining, subglabrous, reddish; abdomen pale reddish at base, apices piceous; maxillary palpi with four free segments. *Thorax* black, shining; pronotal collar and tubercles densely clothed with pale hairs; mesoscutum and mesoscutellum subglabrous; metanotum pubescent, more densely at sides; mesepisterna with vertical face densely clothed with appressed white hairs; propodeum with dense patches of white pubescence on lateral margin, over anterior angles of triangular area, and on each side of posterior angle of area; intermediate and posterior coxae broadly lamellate; wings tinted with fuscous, anterior pair with a large pale area beyond submarginal and discoidal cells; veins and stigma dark brown. *Abdomen* black, shining, with a velvety band of plumose white pubescence along apical margin of tergites two, three, and four, band of second tergite broadly, of third tergite narrowly, interrupted at middle; pygidial plate elongate, apex narrowly triangular, emarginate. Length 7 mm., anterior wing 5 mm.

Male.—Form a little more slender than female; abdominal bands broadly interrupted on second tergite, successively less broadly interrupted on tergites three, four, and five; pygidial plate narrow, apex narrowly rounded; genitalia with sagittae about as long as stipites, nearly straight externally. Length 7 mm., anterior wing, 5.5 mm.

Holotype female and *allotype* male (Timberlake Collection), from Yucca Valley, San Bernardino County, CALIFORNIA, September 28, 1944, collected by Mr. P. H. Timberlake. Both examples were captured flying close to the ground at flowers of *Gutierrezia lucida* in company with *Exomalopsis verbesinae* Ckll. Mr. Timberlake suggests that *Exomalopsis* may be the host of this genus, calling attention to the fact that the two fly together and share a striking similarity in general appearance and sculpture.

This species is closely related to *P. velutina* Linsley (Arizona and Lower California), differing at once from *P. nitida* Linsley and Michener (Arizona) in the black color and four-segmented maxillary palpi. From *P. velutina* it may be distinguished by the white rather than ochraceous or golden pubescence, and the interrupted pubescent bands of the abdomen (in the female, broadly interrupted on second tergite, narrowly on third; in male, very broadly on second tergite, successively more narrowly on third, fourth, and fifth tergites.) The female may be further distinguished by the more narrowly triangular pygidial plate, the male also by the narrow pygidial plate which is narrowly rounded at apex, and possibly also by the slightly longer sagittae of the genitalia. These differences are expressed in the following key:

Females

1. Color black; maxillary palpi with four free segments......2
   Color pale reddish-brown; maxillary palpi with five free segments; abdominal tergites two to four with white pubescent bands; wings clouded with pale brownish, veins and stigma light brown. 7.5 mm. Arizona...........*nitida*
2. Pubescent bands of abdominal tergites ochraceous or golden, entire; pygidial plate more broadly triangular, apex subtruncate. 8.5–11 mm. Arizona and Lower California *velutina*
   Pubescent bands of abdominal tergites white, broadly interrupted at middle of second tergite, narrowly on third tergite; pygidial plate more narrowly triangular, apex shallowly emarginate. 7 mm. So. California..*californica*

Males

1. Pubescent bands of abdominal tergites two to five golden or ochraceous, entire; pygidial plate broadly subtriangular, apex broadly truncate. 8.5–10.5 mm. Arizona and Lower California .... *velutina*
   Pubescent bands of abdominal tergites two to five white, widely interrupted at middle on second tergite, successively more narrowly interrupted on tergites three, four, and five; pygidial plate narrow, apex narrowly rounded. 7 mm. So. California .... *californica*

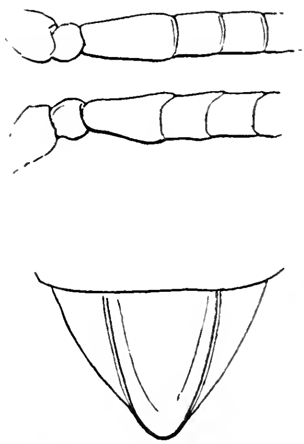

Figure 1. *Melecta thoracica* Cresson, female. Above: basal antennal segments in dorsal view (upper) and frontal view (lower). Below: pygidial plate. × 18.

Melecta (Melecta) thoracica Cresson [Fig. 1]

Melecta thoracica Cresson has not been recognized by recent workers. In my revision of nearctic Melectinae,[1] it was placed in the keys on the basis of the extremely brief original description and the few structural characters subsequently mentioned by Viereck.[2] These characters appear, however, to be valid and definitive, especially the form of the pygidial plate of the

[1] Linsley, E. G., 1939, Ann. Ent. Soc. Amer., 32: 429–468, figs. 1–9.
[2] Viereck, H. L., 1903, Trans. Amer. Ent. Soc., 29: 179.

sixth abdominal tergite of the female and the proportions of the flagellar segments of the antennae (fig. 1). A fuller description follows:

Female.—Black, pubescence of occiput, dorsum of thorax, and first abdominal tergite ochraceous to fulvous, remaining pubescence black. *Head* densely clothed with long, erect, black hairs at sides of face and about antennal bases, upper frons and clypeus thinly pubescent; upper frons and vertex closely, moderately coarsely punctate, median ocellus without a shining, impunctate triangular area in front, a distinct, elevated carina present between antennal bases and extending to base of clypeus; antennae piceous, first flagellar segment distinctly longer than second; clypeus moderately shining, finely, irregularly punctate, more coarsely and densely at base on each side of a smooth, median longitudinal basal line, base thinly clothed with long, fine, black hairs; mandibles pale, base and apex piceous. *Thorax* densely pubescent; mesoscutum with surface obscured by the long erect pubescence, surface apparently closely punctate; mesoscutellum with dorsal lobes armed with a spine which is much shorter than, and largely obscured by, the long erect hairs; mesepisterna opaque, coarsely, closely punctured, clothed with black hairs which do not obscure surface; wings dark brownish; legs moderately densely pubescent. *Propodeum* with enclosure finely punctate, nearly glabrous, otherwise clothed with long, erect, black hairs. *Abdomen* dark brownish or piceous, dull, surface tessellate, finely sparsely punctate; first tergite clothed with long, depressed or suberect, ochraceous or fulvous hairs except for a narrow median line and posterior margin, remaining segments with a few, coarse, suberect black hairs at sides; pygidial plate elongate triangular, flat, sides straight, apex evenly rounded, not liguliform. Length approximately 15 mm.

Described from a female from Buffalo, South Dakota, June 16, 1941 (H. C. Severin).

There is considerable uncertainty about the type of this species. In his original description, Cresson [3] states, "1 speci-

[3] Cresson, E. T., 1875, Wheeler Exp., Zool., 5: 726.

men; Eastern Nevada; 1872; Dr. H. C. Yarrow," in his catalogue of North American Apidae,[4] he gives the distribution as "Colorado and Nevada," and in his list of types,[5] he records the type locality as "Colorado." Mr. E. T. Cresson, Jr., who very kindly looked into the matter for the writer, reports that the putative type bears the following labels: (1) "Col," (2) "♀," (3) "Holotype 2286," (4) "M. thoracica." Mr. C. F. W. Muesebeck, who made a search for the Nevada specimen in the collections of the United States National Museum, which contain some of the material from the Wheeler Expedition, was unable to locate it. It is reasonable to suppose, therefore, that the Cresson type designation is in error and the type lost.

A New Henicopid Centiped from Utah

By Ralph V. Chamberlin, University of Utah

In a small collection of centipeds and millipeds made by Prof. C. L. Hayward on the slopes of the Wasatch Mountains east of Provo, Utah, is a single specimen representing a new genus in the family Henicopidae. It belongs in the subfamily Zygethobiinae, the type of which is Zygethobius, a genus erected by the author many years ago for another Utah species living at high elevations in the Uintah and Wasatch Mountains. The present genus is the second one of the group to be found in which ocelli are wholly lacking.

Genus **Yobius**, new

This is a henicopid genus of the Zygethobiinae, a subfamily characterized by lacking spiracles on the first pediferous segment. It is like *Buethobius* in lacking ocelli, but differs in having the tarsi of all legs biarticulate. The key given below will aid in placing the new genus among those previously known in the subfamily.

[4] Cresson, E. T., 1879, Trans. Amer. Ent. Soc., 7: 218.

[5] Cresson, E. T., 1916, Mem. Amer. Ent. Soc., 1: 132.

Generotype: *Yobius haywardi,* new species.

The name *Yobius* is given in reference to the finding of the type specimen on what is locally called "Y" Mountain.

Key to the Genera of Zygethobiinae

1. Ocelli absent 2
   Ocelli present, one on each side 3
2. Tarsi of all but last two pairs of legs uniarticulate *Buethobius* Chamberlin
   Tarsi of all legs biarticulate . . . . *Yobius,* new
3. All tarsi simply biarticulate; pores on last 5 pairs of coxae *Zygethobius* Chamberlin
   The second article of all tarsi subdivided into two to many subdivisions; pores on only the last four pairs of coxae *Esastigmatobius* Silvestri

Yobius haywardi, new species

Body with head, antennae and legs yellow throughout.

Antennae moderately long, composed typically of 35 or 36 articles, of which those distad of the second are short; second article long; the first short or intermediate.

Prosternal teeth small and pale, 3 + 3, with the median sinus shallow and U-shaped.

Legs having the usual tibial spur on anterior side of distal end, otherwise without spines but bearing setae as usual. Tarsi with three claws, of which the accessory laterals are small. Tarsi biarticulate in all legs present, including the penult. It is presumed that the tarsi of the anal legs are similar, but as these legs are missing from the holotype this point is not wholly certain. The second tarsal article is relatively short.

Coxal pores circular, 2, 2, 2, 2.

Claw of the gonopods of female entire, relatively short; basal spines 2 + 2.

Length, 7.5 mm.

Locality—UTAH: Utah County, on "Y" Mountain, east of Provo. One female, lacking anal legs taken May 12, 1944, by C. L. Hayward.

Undescribed Species of Crane-Flies from the Western United States and Canada (Dipt.: Tipulidae). Part IV

By Charles P. Alexander, Massachusetts State College, Amherst, Massachusetts

The preceding part under this general title was published in Entomological News, **56**: 126–132, 1945. In the present paper I am describing some additional novelties, almost all from the extensive Melander Collection, particularly rich in species from our northwestern states. Where the species are represented by uniques, Dr. Melander has very generously permitted me to retain the type specimens in my collection of World Tipulidae, a favor for which I express my deepest thanks.

Limonia (Limonia) yellowstonensis new species

General coloration gray, the mesonotum patterned with dark brown, including three praescutal stripes; antennae black, the bases of the flagellar segments narrowly pale and constricted; knobs of halteres dark brown; legs yellow, the tips of femora narrowly but conspicuously blackened; wings unusually narrow, especially on proximal half; ground color whitish subhyaline, heavily spotted and dotted with brown; Sc_1 ending opposite one-fourth to one-fifth the length of *Rs*; *m-cu* before the fork of *M*.

♀. Length about 6 – 6.5 mm.; wing 6.2 × 1.35 – 6.8 × 1.45 mm.

Rostrum brownish black, sparsely pruinose; palpi black. Antennae chiefly black, the scape weakly pruinose; flagellar segments with their bases narrowly pale, the remainder dark brown, the basal stems of the outer segments becoming more constricted; terminal segment a little longer than the penultimate. Head dark brownish gray, vaguely patterned with darker.

Pronotum gray, patterned with dark brown. Mesonotum gray, the praescutum with three conspicuous black stripes, the median one vaguely split by a capillary paler vitta, this less distinct in the holotype; scutal lobes likewise conspicuously blackened. Pleura gray; dorsopleural membrane infuscated. Halteres with stem yellow, knob dark brown. Legs with coxae brownish testaceous, the posterior pair paler; trochanters obscure yellow; femora light yellow, the tips narrowly but conspicuously blackened; tibiae yellow, the tips very narrowly and vaguely infuscated; proximal two tarsal segments yellow, the tips darker; outer tarsal segments infuscated. Wings unusually narrow, especially on more than the proximal half; ground color whitish subhyaline, heavily spotted and dotted with brown; the larger areas include, additional to the uniformly darkened stigma, a series of three costal areas, these subequal to or more extensive than the interspaces; third dark area a common one over the origin of *Rs* and fork of *Sc*; besides brown seams over cord, outer end of cell *1st* M_2 and at ends of the veins, numerous brown dots in the cells, all more or less confluent, in the outer medial field unusually extensive and suffusing the veins; veins yellow, brown in the patterned areas. Venation: *Sc* moderately long, Sc_1 ending about opposite one-fourth to one-fifth the length of *Rs*, Sc_2 faintly indicated to lacking; cell *1st* M_2 nearly as long as vein M_{1+2} beyond it; *m-cu* from about two-fifths to three-fourths its length before the fork of *M*.

Abdominal tergites yellowish brown to dark brown, still darker laterally, the surface more or less pruinose; sternites obscure brownish yellow to light brown.

Habitat.—Wyoming. *Holotype:* ♀, Yellowstone National Park, August 25, 1934 (C. P. Alexander). *Paratopotype:* 1 ♀.

The most similar described species is *Limonia* (*Limonia*) *nelliana* (Alexander) from an unknown station in Colorado. This is a larger fly, with broader wings and with vein *Sc* very short, Sc_1 ending opposite the origin of *Rs*. The structure of the male hypopygium of *nelliana* shows that it is quite distinct from *L.* (*L.*) *venusta* (Bergroth) and allies. The discovery of the male sex of the present fly will be of much interest.

Erioptera (Ilisia) polycantha new species

Allied to *sparsa;* general coloration of mesonotum dark gray, the posterior sclerites variegated with chestnut brown; basal flagellar segments yellow; legs yellow, the tips of the femora, tibiae and basitarsi infuscated; wings yellow, spotted with brown; male hypopygium with the inner arm of the outer dististyle terminating in a sharp recurved spine, on outer margin of base with several acute spinulose points; phallosome with the lateral apophyses gradually narrowed to acute points.

♂. Length about 5 mm.; wing 6 mm.

Rostrum and palpi brownish black. Antennae with the scape and pedicel light brown, basal flagellar segments yellow, the outer ones infuscated; flagellar segments with the longest verticils unilaterally distributed, exceeding the segments. Head brownish gray.

Pronotum light brown medially, darker on sides; scutellum and pretergites light yellow. Mesonotum chiefly dark gray, the praescutum with indications of a darker plumbeous gray central stripe; pseudosutural foveae and tuberculate pits black; posterior sclerites of notum chiefly dark gray, the posterior border of scutellum, most of the parascutella, and the broad lateral borders of the mediotergite more chestnut brown. Pleura chiefly brownish gray, the propleura extensively obscure yellow, concolorous with the dorsopleural membrane. Halteres uniformly pale yellow. Legs with the coxae and trochanters brownish yellow; femora, tibiae and basitarsi yellow, the tips infuscated, slightly more extensively so on femora; remainder of tarsi dark brown. Wings with the ground color yellow, restrictedly but handsomely patterned with brown, including spots as follows: At *h*; arculus; origin of *Rs*; Sc_2; marginal areas at ends of all longitudinal veins excepting R_5 and *1st A*, largest at R_{1+2}, R_3 and *2nd A*; an oblique seam on anterior cord from *C* to *r-m*, widest in front; other seams over *m-cu*, *m* and as a spot on basal section of M_3; veins yellow, dark brown in the patterned fields. Venation: Sc_2 about opposite one-third *Rs*; R_2 and R_{2+3} subequal; cell *1st* M_2 elongate, the basal section of M_3 more than twice *m*; *m-cu* transverse, almost its own length before the fork of *M*; vein *2nd A* nearly straight, the anal veins divergent.

Abdomen, including hypopygium, dark brown. Male hypopygium with the dististyles virtually terminal in position, the mesal portion of basistyle slightly produced beyond their bases. Outer dististyle profoundly bifid, the outer arm a long brownish yellow, paddle-like blade; inner arm blackened, gradually narrowed to a sharp recurved spine, on face of style before midlength with a strong black spine; besides the above, outer margin of the basal half with four or five small erect spinulose points. Inner dististyle relatively narrow, entirely fleshy. Phallosome with the lateral apophyses appearing as broad black plates, gradually narrowed to acute points, the outer margin microscopically serrulate or roughened; inner apophyses appearing as short slender black spines that are directed strongly laterad.

Habitat.—WASHINGTON. *Holotype:* ♂, Quilcene, Jefferson Co., July 24, 1917 (A. L. Melander).

The most similar species is *Erioptera* (*Ilisia*) *sparsa* Alexander, of California, which has the details of the male hypopygium, particularly the outer dististyle and the phallosome, entirely different. The unusually spinose inner arm of the outer style is distinctive.

Ormosia (Ormosia) hispa new species

Belongs to the *manicata* group; general coloration of mesonotum reddish brown, of pleura and abdomen more yellowed; wings whitish subhyaline, the stigmal region faintly more darkened; R_2 very oblique; male hypopygium with the tergal lobes unusually dilated; phallosome very large, complex and heavily sclerotized; furcula widely expanded toward apex, deeply forked, the arms truncate at tips and provided with numerous microscopic spinulae; near midlength of phallosome with a very high crest or flange.

♂ Length about 4.5 mm.; wing 5.1 mm.; antenna about 0.75 mm.

Rostrum brownish yellow; palpi medium brown. Antennae short; scape light brown, pedicel large, pale yellow, flagellum brown; flagellar segments elongate, slightly dilated before midlength and here provided with long conspicuous verticils, these exceeding the segments in length. Head light reddish brown.

Pronotum and pretergites yellow. Mesonotum chiefly reddish brown, the surface gray pruinose, especially on the posterior sclerites; lateral portion of praescutum restrictedly more yellowed. Pleura chiefly reddish yellow. Halteres relatively elongate, stem pale yellow, knob weakly more darkened. Legs with coxae and trochanters yellow; remainder of legs broken. Wings whitish subhyaline, the prearcular and costal regions slightly more yellowed; stigmal region faintly more darkened; veins brown, yellow in the brightened fields. Venation: Sc_1 ending just before the unusually oblique R_2, Sc_2 about opposite one-fifth to one-sixth the length of the long Rs; cell M_2 open by the atrophy of the basal section of M_3; *m-cu* close to the fork of M; Anal veins divergent.

Abdomen, including hypopygium, chiefly yellow. Male hypopygium with the tergal lobes even more dilated than in *manicata* and allies. Both dististyles unusually narrow, the outer style arcuated, its distal half with microscopic setulae; inner style subequal in length, nearly straight, the length about six times the diameter at midlength, the apex obliquely truncated. Phallosome unusually large, complex and heavily sclerotized; furcula widely expanded at apex, the two arms with numerous microscopic spinulae, especially along the margins of the notch, the apices obliquely truncated; at near midlength of phallosome with a very high crest or flange; what appears to represent the aedeagus originates still more basad, bifurcate at its tip.

Habitat.—WASHINGTON. *Holotype:* ♂, Puget, Thurston Co., July 4, 1925 (A. L. Melander).

Ormosia (*Ormosia*) *hispa* is entirely different from the other species of the *manicata* group, especially in the very distinct phallosome of the male hypopygium. The other species, *O.* (*O.*) *manicata* Doane (*deviata* Dietz, *fuscopyga* Alexander) and *O.* (*O.*) *modica* Dietz (*stylifer* Alexander) of North

America, and *O.* (*O.*) *subdeviata* Alexander, of Japan, are all much more closely allied among themselves. *O.* (*O.*) *profunda* Alexander, of western North America, is even more isolated and generalized but from the structure of the phallosome I believe should be referred to this group of *Ormosia*.

Molophilus (Molophilus) distilobatus new species

Belongs to the *gracilis* group, *pubipennis* subgroup; general coloration of mesonotum reddish brown, variegated with yellow; antennae short, the more proximal flagellar segments with very long verticils; legs yellow, tips of femora and tibiae inconspicuously darkened; wings grayish yellow; male hypopygium with the basistyle unusually long, the lobes lying far distad; mesal lobe with the blackened spinous setae all near apex of lobe; a supplementary slender flattened blade at edge of mesal lobe; both dististyles pointed at their tips; phallosome with long pale setae.

♂. Length about 4.5 mm.; wing 5 mm.; antenna about 1.1 mm.

Rostrum light brown; palpi black. Antennae short; basal segments yellow, outer ones passing into pale brown; the more basal segments with unusually long verticils, the longest about twice the segments, those of the outer segments smaller; remaining vestiture of segments abundant but pale and inconspicuous. Head above chiefly dark brownish gray, the anterior and posterior portions yellowed.

Pronotum yellow, vaguely more darkened medially above; pretergites yellow. Mesonotum reddish brown, very sparsely pruinose, the humeral region extensively light yellow, the extreme lateral borders back to the suture very narrowly so; scutellum infuscated, its posterior border narrowly obscure yellow; postnotum infuscated, the suture between mediotergite and pleurotergite conspicuously yellow. Pleura chiefly reddish brown, more heavily darkened on the anepisternum, the remainder more or less variegated by yellow. Halteres with stem whitened, its outer portion weakly infuscated, apex of knob light yellow. Legs with coxae reddish yellow; trochanters yellow; remainder of legs yellow, the tips of the femora somewhat extensively but very vaguely darkened, of the tibiae more narrowly so; outer tarsal segments brownish black. Wings grayish yellow, the prearcular and costal fields clear light yellow; veins brownish yellow, macrotrichia brown. Venation: R_2 virtually in alignment with *r-m*; petiole of cell M_3 about twice *m-cu*; vein *2nd A* sinuous, narrowing the cell on outer half, ending about opposite one-third the length of the petiole of cell M_3.

Abdominal tergites brown, with narrowly pale posterior borders; sternites more yellowed. Male hypopygium with the basistyle unusually long, the lobes lying far distad, including both the ventral and mesal ones, both on the same general level and terminating before the tips of the dististyles. On edge of mesal lobe a small and relatively slender flattened lobe, its surface with rather numerous setae on the outer portion, the apex and inner edge of the blade glabrous; main portion of mesal lobe broad, with about 18 black spinous setae, all placed near the apex. Outer dististyle moderately curved, slender, narrowed to the acute tip, the outer margin with a few appressed spines. Inner dististyle longer, strongly bent beyond midlength, narrowed to the long apical spine, the ventral margin of outer half with coarse conspicuous spines; face of style near midlength with a few very long setae. Phallosome broad, subacute at apex, the surface with numerous long pale setae.

Habitat.—OREGON. *Holotype:* ♂, Viento, Wasco Co., July 1, 1917 (A. L. Melander).

From the other regional members of the *pubipennis* subgroup having short antennae in the male sex, the present fly differs somewhat conspicuously in the structure of the male hypopygium, particularly of the basistyle and its lobes. It is most similar to *Molophilus* (*Molophilus*) *spiculatus* Alexander, yet entirely distinct.

Personals

Dr. Nathan Banks. As of July first, Dr. Banks will retire from the position of Curator of Insects in the Museum of Comparative Zoology at Harvard College, Cambridge, Massachusetts. Dr. Banks will continue his work on the Neuropteroids and on the Psammocharids. Personal mail should be addressed to 103 Norfolk Street, Holliston, Massachusetts.

Dr. A. Glenn Richards, Jr. is relinquishing his Assistant Professorship of Zoology at the University of Pennsylvania to become an Associate Professor at Minnesota. He is to inaugurate a graduate course and research in Insect Physiology, to establish a research laboratory in insect physiology and to continue the course in Insecticides. His new address, as of July 1st, is: Division of Entomology and Economic Zoology, University of Minnesota, St. Paul 8, Minnesota.

Dr. Richards, since 1942, has also served as the Recording Secretary of the American Entomological Society, and as Secretary of its Council, and brought to those offices discerning ability and tactful judgment, for which the thanks of the Society and of its members follow Dr. Richards to his new post.

For his effective work on ENTOMOLOGICAL NEWS,—as a member of its Editorial Staff since 1942, and as Managing Editor from January 1944 to May 1945,—the NEWS wishes to express to Dr. Richards its grateful acknowledgement and thanks. The NEWS extends to him its best wishes for success and joy in his new field of activity.

Dr. Frank E. Blaisdell, Sr., California's well known Coleopterist, has retired and moved away from San Francisco; also given up his research studies. His new address is 22 High Street, Watsonville, California.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Typhus in Naples: Typhus is a louse-borne disease which can be effectively controlled only as lice are exterminated. Shortly after its capture by the Allies, Naples was threatened by a serious epidemic. Thousands had lived in bomb-shelters with inadequate sanitary arrangements and the situation was ripe for an explosive outburst of the disease. The Rockefeller Foundation's typhus team, using their new method for application of insecticide without removing clothes, undertook the mass delousing of the entire population. Forty delousing stations were established to which the people came by the thousands and tens of thousands. Men dusters cared for the boys and men, and a staff of women cared for the girls and women and the white DDT powder was applied directly by compressed air guns which swoshed it up trousers and skirts, down sleeves, into collars, seams, tucks and folds, wherever the insect or its eggs might cling. More than 1,300,000 were treated in January alone, and Naples has a population of less than 1,000,000, which shows that some people came for more than one treatment. If well dusted, DDT will protect the body against lice for four to five weeks. The epidemic in Naples which might have taken thousands of lives collapsed with astonishing rapidity.

Yellow Fever. Research in yellow fever is now being carried on by the Rockefeller Foundation in seven localities outside the United States, four of them in South America and three in Africa.

In Villavicencio, Colombia, in an endemic yellow fever region, more than 2,000 animals have been trapped, ranging all the way from mice to wildcats and monkeys, and from birds to snakes and other reptiles. Immunity and inoculation tests gave positive results in only two species—the monkey and the opossum. That is, antibodies against yellow fever were found in their bloodstreams, evidence that at some time past they had been infected with the virus.

In June 1944, the laboratory at Ilhéus, Brazil, trapped a sick monkey, a marmoset. In its bloodstream were discovered not antibodies, but the active virus of yellow fever. The animal was seriously ill and soon died, and exhaustive laboratory tests showed conclusively that it had died of yellow fever.

This episode is historically interesting, because it is the first time in any country that a wild animal has been picked up in its natural habitat suffering from yellow fever. It lends support to the thesis that yellow fever is primarily a disease of jungle animals transmitted by jungle mosquitoes. But there are many questions still to be answered. How is jungle yellow fever transmitted to man? Where is the reservoir of the virus during the periods between epidemics? In brief, where does the sporadic infection come from and what keeps it going? From: THE ROCKEFELLER FOUNDATION, A REVIEW FOR 1944.

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 and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—**Beebe, W.**—Jean Henry Fabre. Tribulations of a naturalist and the courtship of the scorpion. [Book of Naturalists] pp. 213–33. (See also under Hymenoptera and Arachnida.) **Carpenter, F. M.**—Carboniferous insects from the valley of Mazon Creek, Ill. [Illinois Sta. Mus., Sci Pap.] 3: 20 pp., ill. (*). **Endicott, A.**—Preliminary survey of insects visiting goldenrod in Itasca

Park, Minn. [Proc. Minn. Acad. Sci.] 11: 28. **MacCreary, D.**—Some ectoparasites, excluding Ixodoidea, of Delaware mammals. [12] 38: 126–27. **de Oliveira, S. J.**—Dicloro-difenil-tricloroetana (DDT) no combate as brocas de livros: Dorcatoma bibliophagum e Catorama herbarium (Anob). [105] 15: 325–28. **Reeks & Smith.**—List of some forest insects of Newfoundland. [Scadian Nat., N. Brunswick] 2 (5): 1–17.

ANATOMY, PHYSIOLOGY, MEDICAL—Beebe, W.—Rene Antoine Ferchault de Reaumur. Why ants have wings. [Book of Naturalists] pp. 39–44. **Cragg & Ramage.**—Chemotropic studies on the blow-flies Lucilia sericata and L. caesar. [116] 36: 168–75. **Day, M. F.**—Corpus allatum of the sheep ked. [5] 50: 1–8 (1943). **Goldschmidt, R. B.**—Podoptera, a homoeotic mutant of Drosophila and the origin of the insect wing. [68] 101: 389–90. **Harrington, C. D.**—Biological races of the pea aphid. [12] 38: 12–22. **Hartman, C. G.**—How Odynerus suspends her egg. [5] 51: 1–4, 1944. **Hartman, C. G., et al.**—Notes on the habits of Osmia georgica as ascertained by the glass-tube method. [5] 51: 162–65 (1944). **Ludwig, D.**—Effects of atmospheric humidity on animal life. [23] 18: 103–35. **Marvin, P. H.**—Effectiveness of macrocentrus ancylivorus reared from strawberry leaf roller in parasitizing oriental fruit moth. [12] 38: 119. **Milne, A.**—Ecology of of the sheep tick, Ixodes ricinus. Seasonal activity in Britain with particular reference to northern England. Host availability and seasonal activity. [116] 36: 142–52; 153–57. **Parman, et al.**—Overwintering ecology of the screwworm, Cochliomyia americana—a symposium (5 papers). [12] 38: 66–90. **Schneirla, T. C.**—Army-ant behavior pattern: Nomad-statary relations in the swarmers and the problem of migration. [92] 88: 166–93. **Sommerman, K. M.**—Bionomics of Ectopsocus pumilis (Corrod.). [5] 50: 53–64 (1933), ill. **Sulkin, S. E.**—Recovery of equine encephalomyelitis virus (Western type) from chicken mites. [68] 101: 381–83. **Tshernov, O.**—Biological peculiarities of nymphs of Ephemeroptera on which sterlets of dvina feed. [Zool. Jour., Moscow] 23: 216–20. (Russian with Eng. Sum.) **Vellard, J.**—Cuatro conferencias sobre animales venenosos. [Inst. Univ. Pas Paris en Buenos Aires] 71 pp. **Wellington, W. G.**—Conditions governing the distribution of insects in the free atmosphere. [4] 77: 7–15.

ARACHNIDA & MYRIOPODA—Beebe, W.—(See under General.) **Bishopp & Trembley.**—Distribution and hosts of certain N. Amer. ticks. [17] 31: 1–54. **Bryant, E. B.**—Notes on Dictyolathys maculata (Araneae). [5] 50: 83–86 (1943). Three species of Coleosoma from Florida. [5] 51: 51–58, ill. (1944). **Crane, J.**—Spiders of the family Salticidae from Brit. Guinana and Venez. [18] 30: 33–42, ill. (*). **Goodnight, C. J. & M. L.**—Duas esp. nov. de opilioes Sul-Americanos. [105] 15: 332–34, ill. **Loomis, H. F.**—Millipeds principally collected by Prof. H. E. Shelford in the eastern and southeastern states. [5] 51: 166–77, ill. (1944) (*). **Milne, A.**—(See under physiology.) **Turk, F. A.**—Studies of Acari. II. Descr. of new sp. and notes on established forms of parasitic mites. [116] 36: 133–41, ill.

SMALLER ORDERS AND ORTHOPTERA—Banks, N.—New Neuroptera and Trichoptera from the U. S. [5] 50: 74–81 (1943). **Carpenter, F. M.**—Notes on Nearctic Neuroptera. [5] 49: 49–51 (1942). (See also under General.) **da Costa Lima, A.**—Sobre dois fosseis da bacia terciaria de Fonseca (Alvinopolis—Minas Gerais). [15] 16: 291–92, ill. **Emerson, A. E.**—Kolotermes milleri, n.sp. of termite from the Florida keys and Jamaica. [5] 50: 18–22 (1943). **Milne & Milne.**—Caddis flies (trich.) and pitcher plants. [5] 51: 179–82 (1944). **Prince, F. M.**—Description of three new sp. of Dactylopsylla and one new subsp. of Foxella, with records of other species and genera (Siphonaptera). [4] 77: 15–20, ill. **Sommerman, K. M.**—(See under physiology.) **Strohecker, F. H.**—An Ammobaenetes from Nevada (Gryllacrid). [5] 51: 147–50, ill. (1944). **Steyskal, G. C.**—Notes on Nallachius americanus (Dilar., Neur.). [5] 51: 183–84 (1944).

HEMIPTERA—Callan, E. McC.—Cacao stink-bugs in Trinidad (Pentatomid). [105] 15: 321–24. **Drake & Harris.**—New Pheumatobates from Brazil, with a note on R. imitator (Gerrid). [105] 15: 269–72, ill. **Fennah, R. G.**—New species of Bothriocera (Cixiid) from the Lesser Antilles. [5] 50: 9–17 (1943). **Usinger, R. L.**—Annectant genus of Cimicoidea from Baltic amber. [5] 49: 41–47 (1943). **Wygodzinsky, P.**—Additional notes on the Brazilian sps. of gen. Aradus. Notas sobre Reduvioidea. [105] 15: 326–31, ill.; 342–51, ill.

LEPIDOPTERA—Beebe & Fleming.—Sphingidae of Kartabo, Br. Guiana and Caripito, Venezuela. [18] 30: 1–

6. **Clench, H. K.**—Lycaenidae of the Bahama Is. [5] 49: 52–60 (1942). New Calisto from Hispaniola and Cuba. [5] 50: 23–29 (1943). Notes on Calisto. [5] 50: 115 (1943). **Gorham, R. P.**—Lepidoptera (moths) taken in and near Fredericton, N. B. [Acadian Nat. N. Brunswick] 2 (5): 52–66. **Lichy, R.**—Documents pour servir a l'etude des lepidopteres du Venezuela. 2. Terias gratiosa (Peierid). Documents pour servir a l'etude des Sphingidae du Venezuela 6. Madoryx oiclus. [46] 3: 193–94; 195–202, ill. **Loveridge, A.**—Wings of the mourning cloak butterfly snipped by ant. [5] 51: 178 (1944). **Nabokov, V.**—New or little known nearctic Neonympha. [5] 49: 61–80 (1943). Female of Neonympha maniola. [5] 50: 33 (1943). Nearctic forms of Lycaeides. [5] 50: 87–99 (1943). Notes on the morphology of the genus Lycaeides. [5] 51: 104–38, ill. (1944).

DIPTERA—Alexander, C. P.—New Nearctic craneflies. [4] 77: 1–6. New or little-known Tipulidae from Venezuela.V. [46] 3: 171–92. Records & descr. of Brazilian Tipulidae. XI. Two undescr. sps. of Psychodid diptera from Tropical Amer. [105] 15: 292–312; 313–17. Records & descr. of N. Am. crane flies. V. Tipuloidea of Grand Teton Nat. Park & Teton Nat. Forest, Wyo. [119] 33: 391–439, ill. (*). **Baker, E. W.**—Studies on the Mexican fruitfly known as Anastrepha fraterculus. [12] 38: 95–100. **Barnes, R. C.**—Anopheles walkeri in diurnal shelters in Massachusetts. [12] 38: 114. **Bequaert, J.**—Notes on Hippoboscidae. 18. The genus Chypteromyia; with the descr. of a n.sp. [5] 49: 108–17 (1942). Further studies of the Tabanidae of Trinidad. [5] 51: 12–21 (k), (1944). **Bromley, S. W.**—Bee-killing asilids in N. England. [5] 49: 81–83 (1943). **Brues, C. T.**—N. Amer. species of Chaetopleuromorpha (Phorid). [5] 50: 50–52 (1943). New neotropical Phoridae. [5] 51: 151–61 (1944). **Eyles & Burgess.**—Anopheles walkeri in S. Carolina. [12] 38: 115. **Hull, F. M.**—New species of Syrphidae from the neotropical region. [5] 49: 84–107 (1942). Studies on Syrphid flies in the Mus. Comp. Anat. [5] 51: 22–45 (1944). Revisional study of the fossil Syrphidae. [26] 95: 251–353, ill. (*). Some n.sps. of genus Salpinogaster (Syrphid). [46] 3: 165–70 (S). **Johannsen, O. A.**—Noxious species of Phlebotomus in the Okefenokee Swamp, Ga. [5] 50: 112–13 (1943). **Lane, J.**—As esp. Neotropical do gen. Clinohelea (Ceratopog.) Zoogeography of Neotropical Anophelini (Culicid). [105] 15: 249–61; 262–68 (*). **Schoof & Schell.**—Survival of anopheline larvae and pupae in muck. [12] 38: 113–14. **Stone, A.**—Notes on gen. Trichoprosopon (Culicid). [105] 15: 335–41 (S). **Thurman, Ogden & Eyles.**—United States record for Culex interrogator. [12] 38: 115.

COLEOPTERA—Monte, O.—Sobre Coleopteros Otidocephalinae. [105] 15: 318–20 (*). **Patterson & Hatch.**—Annotated list of the Scolytoidea of Washington. [Univ. Wash. Pub., Biol.] 10: 147–54. **Werner, F. G.**—Rev. of the gen. Pleomorpha. Three n.sp. of Cebrio. [5] 50: 30–32, 34–36 (1943). New N. Amer. species of Epicauta. [5] 50: 65–73 (1943).

HYMENOPTERA—Banks, N.—Two new genera in Psammocharidae. [5] 50:82 (1943). **Beebe, W.**—Thomas Belt. Driver ants. [Book of Naturalists] pp. 151–59. Maurice Maeterlinck. The Swarm. [Book of Naturalists] pp. 197–212. (See also under Anatomy.) **Benson, R. B.**—Blasticotomidae in the miocene of Florissant, Colorado. [5] 49: 47–48 (1942). **Buren, W. F.**—New fungus growing ant from Mexico. [5] 51: 5–7 (1944). **Enzmann, E. V.**—Systematic notes on the genus Pseudomyrma. [5] 51: 49–103, ill. (1944), (k*). **Haeussler, G. J.**—Gambrus stokesii, an Australian parasite of codling moth and oriental fruit moth. [12] 38: 103–06. **Hartman, C. G.**—(See under Physiology.) **Michener, C. D.**—New bee of the genus Heriades from Panama. [5] 50: 109–11 (1943). **Moure, J.**—Notas sobre Abelhas da Colecao Zikan. II. (Apoid.) [105] 15: 273–91 (*). **Rau, P.**—Appearance of Vespula squamosa in Missouri. [5] 50: 114 (1943). Wasps feeding on comb honey. [5] 51: 50 (1944). **Schneirla, T. C.**—(See under Physiology.)

LIST OF JOURNALS CITED

4.—Canadian Entom. 5.—Psyche, Jour. of Entom. 12.—Jour. Economic Entom. 15.—Anais Acad. Brasil. Cien., Rio. 17.—Jour. Parasitology. 18.—Zoologica, New York. 23.—Physiological Zool. 26.—Bull. Mus. Comparative Zool. 46.—Bol. Entom. Venezolana. 68.—Science, New York. 92.—Biological Bull. 105.—Rev. Entomol. R. d. Janeiro. 116.—Parasitology, London. 119.—Amer. Midland Nat.

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.

Lepidoptera—Would like to exchange Californian butterflies, noctuids, geometrids, etc. for eastern specimens. Glenn E. Pollard, 500 Clark Drive, San Mateo, Calif.

Lepidoptera—Am still collecting here and have only fine specimens for exchange. H. W. Eustis, Woodbine Rd., Augusta, Ga.

Wanted—Viennese Entomological Printing Press, for printing 3, 3½ and 4 type data labels. Kent H. Wilson, 430 Ridgewood Road, Fort Worth 7, Texas.

Wanted—Heteroptera from all parts of the world, all families except Miridae. Will buy, exchange or determine. S. and C. Amer. species esp. desired. John C. Lutz, 6623 Lansdowne Ave., Philadelphia 31, Pa.

Wanted—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

Arctic Lepidoptera on hand, including Erebia, Oeneis and Brenthis. R. J. Fitch, Lloydminster, Sask., Canada.

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ENTOMOLOGICAL NEWS

JULY 1945

Vol. LVI **No. 7**

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ENTOMOLOGICAL NEWS

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Ovoviviparous Mayflies of the Genus Callibaetis (Ephemeroptera: Baetidae)

By George F. Edmunds, Jr., University of Utah, Salt Lake City

Of the several records of the occurrence of ovoviviparity in the genus *Callibaetis,* Nedham and Murphy (1924) were first to record the phenomenon in the species *Callibaetis vivipara* Needham and Murphy of Brazil. Doctor Osgood Smith (Needham, Traver, Hsu, 1935) reported a single female of *Callibaetis* sp. as containing well developed nymphs. Berner (1941) described this condition in *C. floridanus* Banks and *C. pretiosus* Banks from Florida and *Callibaetis* sp. from Michigan and gave an excellent description of the nymph within the chorion and after its liberation which occurs at approximately the time of ovopositing. *Cloeon dipterum* Linn., the only ovoviviparous mayfly reported in a genus other than *Callibaetis,* was recorded by Von Siebold as early as 1837.

The author was first attracted to this study in 1943 when he noticed how rapidly *Callibaetis claudiae* Edmunds * established itself in temporary pools. Several female imagos were dissected and some were found to contain eggs with well developed nymphs in them. The nymphs were carefully studied and found to agree with Berner's description of the nymph of *C. floridanus* Banks. Each specimen was found to contain 400 to 450 eggs. It was noted that the eggs of newly emerged imagos do not fill the abdominal cavity, thus considerable room is left for growth.

* This species is in the process of being described by the author. The description will appear in a future issue of this journal.

In Salt Lake City, September 21, 1944, *Callibaetis montanus* Eaton was observed ovopositing in puddles of waste sprinkling water that had accumulated on an asphalt pavement. This water had been standing only a few hours, yet there were a number of tiny white nymphs clearly visible against the black pavement. The eggs hatched within a few minutes after touching the water and the tiny nymphs began moving about in the shallow puddle. Several females were collected from the surface of the water at the time. One of these has two eggs containing well developed nymphs still clinging to the egg valve.

The addition of these two species to those previously reported increases the number in the genus known to be ovoviviparous to six or possibly seven species, depending on whether the New York (Smith) and Michigan (Berner) specimens were of the same or of different species. Thus, Berner's assumption that most if not all of the North American species of the genus are normally ovoviviparous is strengthened by these observations.

Berner noted the correlation of ovoviviparity and longevity in mayflies. He kept a female of *Callibaetis floridanus* Banks alive for eight days, and European workers have kept a female of *Cloeon dipterum* Linn. for twenty-one days. In June, 1944, the author kept two females of *Callibaetis claudiae* Edmunds alive in a flask for ten days and believes their death to have been due to desiccation rather than to any other cause. Berner states, and the author agrees, that this time is more than sufficient for the development of the eggs.

This extended longevity of the females coupled with the comparatively short life of the male produces a peculiar sex ratio in nature. Although the males are by far the most active, field collecting usually produces an overwhelming majority of females. Even though the author has made special efforts to collect male specimens, females are predominant in the collection at an eight to one ratio. Thus the fact that a considerable number of species are known only from female specimens seems to be further evidence of ovoviviparity throughout the genus.

Conclusions

1. It is probable that all species of the genus *Callibaetis* are ovoviviparous.

2. Longevity is necessarily correlated with ovoviviparity in the order Ephemeroptera.

3. The sexual ratio of an ovoviviparous species of Ephemeroptera is abnormal due to the longevity of the female and the comparatively short life of the male.

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Two New Centipeds from Trinidad

By Ralph V. Chamberlin, University of Utah

The types of the two new centipeds described in this article are part of a collection made by A. H. Strickland on Trinidad in the period from Nov. 23, 1943, to Mar. 1, 1944. This collection was sent for identification by Mr. C. F. W. Muesebeck of the U. S. Bureau of Entomology and Plant Quarantine. The types of the new species are at present retained by the author.

In addition to the new forms here described there were in the collection specimens of *Lamyctinus coeculus* Brolemann (St. Augustine), *Lamyctes* sp. (St. Augustine), and *Ityphilus guianensis* Chamberlin (Sangre Grande), and of the millipeds *Siphonotus purpureus* Pocock and *Docodesmus trinidadensis* Chamberlin.

Newportia oligopla, new species

Cephalic plate with two fine longitudinal sulci diverging forward from caudal margin as shown in the figure. (Fig. 1.) Antennae compound of 17 articles; the first two articles and most of the third sparsely setose, the remaining articles, including distal portion of the third, more densely clothed with fine short hairs.

Basal plate with a transverse semicircular sulcus which is somewhat angled at the middle where there is a pit-like depression. Paired longitudinal sulci run from the caudal margin forward, each furcate behind the transverse sulcus at which the branches

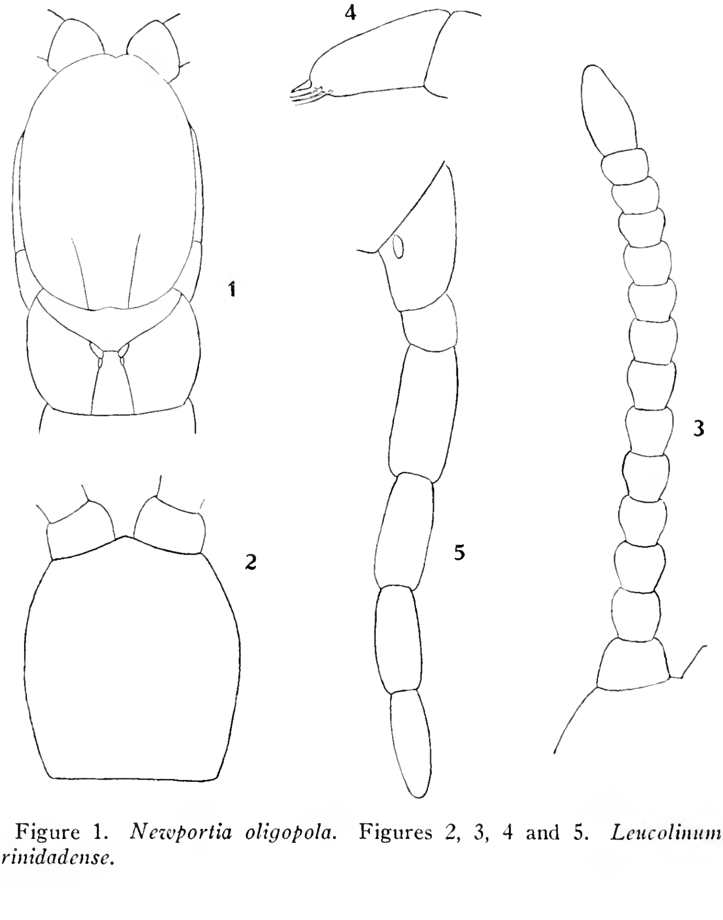

Figure 1. *Newportia oligopola.* Figures 2, 3, 4 and 5. *Leucolinum trinidadense.*

end. (See fig. 1.) Paired longitudinal sulci present on tergites from the second to the twenty-second inclusive.

Prosternal margin with a narrow, gently convex rim on each side, the two halves meeting in an obtuse, reentrant angle at the middle. A single seta a little caudad of the margin on each side. Claws of normal size.

Tarsi of anterior legs not divided. Tibiae of anterior legs with a spine at distal end in anterodorsal position, but with no ventral spine.

Pseudopleural processes moderately long and slenderly acuminate, each terminating in a single point or spine, and with no lateral spine. Poriferous area large, reaching to tergite on each side.

Femur of anal legs with a series of four stout teeth below. Patella with a single tooth at base on mesal side and a much smaller one on ventral face distad of middle. Tibia unarmed, much thicker than first article of tarsus, in length about equal to the first article of the tarsus. Tarsus clawless, composed of eleven long articles of which all but the first are subequal in length, the first decidedly thicker than the others and about equal in length to two and a half of those following it.

Length of largest specimen, 26 mm.

Locality—TRINIDAD, B. W. I.: St. Augustine, in soil of Savannah land, taken between 23rd Nov., 1943, and 1st Mar., 1944.

Distinguished from other species in which the cervical sulcus is angled and has a pit at middle in having no ventral spine on anterior tibiae and tarsi and in having four teeth on the femur.

Genus **Leucolinum**, new

This genus is placed tentatively in the Ballophilidae along with the apparently related and imperfectly known *Taeniolinum*, occurring on St. Vincent. It agrees with the latter genus in having the ventral pores diffuse instead of concentrated in a sharply limited circular or oval area. It is readily distinguished from *Taeniolinum* in having the antennae slender and filiform instead of short, thick and attenuated. The Panamican *Leptynophilus* also agrees with these two genera in having non-clavate, non-geniculate antennae but differs in having its ventral pores in a sharply defined elliptic area. *Leucolinum* agrees with other members of the family in having the labral margin smooth and wholly lacking teeth over the median arc. Last ventral plate broad.

Coxopleurae each with a single pore. Anal legs clawless.
Generotype: Leucolinum trinidadense, new species.

Leucolinum trinidadense, new species

This is a pale, almost white, soil-dwelling form.

Head and antennae of forms shown in figs. 2 and 3. No frontal suture evident. Palpi of second maxillae with claws reduced as shown in fig. 4.

Prebasal plate not exposed.

Prehensors with joints unarmed; claws rather small, unarmed, when closed scarcely exceeding the anterior margin of head. Chitinous lines not apparent on the prosternum.

Dorsal scuta bisulcate.

Ventral plates with not definitely defined porigerous area.

Anal legs clawless; the articles proportioned as shown in fig. 5.

Last ventral plate broad. Coxopleurae each apparently with a single pore of moderate size, the limiting rim of which is not sharply sclerotized.

Pairs of legs, 37.

Length, 9 mm.

Locality—TRINIDAD: St. Augustine. Several specimens taken in soil ("detrital silt") from Savannah land between the 23rd of November, 1943, and the first of March, 1944. Collector, A. H. Strickland.

The Species and Races of Hesperotettix in Utah (Orthoptera: Acrididae, Cyrtacanthacridinae)

By Morgan Hebard, Research Fellow, Academy of Natural Sciences of Philadelphia

A study of *Hesperotettix* as found in Utah, based on the collections of the Utah State Agricultural College, has recently been published by my friend the late Professor W. W. Henderson.[1] Reliance on past literature, much too often misleading or actually incorrect, has in that study largely led to a number of serious errors. Extensive collections made by J. A. G. Rehn and the author in Utah, and a number of other important though small series, enable me to list the species and races of the genus in question, though time at present is not available to revise this difficult genus and analyze its species and races which occur west of the Rocky Mountains.

The following alone include parts of Utah in their distribution.

Hesperotettix viridis viridis (Thomas), 1872.

Synonym established by Hebard 1935, *festivus* Scudder, 1897.

Probably present throughout Utah in better watered areas up to (rarely above) 6000 feet, but there found in the more arid environment, usually on Snakeweed, *Gutierrezia* sp., as observed by Henderson. Usually locally abundant, adults are taken as early as June 13, but are in greatest numbers after mid-summer.

The species is highly variable, size, brilliancy and intensity of marking differing widely, largely if not entirely in keeping with the luxuriance and green through light yellowish brown to brown color of the plants in which it lives.

Henderson has recorded *viridis viridis* from nineteen Utah counties and has cited much literature, previous records being erroneous from Iowa, where it is supplanted by *viridis pratensis* Scudder, and from New Jersey, where the even more distinc-

[1] Great Basin Nat., III, pp. 9 to 21 (1942).

tive *viridis brevipennis* alone occurs. Our Utah material was taken at elevations between 2500 and 6500 feet, and is from Logan, Mantua, Box Elder Canyon, Ogden reservoir, Sunset, Salt Lake City, Maple Peak, Big Cottonwood Canyon, Morris, Deseret, Leeds, Washington, Middleton, Harrisburg, Santa Clara, Kanab, Zion Canyon, St. George and the western slope of the Beaver Dam Mountains. This race is absent from most of the desert portions of western Utah, where the genus is rarely encountered, and is known as yet only from the few widely separated localities here given.

The present race is particularly widespread and abundant as well as generally distributed over the Great Plains and Southwest. West of Utah different phases occur, apparently attributable to influences on *viridis viridis* of immediate environment or even adaptation to certain different types of food plant. Whether or not some of these warrant description as previously unrecognized races cannot at present be decided.

Hesperotettix viridis pratensis Scudder, 1897 (atypic toward *viridis viridis*). Reduced to race of *viridis* by Hebard in 1931.

Maple Peak, outlying Wasatch Mountains back of Salt Lake City, 5000 to 6500 feet, ix. 7, 1909 (Rehn and Hebard), 2 ♂, 4 ♀.

Typical over wide areas of the mid-west and eastern border of the Great Plains, but often locally distributed even there, this race occurs even more locally in parts of Wyoming, all but Western Colorado and New Mexico, southern Idaho[2] and southeastern Oregon.[2] Far distant from its other western limits, a condition apparently referable to this race, and the only development of *viridis* there existing, populates locally the mountains to the Pacific Coast at the extreme southwestern portion of California.

Divergence toward or integradation with *viridis viridis* is shown by atypic material of *viridis pratensis* before me from

[2] But often slightly to definitely atypic there.

southern Saskatchewan and Alberta, narrowly on the Great Plains where these races meet, in Montana and at some localities in Wyoming and Colorado, at the locality in Utah here recorded, and locally on the Pacific Coast from southern British Columbia to northern California.

Hesperotettix viridis nevadensis Morse, 1903.

Synonym established by Hebard in 1931, *gillettei* Bruner, 1904, who in 1929 first placed it as a race of *nevadensis* but referred it to racial status under *viridis* in 1931.

As I feared, and as is now seen, the series recorded by Henderson as *curtipennis,* later sent me through his kind cooperation, represents *viridis nevadensis.* His observations, given under the latter name in the same paper, almost postulated this. Ten Utah counties are represented.

Widespread and often locally abundant in Utah, this race often supplants *viridis viridis* where aridity has become progressively more decided, and is in turn supplanted by the much more local and less numerous *viridis termius* in the extensive desert areas of large western portions of the State.

My series, taken up to 7750 feet (Red Canyon), is from Tintic, Orr's Ranch in Skull Valley, Clear Creek divide in Pavant Range 7250 feet, Dog Valley in Pavant Range at 5900 feet, Marysvale at 6000, Kanosh, Beaver Canyon in Tushar Range at 6400, Parowan Summit in Iron County, Red Canyon southeast in Paunsagunt Plateau, Glendale, Bellevue and the Beaver Dam Mountains at 4650 to 5000 feet.

There is very great variation in degree of reduction of the organs of flight present in series rather than in individuals of the same series. The pair from Marysville, Utah, show such reduction to an extreme degree, the tegmina being small lanceolate pads differing from those of *viridis termius* only in that their apices are not truncate. Thus strongest convergence toward that race is indicated.

I have found *viridis nevadensis* in western Colorado, abundant from southern Idaho through Utah and Nevada (where it is, however, local, often separated by considerable intervals in the desert areas), very scarce in central-eastern and southeastern Oregon, and present, but in even less numbers, in southwestern Oregon east of the Sierras and a small adjacent area in California.

Intergradation with *viridis viridis* is particularly indicated in some series from central southwestern Montana and southern Idaho.

Hesperotettix viridis termius Hebard, 1917.

Described as a race of *nevadensis,* I referred it instead to *viridis* in 1931.

I have this race only from Milford at 4900 to 5000 feet (type locality), Pintura, Frisco at 6300, White Sage Valley at 6600 and Marysvale (one female), Utah.

From outside of Utah I have material from very widely separated localities in arid southern Nevada and California only as far west as the Argus Range.

The small size and truncate tegmina (usually weakly obtuse-angulate emarginate at the end of the humeral trunk) are conspicuous features.

As *Hesperotettix pacificus* Scudder is peculiar to coastal southern California and so is absent everywhere east of the Sierra Nevada, it is unfortunate that Henderson reported his series of *viridis termius* from Utah as that insect.

I have series of *Hesperotettix curtipennis* Scudder from southwestern Colorado, northwestern New Mexico and northern Arizona (where the Grand Canyon is its northern limit). Though the series so reported by Henderson is all representative of *viridis termius,* as I find from examination of that entire series, it is almost certain that *curtipennis* will be found in extreme southeastern Utah.

Thus the Utah forms of *Hesperotettix* are: *viridis viridis, viridis pratensis, viridis nevadensis, viridis termius,* and probably *curtipennis.*

Two New Subgenera of Nomada Scopoli (Hym.: Apoidea) *

Hugo G. Rodeck, University of Colorado Museum,†
Boulder, Colorado

Holonomada Robertson 1903, Can. Ent., 35: 177 (new genus, type *Nomada superba* Cresson).

Robertson's *Holonomada* received its name from the entire seventh male tergite, and was characterized in addition by the third antennal segment exceeding the fourth in length. While *superba* was designated as the type, the listed species included *N. vincta* Say, which is hereunder designated the type of *Pachynomada* new subgenus, and *placida* Cresson which is in the present paper included in *Callinomada* new subgenus. When restricted to the *superba* type of insect, *Holonomada* is perfectly valid as a subgenus, but it cannot at present be considered a genus by the writer. A synopsis of the subgenus, for comparison with the subsequently proposed new subgenera, is as follows:

Holonomada Robt.

Large (11–15 mm.), *vernal* (May–July), sexually monomorphic species of *robust* form. *Ground color* of insects black, sometimes ferruginous. Eyes considerably convergent below in facial aspect, more so in females. Both sexes usually with light facemarks. Punctures of mesonotum moderately coarse, dense, and subuniform. Dorsum of prothorax rounded-carinate, considerably below level of mesonotum. *Sides of propodeum with prominent projecting angles* just behind the propodeal spiracle, most readily seen in profile from diagonally above. *Hair of head and thorax moderately long and abundant. Scape of male antennae robust but not globular.* Segment 3 of antennae subequal to or longer than segment 4.

* Extracted from a thesis accepted by the University of Minnesota.
† On leave of absence for military service.

Basal vein usually slightly to considerably basad of transverse median, but sometimes somewhat apicad. Anterior coxae rather broad at apex, without spines. *Apex of hind tibiae with a rather dense fringe of long, slender, usually golden bristles,* similar in both sexes. Impunctate apical margins of abdominal terga extremely narrow. Seventh tergum of males rather long and narrow, tapering, apex rounded and entire.

The characters in italics are those by which this subgenus may be distinguished from *Pachynomada.*

Pachynomada new subgenus

Type species, *Nomada vincta* Say 1837, present designation.

Large (10–13 mm.), autumnal (Aug.–Sept.), sexually monomorphic species of rather slender form. Ground color of insect usually red. Facial quadrangle nearly equilateral, eyes only slightly converging below. Females without yellow face-marks. Punctures of mesonotum fine, very dense and uniform. *Dorsum of prothorax rounded-carinate, only slightly depressed medially.* Hair very short and sparse, nearly absent on mesonotum and (except *adducta*) on sides of propodeum. *Scape of male antennae globular-swollen.* Segment 3 of antennae slightly longer than segment 4. Basal vein interstitial with to slightly basad of transverse median. Anterior coxae narrow at apex, often with a low tubercle, but not spined. *Apex of hind tibiae with 4–6 widely-spaced, short, acute spines,* heavier in the female. Impunctate apical margins of abdominal tergites very narrow. *Seventh tergum of males not very broad,* tapering, rounded at tip, entire or minutely or very shallowly emarginate.

Apparently allied to *Callinomada,* but distinguished by the characters in italics. For comparison with *Holonomada* see italicized characters of that subgenus in the synopsis above.

This subgenus is partially a segregate from *Holonomada* Robertson, receiving *vincta* Say and *zebrata* Cresson, which have been included in that group. *N. besseyi* Swenk belongs here, as does *adducta* Cresson. It has been the good fortune of the writer to find the male of *N. victrix* Cockerell which likewise belongs in this subgenus, although it has in all the known specimens of both sexes only two submarginal cells. It is likely that *N. morrisoni* Cresson also belongs in this subgenus although the writer has not yet had an opportunity to examine the genitalia. There are undoubtedly other species which should be included, but which have not yet come to attention.

Callinomada new subgenus

Type species, *Nomada antonita* Cockerell 1909, present designation.

Rather *small* (7–9 mm.), autumnal (Aug.–Sept.), sexually monomorphic species. Facial quadrangle nearly equilateral, eyes only slightly converging below. Punctures of mesonotum fine, very dense and uniform. *Dorsum of prothorax sharp-carinate, produced upward at sides and depressed medially,* anterior face more or less concave. Hair very short and sparse, nearly absent on mesonotum and sides of propodeum. *Antennal scape of males obconic, rather slender and curved.* Segment 3 of antennae from about equal to distinctly longer than segment 4. Basal vein interstitial with to definitely apicad of transverse median. Anterior coxae with low, rounded or conical spine rudiments but not actually spined. *Apex of hind tibiae with 3–5 very short, stout, acute, straight spines.* Impunctate apical margins of abdominal terga very narrow. *Seventh tergum of males broad, very broadly rounded,* entire or minutely or very shallowly emarginate.

Apparently allied to *Pachynomada* but distinguished by the characters in italics. This subgenus contains *Nomada snowii* Cresson, *aquilarum* Cockerell, *mutans* Cockerell, *placida* Cresson, and *verecunda* Cresson, as well as the type, *antonita* Cockerell.

New Syrphid Flies

By F. M. Hull, University of Mississippi

This paper describes the new species and varieties of Syrphid flies which have accumulated during the last two years.

Cerioides malleus n. sp.

A small species with club shaped abdomen. Wing with a single brown spot at apex. Face with a thick armed yellow V, narrowly margined by brown.

Male. Length 10 mm. *Head:* vertex, except for the area across and immediately after and before the ocelli and the upper part of the occiput which is brownish red, light yellow. The face and front and cheeks are light yellow, marked with brownish red, as follows: a small spot on the eye margin on the posterior part of the cheeks, a broad band from the lowest portion of the epistoma almost to the eye margins. Also there is an area reaching from the anterior tip of epistoma in the form of narrow linear vittae. These two vittae diverge on either side of the face at the same angle as the band of the lower face diverges and they continue to widen until they become confluent above with a broad, similarly colored area that occupies almost exactly one half the width of the face below the antennae, and which area also extends half the length of the face beneath the antennae. This upper block of reddish brown encloses the lower half of the short front; it contains just below its middle a pair of pale yellow ventrally rounded triangles narrowly separated from one another. Also the large red brown block sends a short, sharp, small projection into the yellow of the lateral portion of the face. Finally the yellow triangle which remains upon the lower half of the face is narrowly divided upon its upper portion by a linear brown stripe. The central area is enclosed by the brown. The cheeks and all of the lower portion of the face are silvery pubescent; the upper block of brown has minute brown patches bare of pubescence. The antennae are missing. The frontal prominence is completely lacking in this species. *Thorax:* brownish red, a little darker upon the central portion of the mesonotum which, however, is not black, but is darker due to the very thick accumulation of microscopic black setae. The lateral half of the transverse suture is margined with pale yellow which continues down narrowly upon the posterior part of the mesopleura, across the middle of the sternopleura almost to touch the arcuate yellow stripe upon the upper part of sternopleura. There is a wider, pale yellow stripe across the middle of the metapleura. The humeri, thé narrow subapical margin of the scutellum and a long slender, narrow margined vitta upon the posterior part of the mesonotum which runs from the suture slightly obliquely almost to post calli are pale yellow. The pile of the mesonotum, though exceedingly short, is all golden and the reddish color is overlaid especially laterally and particularly upon the pleura and upon the coxae as well as the legs with quite microscopic silvery pubescence. *Abdomen:* club-shaped, rather short, the first two segments almost as long as the remaining three and greatly narrowed. The abdomen is narrowest just before the middle of the second segment, but the apex of that segment is considerably wider than its base which in turn is more narrow than the base of the first segment. The hypopygium is quite large, protuberant and bluntly rounded and not greatly smaller than the third segment. The third and fourth segment and the protuberant hypopygium form a large, oval, broadly rounded club. The abdomen is reddish brown, a little darker upon the third segment, its posterior margin laterally and narrowly, the whole posterior margin of the cylindrical second segment and the whole wider posterior margin of the third segment pale yellow. There is an obscure, transverse, narrow, dorsal and ventral fascia of yellow across the apical portion of the hypopygium. *Legs:* brownish red, the basal sixth of the hind femora and the basal portion of their tibiae pale yellow. The brown of the tibiae, however, extends almost to the base ventrally. The hind tarsi are lacking, the anterior tarsi quite dark reddish brown, the apical segment very pale, the middle tarsi light brown. *Wings:* hyaline, veins pale brown. There is a sharp, acute bend in the third vein, somewhat less than a right angle; it is without spur and all of the remainder of the submarginal cell, after the completion of the bend, together with most of the marginal cell above it is light brown in color.

Holotype: one male. Rikatla, Lourenco Marquez (H. Junod) April 1915. In the Cornell University collection.

Mallota separata n. sp.

Flies with the male eyes separated narrowly; abdomen black pilose beyond the second segment; related to *posticata* Fabr.

Male. Length 15 mm. *Head:* vertex protuberant, shining black and apparently quite bare. There is no evidence that pile has been denuded for there is yellow pile on the posterior part of this prominence and extensive, long, sulphur-yellow pile on the posterior part of the occiput. There is also a single row of long black hairs, widespread, nearer the eye margins and upon the occiput. The lateral half of the front is sparsely white pubescent with a few long white hairs and more black ones. The triangular, middle, anterior area of the front is polished, bare, black and with a linear, median crease on the upper half and a transverse crease across the lower middle. The eyes are definitely separated by from two to three times the width of the anterior ocellus. The face and cheeks are shining black, silver pubescent with silvery pile. The antennae are dark brown, the arista pale yellow, black apically, white at apex. *Thorax:* shining brownish on the sides and anteriorly, due to pollen, the mesonotum is broadly black, except on the anterior margin. The pile of the mesonotum is light sulphur-yellow with only a few black hairs in the center. The scutellum is light brown with narrow blackish base, the pile is entirely sulphur-yellow; there is similar pile upon the post calli and widely over the mesopleura, pteropleura and sternopleura. *Abdomen:* shining blackish with light yellow pile upon the first segment except its anterior corners; the yellow pile is continued upon the base of the second segment, triangularly, and upon the basal half of the sides. The remaining pile of the abdomen is thick, long and entirely jet-black including that upon the hypopygium. *Legs:* all of the femora shining black, the tibiae very dark brown, the tarsi light reddish-brown. The pile of the hind femora, except a few inner basal hairs and their tibiae and tarsi, is entirely black. The femora are considerably thickened and arcuate, their ventral surface concave with a subapical, ventral protuberance and black, bristly, tufted pile. The hind tibiae are flattened and somewhat arcuate, but without the thick, abundant black pile found in the middle of the ventral surface in *posticata* Fabricius. *Wings:* hyaline with a faint, small brown cloud near the origin of the second and third veins.

Holotype: a male. Oxford, Mississippi, May, 1942, (F. M. Hull).

Mesogramma arethusa n. sp.

A small fly, the abdomen shining light orange brown, the third and fourth segments with four black vittae. Related to *boscii* Macquart.

Male. Length 5.5 mm. Face and front yellow, the cheeks blackish behind, the vertex coppery red, shading into brassy, the vertical triangle metallic black. The upper pile of the vertex is entirely black and the very sparse pile of the front whitish. The first two antennal segments are pale brown, the third wholly light orange, the arista brown and rather thickened at the immediate base. The middle indentation of the occiput marked; the occiput is bluish black with silvery pubescence and pile of which there are several rows. *Thorax:* blackish and brassy brown before the scutellum and with some evidence of similar vittae but the mesonotum is however discolored. The humeri are dark brown, linearly yellowish behind; the mesonotal margin between the humeri and the transverse suture is wholly black but dull yellowish brown behind the suture and over the post calli and again upon the margin of the scutellum; disc of scutellum greenish black. The upper sternopleura and the posterior half of the mesopleura is yellow, only the former white pubescent; propleura black. *Abdomen:* narrowly oval with nearly parallel sides; shining black. The extreme anterior corners of the first segment and a median, medially subinterrupted and sublaterally subinterrupted fasciae are orange in color. Third and fourth segments are shining orange brown; down the middle run two slender, linear, narrowly separated, anteriorly divergent vittae reaching the base of the segments. The posterior corners of these segments are black and from the medial, anterior angle of this black area a wider vitta reaches forward the full length of the segment and from the outer anterior angle of this same black there runs along the margin of the segment a diminishing extension of the black ending rather sharply at about one-third of the distance from the base of the segment. The fifth segment has a slender medial vitta and a wider sublateral one on either side. The hypopygium is orange brown with a prominent, sharply delineated, shining black spot to the right. *Legs:* pale brownish yellow, the hind femora with a wide, distinct, black band occupying most of the posterior half except the apex. The hind tibiae are blackish except the extreme apex and the narrow base, their tarsi dark brown, the second and third segments barely lighter. *Wings:* hyaline, stigmal cell dilute brown.

Female. The front is metallic bluish black, minutely wrinkled but not striate; vertex similar to male; frontal pile blackish, the margins of the front linearly yellow, face yellowish with a divergent, obscure brownish stripe beginning just below the antennae; third antennal segment dark brown on at least the upper half. *Thorax:* mesonotum and scutellum and pleura similar to male. *Abdomen:* wider, more oval, the fascia of the middle of the second segment scarcely interrupted sublaterally and not at all medially. Medial vittae of third and fourth segments rather more extensively produced upon the lateral anterior ends of these vittae. The whole anterior portion of these vittae is somewhat larger and the lateral margin of all of the segments is black throughout, least so upon the second segment at the ends of the yellow fascia. The yellow of the abdomen is less of an orange color, has a rather extensive opaque pattern which comprises most of the vittae except their narrow posterior apices. *Legs and wings:* similar to the male, the stigmal cell almost hyaline.

Holotype: a male, from Englewood, FLORIDA (J. G. Needham). Allotype: one female, Englewood, Florida.

The pattern of the female suggests *boscii* Macquart but besides the lateral and sublateral vittae posteriorly, it also differs in the divergent stripe of the face and the hind tibiae which are blackish almost throughout. Furthermore, the notopleura are black, and in *boscii* are yellow vittate. The male of *arethusa* differs even more from the male of *boscii* Macq.

(To be continued)

Additional Notes on Papilio Aristodemus Ponceana Schaus (Lepidoptera: Papilionidae)

By W. F. HENDERSON, Chicago, Illinois

The article in the February (1945) issue of ENTOMOLOGICAL NEWS brought in several memoranda concerning ponceana. One of these was in the form of a correction concerning specimen No. 24 in the published table, but the other memoranda brought information in regard to additional specimens. All suggestions have been followed up and in so far as replies have been received, the following notes bring the data concerning ponceana up to date:

No. 24. A correction should be made in the table as published in February: Locality: Key Largo, Florida; Date: August, 1943; Present Possessor: R. Chermock, Coral Gables, Florida.

Additional specimens:

No. 25. ♂. Miami, Florida; May 21, ——, Wm. Schaus. Specimen now in the collection at Cornell University, Ithaca, New York. This specimen bears an authentic label indicating its possession by Jacob Doll, but Dr. W. T. M. Forbes is of the opinion that it is another one of the original Schaus specimens.

There is no year of capture indicated on the label. Cornell University received this specimen from the collection of Addison Ellsworth (Johnson City, N. Y.), whose record book shows that he obtained it from William Reiff.

No. 26. ♂. No. 27. ♀. Lower Matecumbe Key, Florida; May, 1935; Mrs. C. N. Grimshawe; Present Possessor: R. Chermock, Coral Gables, Florida.

No. 28. ♀. Lower Matecumbe Key, Florida; May 28, 1935; Mrs. C. N. Grimshawe. (Believed to be a bred specimen.)

No. 29. ♂. Same data as No. 28 except date: May 30, 1935.

No. 30. ♀. Lower Matecumbe Key, Florida; May 19, 1936 (bred); Mrs. C. N. Grimshawe.

No. 31. ♂. Same as No. 30 except date: June 10, 1936 (bred).

No. 32. ♀. Key Largo, Florida; June 24, 1940; Mrs. C. N. Grimshawe.

No. 33. ♂. Key Largo, Florida; May 18, 1941; Mrs. C. N. Grimshawe.

Specimens 28–33 inclusive are in the possession of Mr. Kent H. Wilson, Fort Worth, Texas.

This brings the total number of specimens up to 33, the last recorded capture being in August, 1943.

The writer wishes to express his thanks to those who have so kindly cooperated in making this record more complete, and it is hoped that any other collectors who have ponceana will write in and report them.

Personals

Dr. Andrey Avinoff, Director of the Carnegie Museum at Pittsburgh since 1926, has resigned for reasons of health. The title of emeritus has been conferred upon him.

Dr. Joseph C. Bequaert has been appointed head curator of recent insects at the Museum of Comparative Zoology at Harvard University.

Entomologists of Netherlands Indies. According to Dr. J. C. Bradley, information received from the Netherlands Red Cross is to the effect that, as of 28 October, 1943, Jacobus Van der Vecht was a military internee of the Java camp. They have no information concerning Dr. J. G. Betrem, who, at the outbreak of hostilities, was Agricultural Entomologist in Semarang, Java.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

How Long Do Entomologists Live? An examination of Mathilde M. Carpenter's "Bibliography of Biographies of Entomologists" (American Midland Naturalist, vol. 32, no. 1, p. 1–116, 1945), discloses among other things, the birth and death dates for 2,187 entomologists born between 372 B.C. and 1920. Both amateur and professional entomologists are included and although some of the entomologists had other occupations, the list as it stands may be considered as representing an occupational group of white males for the entire world, and the mortality of the subjects as being due to all causes.

It is of interest to note that the average age at death for the entire 2,187, was 65.48 years. The largest number of deaths occurred in the age group 70 to 74. Thirty per cent of the 2,187 died before reaching 60 years. Of the remaining 70 per cent, 23 per cent died between the ages of 60 and 69, 29 per cent between 70 and 79, and 18 per cent between the ages of 80 and 94.

Of special interest are the 1,600 entomologists who were born between 1500 and 1859. The average age at death for this group was 69.09 years. When the period from 1500 to 1859 was divided into smaller periods it was found that the deviations from 69.09 were small. In other words, all during the years from 1500 to 1859 entomologists continued to live an average of 69 years.

Life tables for early times are fragmentary and rather incomplete, but the expectation of life at birth in Breslau for the years 1687 to 1691 was about 34 years. In Carlisle, England, 1780–1787, the expectation at birth was close to 40 years. In continental United States in 1910, it was about 50 years and in 1940 it was 62.94 years for white males and 67.31 years for white females.

All during these times, however, when the expectation of life at birth was low for populations in general, entomologists continued to live an average of 69 years.

In every population from early times to the present, a certain part of the population, by reason of parentage and environment, has always lived many years beyond the average for the balance of the population, and it is apparent that entomologists for the most part have always been recruited from among that portion of the population that lived the longest. Karl Pearson concluded many years ago that from 50 to 75 per cent of the general death rate is determined by the forces of heredity. If this is correct, most of the credit for living long lives should go to the parents of the entomologists.—Harry B. Weiss.

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 and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in Entomological News are not listed.

GENERAL—On the retention of ii or i in specific patronymic names. [87] 1: 147–58. Use of the name of a composit genus for a component part requiring a name, where the name so used was published on, or before, 31st Dec. 1930. [87] 1: 159–70. Designation of genotypes for genera published with identical limits on, or before, 31st Dec. 1930. [87] 1: 171–78. Designation of genotypes by Latreille, 1810. [87] 1: 179–90. **Acosta Solis, M.** Los climas en la regiones naturales del Ecuador. [Flora, Quito] 4 (11–12): 139–208. **Allen, A. A.**—Nomenclature—Another plea for realism. [8] 71: 81–83. **Balfour-Browne, F.**—Further to the problem of a changing nomenclature. [8] 71: 108–9. **Bradley, J. C.**—Amateurs. [19] 40: 9–10. **Campos, F.**—Fauna entomologica de Guayaquil en vertiginosa exposicion. [Flora, Quito] 4 (11–12): 125–34. **Chamberlin & Lawson**—Mechanical trap for the sampling of aerial insect populations. [Mosquito News] 5: 4–7, ill. **Comstock, W. P.**—Violet Harriet Dos Passos and her N. American moths. [6] 53: 47–48. **Davis, William Thompson**—Obituary notes. [Mus. Bull. Staten Id. Inst. A. & S.] 27 (No. 3), 17 pp., ill. **Dobzhansky, Th.**—Genetics and macro-evolution. (A review of Simpson, G. G., Tempo and mode in evolution.) [Jour. Hered.] 36: 113–15. **Fletcher, F. C.**—Sericulture, its successes and failures. [118] 18: 73–75, cont. **Grensted, L. W.**—Formation and gender of generic names: a further note. [8] 71: 118. **Peterson, A.—Some insect infants.** [54] 60 (6): 426–42, ill. **Riley, N. D.**—Problem of "anting" in birds. [109] 10: 13–14. **Romney, V. E.**—Effect of physical factors upon catch of the beet leaf hopper (Eutettix tenellus (Bak.)) by a cylinder and two sweep-net methods. [84] 26 (2): 135–47, ill. **Sailer, R. I.**—Bite of a lacebug, Corythucha cydoniae. [103] 18: 81–82. **Simpson, G. G.**—Tempo and Mode in Evolution. N. Y. Columbia Univ. Press, 1944, 237 p. $3.50. Review by C. L. Hubbs in [90] 79: 271–75. **Solomon, M. E.**—Tyroglyphid mites in stored products. Methods for study of population density. [20] 32: 71–74. **Teale, E. W.** The sayings of William T. Davis. [19] 40: 3–6. **Vouk, A. M.**—Aphidae as vectors of the mosaic disease on onions. [Microbiology, Moscow] 13 (4): 180–84. (Russian, English summary.) **Wainwright, C. J.**—Nomenclatorial problems. [8] 71: 79–80.

ANATOMY, PHYSIOLOGY, MEDICAL—Bostick, B. O.—Morphology of the carabid beetle, Calosoma scrutator.

[7] 38: 14–32. **Crombie, A. C.**—On competition between different species of graminivorous insects. [Proc. R. Soc. London] B, 132: 362–95. **Daggy, R. H.**—Biology and seasonal cycle of Anopheles farauti on Espiritu Santo, New Hebrides. [7] 38: 1–13. **Dennell, R.**—Insect epicuticle. [31] 155: 545. **Goldschmidt, R. B.**—Evolution of mouth parts in Diptera; a counter critique. [55] 21: 41–47. **Grosch, D. S.**—The relation of cell size and organ size to mortality in Habrobracon. [Growth] 9: 1–17. **Hawley & Dobbins**—Distribution and abundance of the Japanese beetle from 1935 through 1943, with a discussion of some of the known factors that influence its behavior. [6] 53: 1–20. **Lees & Picken**—Shape in relation to fine structure in the bristles of Drosophila melanogaster. [Proc. R. Soc. London] B, 132: 396–423, ill. **Marcus, H.**—La base anatomica del olfato topoquimico. [Acta Zool. Lilloana] 2: 141–45, ill. La respiracion de las hormigas. [Acta Zool. Lilloana] 2: 307–20, ill. **Rau, P.**—Size of the cell and sex of the wasp in Ancistrocerus catskillensis. [7] 38: 88. **Reynolds, J. M.**—On the inheritance of food effects in a flour beetle, Tribolium destructor. [Proc. R. Soc. London] B, 132: 438–51. **Roth, L. M.**—Odoriferous glands in the Tenebrionidae. [7] 38: 77–87, ill. **Schrader, F.**—The cytology of regular heteroploidy in the genus Loxa. (Pent.) [57] 76: 157–78. **Tiegs, O. W.**—Post-embryonic development of Hanseniella agilis (Symphyla). [53] 85: 191–328, ill. **Villee, C. A.**—Phenogenetic studies of homoeotic mutants of Drosophila melanogaster. III. The effects of temperature on the expression of bithorax—34E. [90] 79: 246–58. **Wellington, W. G.**—Conditions governing the distribution of insects in the free atmosphere. II. [4] 77: 21–28. **Whiting, A. R.**—Effects of X-rays on hatchability and on chromosomes of Habrobracon eggs treated in first meiotic prophase and metaphase. [90] 79: 193–227, ill. **Williams, C. R.**—Prolongation of larval-pupal development in Drosophila melanogaster and its effect on facet number. [90] 79: 259–70. **Williams, J. L.**—Anatomy of the internal genitalia of some Coleoptera. [10] 47: 73–91, ill. **Yeager & Heishman**—Some effects of antisera on larvae of the southern armyworm, Prodenia eridania. [7] 38: 45–52.

ARACHNIDA AND MYRIOPODA—**Barrows, W. M.**—New spiders from the Great Smoky Mountain National Park. [7] 38: 70–76, ill. **Bryant, E. B.**—Argiopidae of

Hispaniola. [26] 95 (4): 359–418, ill. (*k). **Carter, A.**—This bug is a borgia (Dermacentor sps.). [Frontiers, Phila.] 9: 132–34, 160, ill. **Curran, C. H.**—Ticks and human welfare. [Nat. Hist. New York] 54: 283–85. **Ewing, H. E.**—Mites of the U. S. Antarctic Service Expedition 1939–41. [Proc. Amer. Phil. Soc.] 89: 296. **McGregor, E. A.**—A new gen. and sp. of tetranychid mite from California. [10] 47: 100–2, ill. **Mulaik, S.**—New mites in the family Caeculidae. [Bull. Univ. Utah] 35 (17): 23 pp., ill. **Schubart, O.**—Os diplopodos de Pirassununga (Argentina). [Acta Zool. Lilloana] 2: 321–440, ill. (*S). **Solomon, M. E.**—(See under General.) **Tiegs, O. W.**—(See under Anatomy.) **Wang, Y. M.**—Preliminary report on Chilopoda at Ishan, Kwangsi and Meitan, Kweichow. [6] 53: 63–67.

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HEMIPTERA—Beamer, R. H.—New sp. of Dikraneura from Arizona (Cicadel). [103] 18: 83–84. **Beamer & Lawson.**—Rev. of the gen. Stragania in Amer. north of Mexico (Cicadel). [103] 18: 49–66, ill. (*). **Caldwell, J. S.**—Notes on Issidae from Mexico (Fulgorid). [7] 38: 89–120, ill. (k). Neotropical lanternflies of the gen. Phrictus in the U.S.N.M., with descr. of 4 n. sps. [50] 96: 177–84, ill. **Fennah, R. G.**—New lanternflies from So. America (Fulgorid). [50] 96: 95–105, ill. Characters of taxonomic importance in the pretarsus of Auchenorhyncha (Homop.). [10] 47: 120–28, ill. **Jensen, D. D.**—Notes on the synonymy, nymphs and distribution of Heteropsylla texana (Psyllid). [55] 21: 74–76. **Metcalf, Z. P.**—General catalogue of the Hemiptera, Fasc. IV, pts. 4–7. Fulgoridae, Derbidae, Achilixiidae Meenoplidae, Kinnaridae. 252 pp. **Romney, V. E.**—(See under General.) **Sailer, R. I.**—Status of Corimelaena White, 1839, Eucoria Mulsant and Rey, 1865 and Allocaris McAtee and Malloch, 1933 (Pent.). [10] 47: 129–35, ill. New name for Acantholoma Stal. (Scutell.). [10] 47: 135. Note concerning Solubea postpostia (Pent.). [10] 47: 136. (See also under General.) **Sampson, W. W.**—Five n.sp. of Aleyrodidae from California. [55] 21: 58–62, ill. **Schiff, H.**—Notes on Thysania zenobia (Heteroc.). [6] 53: 88. **Vouk, A. M.**—(See under General.)

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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 longest in) are discontinued.

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Arctic Lepidoptera on hand, including Erebia, Oeneis and Brenthis. R. J. Fitch, Lloydminster, Sask., Canada.

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T.2

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ENTOMOLOGICAL NEWS

OCTOBER 1945

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ENTOMOLOGICAL NEWS

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On Three Lithobioid Chilopods

By Ralph V. Chamberlin, University of Utah

Of the three new species of chilopods herein described, the first two are based upon specimens taken in Illinois by William F. Rapp, Jr., and pertain to the family Lithobiidae. The third is a member of the Gosibiidae and its type specimen was taken in Mexico by Prof. V. E. Shelford. The types of the three species are in the author's collection.

Genus **Physobius,** new

Differing from *Garibius* and *Monotarsobius* in lacking a special lobe on the tibia of the male. Agreeing with both of these genera in having the articles of the antennae normally 20 in number. Prosternal teeth 2 + 2. Posterior angles of none of the dorsal plates produced. Posterior coxae armed dorsally. Ventral spines of anal legs 0, 1, 3, 3, 0 to 0, 1, 3, 2, 1 as against 0, 1, 3, 1, 0 in *Garibius.*

Generotype.—*Physobius rappi,* new species.

Physobius rappi, new species

Head and antennae brown, the antennae of a somewhat purplish cast with apical portion lighter. Dorsum pale, testaceous, the last tergite darker. Last two pair of legs also darker, except tibiae which are light.

A striking peculiarity is presented by the prosternum which bears only a single tooth on each side; this moderately large, with the special seta near its outer base. Median sinus strictly V-shaped. These teeth are symmetrical and normal as far as can be detected.

Ventral spines of anal legs 0, 1, 3, 2; dorsal, 1, 0, 3, 1, 0; claw single; coxae armed laterally as well as dorsally. Ventral spines of penult legs 0, 1, 3, 3, 2; dorsal, 1, 0, 3, 1, 1, with one accessory claw; coxa not laterally armed. Ventral spines of first legs 0, 0, 1, 2, 1; dorsal, 0, 0, 2, 1, 0.

Coxal pores, 3, 3, 3, 3.

Claw of female genital forceps tripartite with the lateral teeth small; basal spines 2 + 2.

Length, 11.2 mm.

Locality.—Illinois: Mahomet. One female taken Mar. 4, 1945.

Tidabius plesius, new species

A species apparently nearest to *T. poaphilus* of Nebraska, with which it agrees in having the posterior coxae wholly unarmed and in having the ventral spines of the anal legs, 0, 1, 3, 2, 0, with the dorsal spines 0, 0, 2, 0, 0 and the claws 2. It differs, however, in having the dorsal spines of the penult legs 0, 0, 2, 1, 0, and in having also but 2 dorsal spines on the third joint of the three or four preceding pairs, the others, except the first, having but one spine. Ventral spines of first legs 0, 0, 0, 0, 1, the dorsal, 0, 0, 0, 1, 1; ventral spines of the second legs 0, 0, 0, 1, 1; dorsal, 0, 0, 1, 1, 2. The articles of the antennae typically 28 instead of 32.

Length of female holotype, 9 mm.

Locality.—Illinois: Urbana, Feb. 25, 1945.

Mayobius victoriae, new species

In the type specimen the head, antennae, prehensors and first tergite are brown; the remaining part of the dorsum testaceous; legs yellowish.

The antennae of moderate length, the articles mostly short, 47 in number. Ocelli in 2 series, 1 + 3, 3, the single ocellus large, the seriate ocelli in each row decreasing in size cephalad.

Prosternal teeth 2 + 2 as usual, the ectal spine on each side much less robust than the teeth but truly spiniform.

Readily to be distinguished from other known species in apparently lacking spines on the first legs both below and above. The second legs also lack spines below but have small ones above; thus, 0, 0, 2, 2, 1. Ventral spines of penult legs 0, 1, 3, 1 (2?) 1; dorsal, 0, 0, 3, 1, 1; an accessory claw present. None of the posterior coxae armed.

Claw of the female gonopods strictly entire. Basal spines 2 + 2, stout.

Posterior angles of 9th, 11th and 13th dorsal plates strongly produced, those of the 7th weakly so (Subgenus *Mayobius,* sens. str.).

Length, 11 mm.

Locality.—Mexico: Tamaulipas: Ciudad Victoria. Female type taken Dec. 30, 1943.

Occurrence of a European Centiped in Utah

By R. V. Chamberlin, University of Utah

Cryptops hortensis Leach, a common European centiped, known heretofore also from the Azores, Madeira, and St. Helena, has over a series of years been taken occasionally at quarantine in soil about plants imported from Europe. It has not, however, previously been noted as anywhere established in America. In April of this year, Mr. Stanley Mulaik brought in a single specimen with soil taken near the Biology Building of the University of Utah. Subsequent investigation has shown that it is abundant in cultivated soil on the campus of this institution.

A Note on Synonymy in the Genus Gomphus (Odonata)

By Minter J. Westfall, Jr., Cornell University

While working over the Gomphines recently with Dr. James G. Needham, the author noted several synonymous names, four of which are pointed out below.

Gomphus quadricolor Walsh

1863. *Gomphus quadricolor* Walsh, Proc. Ent. Soc. Phila., 2 (3): 246–249 [Rock Island, Ill., 1 ♂; type lost (Muttkowski, Catal. p. 96)].

1922. *Gomphus alleni* Howe, Occasional Papers Boston Soc. Nat. Hist., 5: 19–20, figs. 1–4. Squam Lake, New Hampshire, June 22, 1907; 1 ♂ only; type (formerly at Bost. Soc. Nat. Hist. Museum) now at Mus. Comp. Zool., Harvard College.

Only the type of *alleni* is known, but I remembered having seen the peculiar teeth figured by Howe on the superior appendage of *alleni* in other specimens we had been calling *quadricolor*. With the original descriptions of *alleni* and *quadricolor* before me and a specimen which had been determined by Dr. E. M. Walker as *quadricolor,* I could find no specific difference in the two descriptions. Howe had compared *alleni* with almost everything else near it except *quadricolor*. This he must have overlooked. Howe states that he compared the type with the Gomphine material of the collection at the Museum of Comparative Zoology with the aid of Nathan Banks, also that Mr. E. B. Williamson and Dr. P. P. Calvert studied the type and believed it to be new. It is difficult to see how all could have failed to note its identity with *quadricolor,* except that the latter species is none too common in collections and not well known.

It was quite certain after my study that *alleni* should be relegated to synonymy, but to be still more certain I sent the specimen of *quadricolor* determined by Walker and which fits Walsh's description to Nathan Banks at the Museum of Comparative Zoology. He has kindly examined the type of *alleni* and compared it with my specimen of *quadricolor*. In a letter he writes, "*G. alleni* is the same species; it agrees with your specimen throughout, and also with two *quadricolor* we have from Ohio."

This species has been recorded in the literature from Ont., Mass., N. Y., Pa., Mich., Wisc., Ohio, Ind., Ill., Tenn., and Ala. This synonymy apparently constitutes a new record for New Hampshire.

Gomphus descriptus Banks

1896. *Gomphus descriptus* Banks, Jn. N. Y. Ent. Soc., 4: 194. Ithaca, N. Y., May 15–21; 6 ♂s, 2 ♀s; types [said by Muttkowski (1910, Catal. p. 91) to be in the collection of Banks] are at the U. S. National Museum according to a recent communication from Nathan Banks.

1943. *Gomphus argus* Needham, Bull. Brooklyn Ent. Soc., 38 (5): 143–152, figs. 1–2. Argus Brook, Lloyd Wildlife Reservation near McLean, N. Y., June 4, 1923; single fragmentary ♂; holotype in Cornell Univ. collection in vial and on two slides.

1943. *Gomphus mortimer* Needham, Bull. Brooklyn Ent. Soc., 38 (5): 143–152, figs. 1–2. Chipola Lake, Fla., April, 1929; 2 ♂s, one taken in transformation; types in Cornell Univ. Coll. in vials and on slides.

After carefully studying the types of *argus* and *mortimer* with me, Dr. Nedham has requested that I report them as synonyms. In describing *argus* he mentioned a close relationship with *descriptus*, but did not recognize it as identical.

G. descriptus had been recorded from Ont., Que., Mass. (specimens in collection of M. J. Westfall, Jr.), N. Y., Mich., Iowa, and N. C. Dr. Needham's specimens extend the known range to Florida.

Gomphus (Stylurus) notatus Rambur

1842. *Gomphus notatus* Rambur, Ins. Nour., p. 162. Single ♂; mutilated type in Mus. Paris (Rambur did not know where the type was collected).

1943. *Gomphus* (*Stylurus*) *jucundus* Needham, Bull. Brooklyn Ent. Soc., 38 (5): 143–152, figs. 1–2. Crown Point, N. Y., July 30, 1939; types ♂ and ♀ taken in copulation, now in Cornell Univ. collection in 2 vials and on 3 slides.

After studying this species again, and comparing it with the type description of *notatus* and material from the Williamson collection, Dr. Needham has requested that I report it as a synonym.

This species is recorded from Manitoba to Que., N. Y. to N. C., Ala., Tenn. to Wisc.

Genus Melanomada Cockerell, New Designation (Hym.: Apoidea) *

Hugo G. Rodeck, University of Colorado Museum,†
Boulder, Colorado

Melanomada Cockerell, Proc. Acad. Nat. Sci. Phila., 55: 587, 1903 (new subgenus, type *Nomada grindeliae* Ckll.).

Hesperonomada Linsley, Pan-Pac. Ent., 15: 5, 1939 (new genus, type *Hesperonomada melanantha* Lins.).

Melanomada was erected by Cockerell as a subgenus based upon *Nomada grindeliae* Ckll., and characterized by the entire seventh male tergite, the black color of the male and the black and red of the female, the smooth shining vertex and mesonotum, etc. Later (Proc. U. S. Nat. Mus., XXXIX: 648, 1911) Cockerell described *N.* (*Melanomada*) *heleniella* as a second species of the group.

* Extracted from a thesis accepted by the University of Minnesota.
† On leave of absence for military service.

Upon examining the types of Cockerell's species *Nomada pennigera, sidaefloris,* and *pasitura,* the writer became convinced that these also belong to this subgenus.

The genus *Hesperonomada* Linsley, based on the species *melanantha* Lins. from California, corresponds to *Melanomada* in both external and genitalial characters. The generic distinctness of *Melanomada* (including *Hesperonomada*) from *Nomada,* recognized by Linsley in the erection of *Hesperonomada,* can be established without any doubt by an examination of the male genitalia, particularly the 9th sternum, which is radically different from that of any group of *Nomada,* and is illustrated in the Linsley reference above.

A thoroughgoing revision of the genus *Melanomada,* apparently considerably larger than anticipated, will necessarily await the accumulation of more specimens than now appear to be available. The insects are rare, or at least are rare in collections. The generic characters will be neither entirely those of Cockerell's *Melanomada* nor entirely those of Linsley's *Hesperonomada* since the inclusion of the additional species which may prove to belong here will modify the concepts of both authors. *M. melanantha* has two cubital cells, a peculiarity which appears sporadically in numerous species of Nomadines, and which is a fairly constant character in *Nomada* (*Heminomada*) *obliterata* and *N.* (*Pachynomada*) *victrix.*

A New Species of Lerodea from Texas (Lepidoptera: Hesperiidae)

By H. A. Freeman, Pharr, Texas

For some time the writer had been confusing a species of *Lerodea* from Texas with *neamathla* Skinner and Williams. Despite the fact that this species resembles the Florida species, certain superficial characteristics encouraged the writer to make genitalic studies and thus find that the specimens from Texas constitute an unnamed species the description of which follow.

Lerodea julia n. sp.

♂. Upper surface: Primaries, greyish-brown with three very faint, linear subapical spots. There are two yellowish spots below the subapical ones, the lowest one not in line and nearer the center of the wing. The entire surface of the wing is overscaled with light yellow scales and hairs. Secondaries, greyish-brown, overscaled with light yellow scales and hairs.

Under surface: Primaries, center of the wing greyish-brown with the costal margin, apex and outer margin overscaled with ochreous scales. The spots reappear but are much fainter. Secondaries, brown, heavily overscaled with ochreous scales, otherwise immaculate.

Fringe: Lighter in coloration than the wings. The palpi are yellowish-brown with some white scales interspersed.

♀. Similar to the ♂, except the ground color is somewhat darker.

Expanse: ♂♂, 26–29 mm., average 28 mm.; ♀♀, 26–29 mm., average 28 mm.

Described from 17 specimens, 11 ♂♂ and 6 ♀♀. The data on these specimens, all collected by the writer, are as follows: 1 ♂, X–15–44, 1 ♂, I–2–45, I ♀, I–1–45, 1 ♀, XII–30–44, 1 ♀, I–28–45, Pharr; 3 ♂♂, I ♀, V–31–42, Uvalde; 1 ♂, 1 ♀, VI–13–40, San Marcos; 1 ♂, VI–3–40, 2 ♂♂, V–30–42, 1 ♂, VIII–16–44, New Braumfels; 1 ♂, VI–8–40, Brownsville; all in Texas and 1 ♀, VI–8–35, Monterrey, N. L., Mexico.

This species is named in honor of my second daughter.

Holotype ♂, X–15–44, Pharr, Texas and *allotype* ♀, XII–30–44, Pharr, Texas, are in the collection of the author. *Paratypes*, 3 ♂♂ are in the collection of Mr. Otto Buchholz; 1 ♂ in the collection of Dr. George Rawson; 1 ♂, in the Stallings and Turner collection; one pair will be placed in each of the following museums; Academy of Natural Sciences of Philadelphia, The American Museum of Natural History, and the United States National Museum. The other 2 ♂♂ and 2 ♀♀ paratypes will remain for the present in the collection of the author.

Julia resembles *neamathla* Skinner and Williams superficially more than any other species of *Lerodea;* however, the following differences can be noted.

1. *Julia* is slightly larger than *neamathla.*
2. The spots on the primaries are larger and somewhat more readily discernible in *julia,* because of their lighter coloration.
3. The overscaling on the upper surface of both wings is somewhat lighter in *julia* than in *neamathla.*
4. On the lower surface of the secondaries of *julia* the overscaling is of a more ochreous coloration, thus being lighter than *neamathla.*

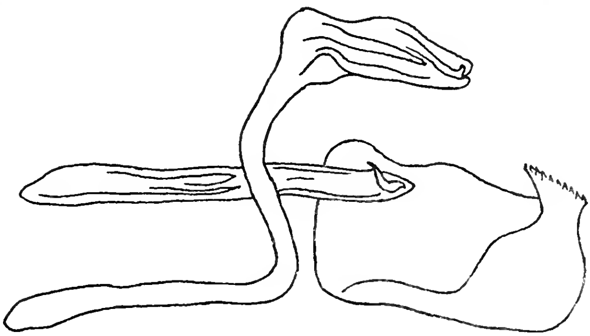

Fig. 1. Genitalia of: *Lerodea julia* n. sp., ♂ paratype, Uvalde, Texas, V–31–42.

Julia belongs to that group of obscurely marked skippers that for accurate determination requires a study of the genitalia. Despite the resemblance to *neamathla,* the genitalia are different as can be seen by comparing the figure with the genitalia of the Florida species.

Amphorophora Aphids Notes

By George F. Knowlton, Utah Agricultural Experiment Station, Logan, Utah

The following paper includes the description of an apparently undescribed *Amphorophora* from currant foliage, and records host and locality data for additional species of the genus *Amphorophora,* a number of which were collected upon berry plants.

Amphorophora fronki [1] n. sp.

Alate vivipara: Color green; cleared specimens largely pale; antennae 2.75 mm. long; antennal III, .865 with 51 to 57 sensoria; IV, .44 to .46 with 2 to 4 sensoria in row on basal half of segment; V, .367 to .385 without secondary sensoria; VI, .014 + .95; rostrum exceeds second coxae; rostral IV + V slenderly obtuse, .145 mm. long; hind tibiae 1.72, pale with thickened distal end blackish; hind tarsi .175, blackish; cornicles vasiform, .296 long, pale with distal three-fifths slightly dusky, swollen portion scarcely twice thickness of narrowest part; cauda .32 mm. long, pale to slightly dusky.

Apterous vivipara: Color green; body 2.4 mm. long; antennae pale with dark ends on III to VI; antennals III, .835 to .93 with 12 to 15 sensoria on proximal half; IV, .408 to .48, without sensoria; V, .4 to .464; VI, .104 to .112 + .92 to .945; rostrum reaching third coxae, tip slenderly obtuse; rostral IV + V, .152; hind tibiae 1.92, pale, blackish at distal ends; hind tarsi .168 to .176; cornicles .736 to .785, spinosely imbricated before the flange; cauda .368 to .385, pale, usually with 3 lateral hairs; cauda rounded.

Collected on foliage of "bedbug currant," *Ribes* sp., at American Fork, Utah, July 25, 1940 (G. F. Knowlton). Type in the collection of writer.

Winged females of *Amphorophora fronki* n. sp. key to *A. sensoriata* Mason in Mason's key (U. S. Natl. Mus. Proc. 67:

[1] Named in honor of 1st Lt. W. D. Fronk.

5–6, 1925) from which they differ in having no sensoria on antennal V, longer rostrum, shorter and paler antennals III and IV with fewer sensoria. Aptera of *A. fronki* key to *A. pergandei* Mason in the above key, but possess longer cornicles and have fewer lateral hairs on cauda. Alate *A. fronki* have paler and less tuberculate antennae and paler cornicles than *A. pergandei.*

Amphorphora arnicae Glend. Collected on *Arnica* sp. near foot of Puyallup Glacier, Mt. Rainier, Washington (H. C. Bennion).

A. crataegi (Monell). An extremely heavy infestation caused foliage of *Crataegus* to drop early in the forestry nursery at the Utah State Agricultural College, Logan, Utah, during the fall of 1943. On September 5 to 8 the trunk, branches and soil beneath a number of *Crataegus* were green with hundreds of thousands of these crawling aphids, deserting heavily infested fallen leaves and crawling back upon the hosts. Also collected at Hoytsville, Utah, October 1943; Mt. Timpanogos, Utah, July 12, 1942; Grand Canyon of the Snake River, Wyoming, September 11, 1941 (Knowlton); and at Hollister, Idaho, August 30, 1930 (D. E. Fox).

A. geranii G.-P. Buhl, Idaho, October 17, 1930 (D. E. Fox).

A. grindeliae Wms. On *Grindelia squarrosa* at Garland, June 4 and 10, 1938, and Granite, June 27, 1937, in Utah; Beaver Dam, April 25, 1935, and Flagstaff, September 23, 1944, in Arizona; Basin, Wyoming, September 12, 1941; Helena, Montana, August 2, 1944; and Castleford, Idaho, August 19, 1943.

A halli Knlt. Runs to *A. nervata* (Gill.) in Mason's key (U. S. Natl. Mus. Proc. 2: 6, 1925) from which it differs in more swollen cornicles, relatively longer antennal V and unguis. Rostral IV + V, .126 mm. long; hind tibiae 1.77; hind tarsi .126.

A. laingi (?) Mason. An apterous female collected at Puyallup, Washington, August 11, 1937 (H. C. Bennion) keys to this species in Mason's key (U. S. Natl. Mus. Proc. 67: 6–7, 1925).

A. masoni (Knlt.). On *Helianthus annuus,* Toquerville, Utah, June 18, 1935; Fredonia, Arizona, July 11, 1935.

A. minima Mason. On raspberry, Wooster, Ohio, August 24 (Wilcox).

A. nervata (Gill.). On leaves and tender tips of twigs of wild rose, *Rosa chrysocarpa,* at Big Cottonwood Canyon, Utah, June 29, 1925; and *Rosa fendleri* at Emigration Canyon, Utah, July 25, 1925; on cultivated rose at Bonneville Dam and Portland, Oregon, June 20, 1939; Twin Falls, Idaho, August 19, 1943; Shoshone, Wyoming, September 13, 1935; Bozeman, Montana, July 16, 1936; Overton, Nevada, May 20, 1935; in Utah at Moab, July 26, 1935, and at Amalga, Cedar Valley, Delta, Hooper, Logan, Ogden, Pleasant Grove, Provo, St. George and Springville. Collected in sweeps on grass at Salem, Oregon, June 17, 1939.

A. rubi (Kalt.). Abundant on wild raspberry leaves at Miner's Basin in LaSal Mountains, Utah, July 28, 1939; on tame raspberry at Wellsville, Utah, July 4, 1939; on *Rubus strigosus,* Hyrum, Utah, October 12, 1938; on *Rubus* sp. at Albany, Oregon, August 24, 1944.

A. rubicola (Oest.). On wild raspberry, *Rubus* sp., Livingston, Montana, July 31, 1942 (H. F. Thornley).

A. rubicumberlandi K.-A. On wild black raspberry canes, *Rubus* sp., Oregon Caves, Southern Oregon, June 24, 1939 (Dr. S. A. Huber). More than 1000 to 2000 in some very large colonies on black raspberry canes examined at Puyallup, Washington, June 17, 1939 (Huber-Knowlton).

A. sensoriata Mason. On growing tips of cultivated raspberry, Madison, Wisconsin, October 7, 1914 (A. C. Burrill); Haddonfield, N. J., July 12, 1938 (M. D. Leonard).

A. sonchi (Oest.) On *Lactuca* at Overton, Nevada, April 26, 1935; Bozeman, Montana (C. B. Philip); Buhl, Idaho, August 19, 1943; Hurricane and Salt Lake City, Utah; on loganberry, Corvallis, Oregon, October 8, 1914 (A. L. Lovett); on wild gooseberry on foothills west of Woodruff, Utah, July 5, 1935; on black currant at Fielding, Collinston and Garland, October 22, 1929; on *Sonchus asper* at Magna; alates on sugar beets (accidentals?) at Cornish, Utah, September 23, 1926. Alate on *Rosa* sp., Ogden Canyon, October 9, 1937 (accidental?); winged females in greenhouse at Logan, Utah on *Agropyron cristatum,* December 5 and 15, 1939; at Preston, Idaho on currant.

The Andrew Bolter Insect Collection [1]

By William F. Rapp, Jr.

The statement has recently been made that the Andrew Bolter collection has been lost. This collection was willed to the Department of Entomology, University of Illinois, Urbana, by the late Andrew Bolter in 1900. The will specified that the collection was to be kept in the original cabinets and was not to be broken up and placed in other collections. The provisions of the will have been kept and the collection is still retained by the University of Illinois' Entomology Department.

At the time of Bolter's death this collection was considered the largest private insect collection in North America. A partial list of types was published by Frison.[2] Many types and co-types are still thought to be in the collection. It is particularly strong in Lepidoptera, the majority of which were determined by the leading specialists of the day, such as Smith, Hulst, Grote, Daecke, Edwards, and Harris. A partial list of the Lepidoptera has been published by Kimball and Jones.[3] The collection is also rich in Coleoptera. There is a fair number of Hymenoptera, which were largely determined by E. T. Cresson, Sr. The type of *Trogus bolteri* is in the collection, and possibly several other of Cresson's types.

Today the collection is in good condition, but the nomenclature is that of 1900. Unfortunately, there is very little collection data with the specimens, the majority having only state labels.

[1] Contribution from the Department of Entomology, University of Illinois, Urbana, No. 252.

[2] Bull. Ill. State Nat. Hist. Survey, vol. 15 (1927), pp. 232–233.

[3] Kimball, C. R. and Jones, F. M., Annotated List of the Lepidoptera of Nantucket and Martha's Vineyard Islands, Mass., Publication of the Nantucket Maria Mitchell Association, vol. IV.

New Syrphid Flies

By F. M. Hull, University of Mississippi

(*Continued from page 187*)

Eristalis maritimus n. sp.

A submetallic fly, the wings widely tinged with brown, especially just beyond the middle; scutellum yellowish brown. Related to *resolutus* Walker. The opaque fasciae upon the abdomen are much more narrow, the front is shining black without the prominent transverse depression.

Female. Length 11 mm. *Head:* The upper occiput, the front and vertex shining black with a slight purplish cast on either side of the faint median line; the entire pile of this area is black and the front is without the prominent transverse depression of *resolutus* which lies a short distance above the antennae. Face widely shining black in the middle, the sides yellowish white pubescent with similar colored pile. Beneath the antennae this pubescence extends nearly across the face and it extends on either side of the antennae and linearly up the front halfway upon the eye margins. Antennae with the first two segments dark brown; the third is reddish ventrally and narrowly along the base and brownish black upon the remainder. Arista dark brown. *Thorax:* black with a bluish reflection especially prominent in the middle of the posterior half. Seen from the rear there are a pair of narrowly separated, submedial, grey pollinose vittae reaching to the posterior third where they are diagonally cut off and their apices are divergent. There is a similar pair of pollinose fasciae just anterior to the transverse suture. There is a more whitish or brownish white pollinose spot mesad to each humerus. The posterior half of mesopleura and upper half of sternopleura and an obscure spot on the hypopleura are pale yellowish or brownish white pollinose and these areas have reddish yellow pile; pteropleura with abundant black pile and the pile of the mesonotum except upon the notapleura, the ventral edge of post calli and a few hairs at the sides of the scutellum are reddish orange; dorsal pile of the post calli black. Scutellum light orange brown with abundant appressed black pile. *Abdomen:* wide and short oval, the first segment black with reddish pile along the sides. The second segment has a subopaque, narrow, basal border and a wider medial vitta which expands posteriorly into a subapical fascia that is somewhat diffuse; the depression which marks the anterior border of this opaque fascia is quite marked and rather deep. The remainder of the antero-lateral portion is strongly brassy but apically coppery red; medially the apical margin of this segment is brassy. Upon the third segment there is a large, subopaque, medial, elongate spot reaching from the base nearly to the apex of the segment. The basolateral part of the segment is quite reddish coppery with a narrow, oblique, greenish blue, quite diffuse, rather shining, diagonal stripe running from the posterior corner towards the opaque medial spot which, however, it does not reach. Upon the fourth segment there is only the large, oval, medial subopaque black spot, the remainder of the sides coppery in color. *Legs:* Femora black, becoming sepia near the apex. Pile of anterior femora entirely black, of the middle femora black except for a band of long, reddish yellow hairs posterodorsally upon the basal half and some short yellow pile along the anterior surface on the basal half. Pile of hind femora short and black but with a prominent, dorsal row of long reddish brassy pile above and similar, more sparse pile ventrally; the lateral pile is chiefly black. The anterior tibiae are blackish on the apical half and light yellowish brown diffusely upon the basal part; the middle tibiae are dark brown apically and yellowish brown basally. The hind tibiae are dark sepia brown upon the apical two-thirds but diffusely yellowish brown basally and without the central yellow triangle found on *resolutus*. Pile of hind tibiae almost wholly reddish orange but with numerous short black hairs ventrally upon the basal half. All of the tarsi are very dark brown with brownish black pile dorsally and yellowish brown pile ventrally. *Wings:* strongly tinged with brown from the middle nearly to the apex; the whole of the posterior and apical border of wings pale brown, the first and second basal cells and the base of the costal cell very pale yellowish brown.

Holotype: a female, GUADALCANAL (C. O. Berg collector), 1944; presented to the author by George Steyskal.

Dideopsis hemipennis n. sp.

Related to *aegrota* Fabricius. The dark sepia brown area upon the base of the wing is sharply delimited instead of diffuse and covers only the basal half or slightly more of the wing. The brown color runs diagonally backward well behind the posterobasal corner of the discal cell. At most only half of the discal cell is colored with brown.

Male. Length 9 mm. *Head:* Vertex shining black, the front shining black on the lower half and with a faint bluish cast laterally, diffusely merging into a pollinose or pubescent area above. Middle of upper front yellowish brown pubescent, merging into the yellowish white pubescence along the eye margins. Pile of upper part of the front long, erect and black with many reddish hairs intermixed but entirely black laterally on each side of the supra-antennal callus. Pile of the face entirely pale yellow. Middle of the face dully shining black, the extreme lower part of face and cheeks black but most of the sides of the face pale yellow and with similarly colored pubescence. Tubercle of face fairly prominent. The first two antennal segments black whereas they are dark brown or reddish brown in *aegrota;* the third segment is blackish above, light reddish brown below entirely to the apex. *Thorax:* Mesonotum shining black, the notapleura grey pollinose, a prominent reddish yellow collar of hairs present; the mesonotal pile is fine, erect and black but reddish along the sides and before the scutellum and entirely reddish over the base of the wing; the thick tuft of black pile over the wing as in *aegrota* is absent. Scutellum yellowish brown with fine, blackish pile; squamae light yellow with similar fringe; halteres orange brown. The mesopleura are yellowish pollinose with thick yellowish brown pile; pteropleural pile black; plumulae white. *Abdomen:* rather similar to *aegrota* in general pattern, the pair of spots upon the base of the second segment almost connected across the midline. The basal fascia of third segment is a little wider and not indented postero-medially. *Legs:* Anterior and middle femora light reddish brown becoming more brownish basally, their tibiae and anterior basitarsi light reddish brown. Middle tarsi entirely blackish except the extreme base which may be a little reddish. Hind femora and their tibiae except for yellowish middle band sepia brown, their tarsi black, the pile of the hind legs black. Venter colored as in *aegrota*. *Wings:* apical half of the wings obliquely hyaline, the apical half of the stigmal cell very pale yellowish, the basal half sepia, the brown color of the wing rather sharply delimited and reaching from just beyond the end of the costal cell across the middle of the discal cell to the end of the wing at the end of the sixth vein. The extreme base of the first and the second basal cells is barely paler than the surrounding brown color.

Holotype: a male, NEW GEORGIA, 1944 (C. O. Berg collector); presented to the author by George Steyskal.

Eristalis collaris De Meijere variety **nigrovittata** new variety

Distinguished by the metallic blackish vitta upon the face.

Male. Length 9.5 mm. *Head:* The pile of the front and vertex is black; of the face pale yellowish brown. The lateral eye marginal bands of pubescence are also pale yellowish brown. Cheeks and lower part of the face deep yellowish brown. Middle of the face with a brownish black highly polished medial vitta. The antennae are orange brown, the arista reddish brown. Upper eye facet of the male enormously enlarged, extending halfway down the eyes but the enlarged area not sharply separated. *Thorax:* black, the entire area anterior to the suture with thick, yellowish brown, slightly reddish pollen and similarly colored pile. Viewed posteriorly there are two broad, submedial vittae of this same pollen which are anteriorly fused and which extend posteriorly a short way past the transverse suture. Their posterior ends are obliquely truncate and divergent. There is a fascia of the same colored pollen just before the scutellum with similar pile. The intervening area upon the mesonotum is nearly opaque black but reddish sepia brown upon the edges and with black to blackish brown pile. The post calli are shining reddish brown; the presutural yellow pollinose stripe extends down upon the mesopleura across the upper sternopleura and curves upward over most of the hypopleura; pleural pile reddish yellow. The squamae are pale yellowish brown basally, sepia on the apical half with sepia fringe; scutellum deep yellow, opaque except upon the translucent rim which is shining, its discal pile thick and black, the marginal pile yellow. *Abdomen:* with the first and all of the second segment deep yellow except an opaque, anteromedially produced, posterior black fascia which however extends only upon the posterior third of the segment and the medial extension extends forward only two-thirds the length of the segment. Pile of the yellow areas yellow or orange except posteriorlaterally on the second segment; pile of the black areas black. The third segment is deep yellow on the basal half, becoming metallic over the yellow laterally; the posterior half is subopaque black, brown where joins the yellow and the black area black pilose. There is a medial, posterior, metallic golden notch on the black area. Fourth segment metallic brassy or golden, with a narrow, central, opaque black fascia very slightly oblique, meeting in the midline at the base of the segment. The pile of this segment is wholly golden. *Legs:* entirely pale brownish orange; the apex of the hind tibiae is light reddish brown, the last two tarsi on all of the legs black. *Wings:* hyaline, the dip of the third vein quite shallow but long, the wings without villi, the stigmal cell very pale yellow and almost hyaline, narrowly brownish at its immediate base but without any stigmal cross vein.

Female. Similar to the male, the metallic black stripe of the face is wider and still more prominent, the vertex shining black; a short distance below the ocelli there is a transverse, posteriorly concave, opaque black cross band which is in the middle extended forward more than half the length of the front; its anterior end rounded. The anterior part of the front is shining black, the lateral margin rather widely creamy brown pubescent and connected with the same pubescences of the face; all of the frontal pile is black. Upon the abdomen there is only a narrow basal yellow fascia upon the second segment, the remainder being opaque black except for metallic black lateral triangles. The whole of the first segment is pale brownish yellow, third segment similar to the male except that the anterior brownish yellow fascia is shallowly indented posteriomedially, the indentation not quite reaching the base and the metallic black laterally extends narrowly to the base. Fourth segment with the basal yellow fascia complete and with a tiny, medial, posterior notch.

Holotype: a male, GUADALCANAL, Nov. 1934, C. O. Berg. Allotype: a female, with the same data. Types in the author's collection.

Chrysogaster minuta n. sp.

A bright metallic greenish black fly in which the wings are rather strongly tinged with brown and the subapical cross vein is straight, making a right angle with the last section of the third vein. Related to *stigmata* Will.

Male. Length 4.5 mm. *Head:* The front, vertex and face are shining greenish black, the front with a prominent, round punctate depression in the middle and very sparse, short, light yellow pile. Pile of the vertex blackish. Face with a transversely striate area beneath the antennae which is narrow and does not reach the eyes. The lower part of the face and epistoma are rather sharply produced forward beyond the base of the antennae. The antennae are wholly black, the second segment approximately twice as long as the first, the third nearly twice as long as the second. *Thorax:* Mesonotum shining greenish black, including the scutellum and with four obscure brassy vittae. Mesonotal pile short, erect, abundant and brassy yellow. The pleural pile is quite sparse but of the same color. Squamae pale yellowish brown with similar fringe, halteres light orange. *Abdomen:* wider than thorax, the lateral margins greenish to brassy black, slightly coppery upon the sides at the end of the second segment. Disc of abdomen only moderately shining and more or less subopaque black with a slight bluish, purplish reflection. *Legs:* Femora and tibiae wholly greenish black with light brownish to pale yellow pile; tarsi wholly black, pale pilose. *Wings:* rather strongly and uniformly tinged with dilute smoky brown, the stigma barely darker. Subapical cross vein straight making a right angle with the last section of the third vein.

Holotype: a male, Mt. Rainier, WASHINGTON, July 7, 1926 (F. M. Hull collector).

Salpingogaster uncinata n. sp.

A dark sepia brown species with yellowish legs; a yellow stripe on the reddish brown pleura and the face reddish brown in the middle. Related to *diana* Hull.

Male. Length 11 mm. *Head:* Vertex shining black, the front deep reddish brown, the sides narrowly yellow, the face light yellow with reddish brown medial stripe reaching to just below the prominent tubercle. The pile of the front and face is sparse and yellow. The front is without a prominent constriction. The first two antennal segments are light brown, the third missing. Occiput yellowish grey pollinose with fine golden pile, the eyes with a medial indentation. *Thorax:* Mesonotum reddish sepia brown with on either side a narrow, slender, shining reddish or chestnut vitta reaching practically to the scutellum and very slightly diverging posteriorly. The post calli and the region just in front are light reddish chestnut. There is a similar colored slender vitta which runs from the inner end of the pale yellow humeri to the transverse suture.

The notapleura are narrowly yellowish, the posterior half of mesopleura and upper posterior half of sternopleura and a narrow vertical band margining the metanotum are light yellow; scutellum sepia brown, the base and the margin light yellow. Pile of the mesonotum quite sparse, short and yellow. Squamae light brownish yellow. Halteres light brown. *Abdomen* strongly constricted upon the cylindrical second segment which segment is reddish chestnut in color. The middle of this segment is not quite half as wide as the base or apex. The first segment is of the same color, its lateral margins or lobes bluntly rounded and a little more yellowish. Third, fourth, and fifth segments shining sepia black with slight bluish reflections and formed into a wide, quite convex club-like portion. The hypopygium is sepia with a strong narrow downward curved hook-like projection; venter dark reddish brown, the fourth sternite with on either side a rounded bristly lobe. *Legs:* First pair of legs wholly yellow, second and third pairs wholly yellow except for light reddish brown coxae and trochanters and for faint but wide brown subapical bands on their femora and the medial surface of the femora more yellowish brown. Posterior femora with thick abundant blackish pile that becomes quite long ventrally and near the apex rather stiffer and more bristly. *Wings:* strongly tinged with yellowish, the costal and subcostal cell and basal half of the marginal cell and of the first basal cell above the spurious vein deep yellow. The stigmal cell is rather dark brown, the marginal cell and the apex of the submarginal cell light brown. Loop of the third vein only moderately deep, about as deep as the usual species of *Eristalis*. Subapical cross vein only moderately sigmoid.

Holotype: a male, La Suiza, Costa Rica (Pablo Schild) 1924. Type in the collection of Dr. A. L. Melander.

Personals

University of Minnesota. In June, the NEWS announced the appointment of Dr. A. Glenn Richards, Jr., to the faculty of the College of Agriculture. Further appointments, as published in a recent number of SCIENCE, are: Dr. Clarence E. Mickel, acting chief of the Division of Entomology and Economic Zoology since the retirement of Dr. William A. Riley on June 15, 1944, has been promoted to be chief of the Division; Dr. Mykola H. Haydak has been promoted to an associate professorship. He will be in charge of the beekeeping work of the Division and succeeds the late Dr. Maurice C. Tanquary. Dr. Laurence K. Cutkomp has been appointed research associate, and Dr. H. Y. Fan has been appointed research fellow in the Division. Both will assist in the research programs in insect physiology.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Observation Hives. In the "A B C and X Y Z of Bee Culture," by Root, we learn that the first approach to the modern type of observation hive was invented in England by W. Mew about 1650.

It is interesting in this connection to call attention to the following paragraph in "The Diary of Samuel Pepys," under the date of May 5, 1665: "After dinner to Mr. Evelyn's; he being abroad, we walked in his garden, and a lovely noble ground he hath indeed. And among other rarities, a hive of bees, so as being hived in glass, you may see the bees making their honey and combs mighty pleasantly."

The paragraph, in all its quaintness, helps to fix the date of the first use of the observation hive, and also its popularity at that time among the gentry of England.—PHIL RAU.

Insects, Men and Ultra-violet. Normal human eyes are blind to ultra-violet light. Many insects, however, are able not only to see ultra-violet light but are extraordinarily sensitive to it. This we know from the work of Lubbock, Von Hess and Kühn in Europe and from the researches of Lutz and of Bertholf in this country. Kühn [1] was able to train bees to come to the ultra-violet line 365 mμ of the mercury-vapor spectrum irrespective of its relative brilliance or of its position with respect to other lines and concluded that bees see this wave-length as qualitively distinct, i.e., as a separate color. For example, bees trained to respond to 365 mμ (ultra-violet) will not respond to 405 mμ (visible blue or violet) and vice versa. Bertholf [2] showed that this wave-length has maximum stimulative efficiency, as compared with all other parts of the spectrum. Furthermore, he is convinced of the validity of Kühn's conclusions.

Recently, Professor George Wald [3] of Harvard University pointed out that aphakic persons (those who have had their lenses removed in the operation for cataract) can see very well in the ultra-violet, the part of the spectrum that is ordinarily absorbed by the yellow color of the human lens. This being so, aphakics should be able to tell us what ultra-violet looks like. Do they experience a strange new color sensation which only they and the bees know of? Dr. Wald disappoints us with:—"this ordinarily produces no striking distortion of their visual experiences, as may be judged from the fact that they usually are wholly unaware of their extraordinary capacities." Nor do they have new sensations; aphakics "seem to see this region (365 mμ) as they do 405 mμ, as blue or violet." Wald also states that we are no longer dependent on "pure speculation" (apparently referring to the conclusions of Kühn) and implies that color sensation in bees must be like that in aphakics.

[1] Kühn, A. 1927. Über den Farbensinn der Bienen. Zeitsch. f. vergleichende Physiol. 5: 762–800.

[2] Bertholf, L. M. 1931. The distribution of stimulative efficiency in the ultra-violet spectrum for the honeybee. Jour. Agric. Research 43: 703–713.

[3] Wald, G. 1945. Human vision and the spectrum. Science 101: 653–658.

But is the basis for Wald's comparison really adequate? In view of the very great differences between the visual organs of man and insects, is it not dangerous to conclude that because wave-lengths 365 mμ and 405 mμ appear qualitatively alike to man they must appear alike to insects? After re-reading Kühn's carefully planned experiments, one is inclined to ask:—Who is speculating?—R. G. SCHMIEDER.

A Correction

By WILLIAM F. RAPP, JR.

In my article in Entomological News for May 1945, page 117, I stated that *Eupaniasis alcoptera* (Druce) is the genotype for *Neopaniasis* Rapp. This is a mistake on my part and the type is *Paniasis alcoptera* Druce. Also Dr. Schaus' name is not spelt with a final "e."

I am greatly endebted to Mr. Hahn W. Capps for calling these errors to my attention.

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 and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in ENTOMOLOGICAL NEWS are not listed.

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ANATOMY, PHYSIOLOGY, MEDICAL—Barnes, H. F.—Studies of fluctuations in insect populations. VIII. Wheat blossom midges on broadbalk, 1932–40. [97] 10: 94–120, 1941. IX. Carrot fly (Psila rosae) 1936–41. [97] 11: 69–81, 1942. **Bouhniol, J. J.**—Nymphes acephales prematurees chez le ver a soie (Bomlyx mori). [127] 188: 418–20, 1944. **Butt, F. H.**—External morphology of Amphimallon majalis, the European chafer (Coleoptera). [Mem. Cornell Univ.] 266, 18 pp., ill. **Douglas, J. R.**—Knowledge of the internal anatomy of Dermacentor andersoni necessary to pursue the study of rickettsial infection in the tick. [125] 4: 487–97, ill. **Ellsworth, J. K.**—Medical entomological problems of the war. [Ann. Biol. Colloquium, Corvallis, Oregon, 1943] 5: 18–21. **Friedland & Harnly.**—Effect of temperature on the wings of dimorphos/dimorphos vestigial-pennant/vestigial in Drosophila melanogaster. [92] 88: 247–53. **Goux, L.**—Note sur la constitution du tegument chez la larve d'une Alenrode. [127] 188: 627–28, 1944. **Herms, W. B.**—Some entomological problems of the Pacific area with which medical entomologists should be concerned. [125] 4: 429–32. **Knowles, F. L.**—Growth measurements of Anopheles quadrimaculatus larvae. [130] 58 (4): 136–39, ill., 1943. **Mickey, G. H.**—Gynandromorphs in Drosophila melanogaster. [Proc. Louisiana Acad. Sci.] 8: 83–99, ill. **Montshadsky, A.**—On the mechanism of digestion in the larvae of Chaoborus (Diptera). [Zool. Jour., Moscow] 24: 98. **Nicolle & Lwoff.**—L'acide pantothenique dans la nutrition de l'hemiptere hemophage Triatoma infestans. [127] 188: 341–43, 1944. **Paillot & Kirkor.**—Etude de la Vitesse de cheminement des aliments a travers les differentes parties du tube digestif de l'abeille. [127] 188: 34–35, 1944. **Peterson, A.**—Some insect infants. [54] 60: 426–42, ill. **Picaud, A.**—Recherches histologiques sur le glycogene chez les larves de dipteres du gen. Simulium. [127] 188: 264–65, 1944. **Poulson, D. F.**—Chromosomal control of embryogenesis in Drosophila. [90] 79: 340. **Richards & Weygandt.**—The selective penetration of fat solvents into the nervous system of mosquito larvae. [6] 53: 153–65. **de Salles & Hathaway.**—Nota sobre a infestacas ae Musca domesteca por um ficorniceto do gen. Empusa. [111] 41: 95–99, ill. **Sautet & Audibert.**—Rythme cardiaque des larves de moustiques, en asphyxie. [127] 188: 679–80, 1944. **Scharrer, B.**—Experimental tumors in an insect. [68] 102: 102. **Shull, A. F.**—Inheritance in lady beetles. III. Crosses between variants of Hippodamia quinquesignata and between this species and H. convergens. [Jour. Hered.] 36: 148–60, ill. **Stewart, M. A.**—Present knowledge of the status of vectors of sylvatic plague in No. Am. [125] 4: 433–37. **Stojanovich, C. J.**—Head and mouthparts of the sucking lice (Anoplura). [117] 10: 1–46, ill. **Wiltshire, E. P.**—Is the diapause in insects eradicable? [21] 57: 49–51. **Yeager, J. F.**—Blood picture of the southern army worm (Prodenia eridania). [47] 71 (1): 1–40, ill.

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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.

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Wanted—Information as to the existence and present location of a copy of Solodonikov, S. V. Contribution à l'étude de la faune et de la biologie des larves des Libellules du Donetz et de certains de ces affluents. [In Ukrainian.] Trav. Soc. Nat. Charkow 52: 249–268. 1929. [Quoted from Zool. Rec. 1936, Ins. p. 147, No. 3114.] P. P. Calvert, P. O. Box 14, Cheyney, Penna.

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ENTOMOLOGICAL NEWS

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Some Remarks on the Genus Apterodorcus Arrow (Coleoptera: Lucanidae) S

By Bernard Benesh, North Chicago, Illinois

Dr. G. J. Arrow, of the British Museum (Natural History), recently proposed a new genus *Apterodorcus* for *Lucanus bacchus* Hope and Westwood (1845), giving a sketchy idea of the characters defining the genus. The purpose of the present contribution is to amplify the generic characters, by description and illustrations, thus facilitating identification of the insect.

APTERODORCUS Arrow (1943). Figs. 1–10

Proceedings of the Royal Entomological Society of London, 12: 139, 1943.

Dorcus Dejean (1837), Solier (1851), Philippi (1859).
Lucanus Hope and Westwood (1845).
Sclerostomus Burmeister (1847).
Sclerognathus Philippi (1887), Heyne and Taschenberg (1909), Van Roon (1910), Bruch (1911), Germaine (1911). Kriesche (1922), Ruiz (1924), Porter (1934).

Obovate, convex, black, dorsum subopaque, venter feebly shining. Head transverse, more than twice as broad as long, declivous in front, anterad nearly straight, clypeus prominent and feebly trilobate (in large individuals) or truncate (small individuals); anterior angles broadly rounded, diverging laterad; eyes circumscribed half-way by the canthus; behind the eyes with an obtusely rounded dilatation protruding beyond the anterior angles of the prothorax, excavated on top and slightly bent upward; antennae (fig. 5) fairly long and slender, not differentiated in the sexes, scape as long as the funicle and clava, slightly bent; funicle nearly twice as long as the clava, segments apparently of equal length, progressively broadening to the seventh segment, piceous, glabrous, shining; clava tri-lamellate, eighth and ninth segments twice as broad as long, lobate, lobes flattened and pubescent, with basal anterior portion glabrous, shining, ultimate segment semicircular and pubescent throughout; mandibles robust, multiform in males (figs. 9, 10), fairly constant in females (fig. 8), rounded externally, inside deeply hollowed.

Prothorax broader than long, front margin slightly emarginate, anterior angles obtuse, gently diverging and arcuate to basal third, obliquely truncate to basal angles, which are obtuse, base straight; lateral and basal margin slightly reflexed; pronotum less convex in the male, simple; female, on the anterior margin with two close median tubercles. Scutellum parabolic, broader than long. Elytra fused, broadest near the middle, posterad regularly rounded in female, more attenuated in male.

Legs fairly long and stout; anterior tibiae broad, terminal furcation well developed and bent downward in large ♂♂ (fig. 8), followed by three to four irregularly spaced strong spines; intermediate and posterior tibiae armed with two spines, the median very strong and two to three times as long as the other; tarsi one third shorter than the tibiae, praetarsus as long as the four succeeding segments combined, segments ventrad beset with long golden setae.

Head and pronotum irregularly punctured by shallow, well-spaced punctures, the pronotum of female more polished and shining; elytra finely rugulose sculptured and, in proportion, longer in the female. Both sexes apterous. Beneath, mentum (fig. 1) broader than long, anterior angles broadly rounded,

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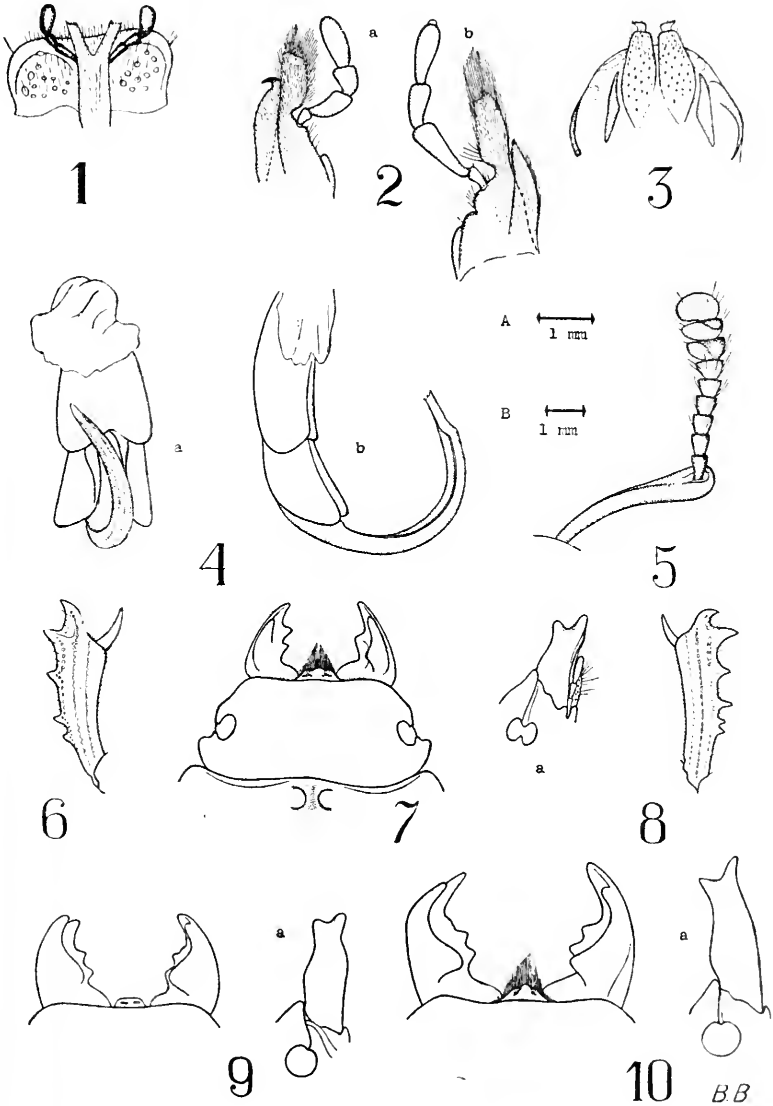
Explanations of the Figures

Fig. 1. Mentum and labium, dorsal view (♀).
Fig. 2. Maxillae, dorsal view, (a) female, (b) male.
Fig. 3. Genitalia, ventral view (♀).
Fig. 4. Genitalia, male, (a) ventral view, (b) lateral view.
Fig. 5. Right antenna, male.
Fig. 6. Left anterior tibia (♀).
Fig. 7. Head and anterior portion of prothorax (♀), (a) lateral aspect.
Fig. 8. Right anterior tibit (♂).
Fig. 9. Mandibles of male (minor development), (a) lateral aspect.
Fig. 10. Mandibles of male (maximum development), (a) lateral aspect.

Scale A = figures 1–5.
Scale B = figures 6–10.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narrowing towards base, rugose; maxillae (fig. 2) strongly constricted in front of the palpifer, inner lobe (lacinia) hooked in the female (fig. 2-a), simple in the male (fig. 2-b). Designated genotypes: *Lucanus bacchus* Hope and Westwood (1845), ♂; *Dorcus bipunctatus* Philippi (1859), ♀.

Apterodorcus bacchus (Hope and Westwood) (1845)

Lucanus bacchus Hope and Westwood, Catalogue of the Lucanoid Coleoptera, p. 26, 1845.

Dorcus bipunctatus Philippi, Anales Universidad de Santiago, 16: 656, 1859.

Hope and Westwood (1845): "Latus niger laevis elytris punctatis, capite lato antice declivi; mandibulis maris vix capitis longitudine intus obtuse dentatis in medio; oculis septo simplici parum incisis, lateribus pone oculos in tuberculum conicum exsertis; prothorace maris transverso angulis posticis rotundatis, elytris vix longioribus quam latis lateribus rotundatis, tibiis anticis 4–5 dentatis posticis in medio 1-dentatis apicibusque externis acutis. Long. corp. mas. (mand. inclus.) lin. 12½. Habitat Chiloe."

Philippi (1859): "D. niger, subovatus, capite angustiore quam thorax punctato, punctis in margine anteriore lateribusque profundius et magis confertis; mandibulis punctatis, extus bicarinatis, supra planis; tergo prothoracis punctato, punctis in medio haud obliteratis antice in medio marginis punctis duobus elevatis notato; elytris valde punctatis (punctis postice multo minoribus), antice sulcis abbreviatis confuse notatis; ventre nitidiore, lateribus valde punctato. Long. cum mandibulis 12½ lin.; latit. capitis inter oculos 3⅔ lin.; latit. thoracis 5½ lin.; latit. elytrorum totidem." [1]

Philippi's selection of the name *bipunctatus* is unfortunate and misleading; what were described as punctures are really the two frontal tubercles on the pronotum, for which "binodosus" or "bituberculatus" would be more appropriate.

The insect is well figured by Ruiz (1924) and Porter (1934); however, the indication of the sexes ♂ and ♀ is erroneous as

[1] The writer desires to express his deep appreciation to Señor Ramón Gutiérrez of Santiago, Chile, for the copy of this description.

both examples are males. Similar examples to those figured by Ruiz (1924) are reproduced here in figures 9 and 10; figure 9 portrays a small male, which agrees in every particular with the small male used by Ruiz for the illustration, and figure 10 represents a male of maximum development, which Ruiz indicated as the female (!) of the species. The ♂ genitalia here figured (fig. 4) were dissected from the latter specimen and the ♀ genitalia (fig. 3) were obtained from a specimen reproduced in figure 7. The female genitalic characters are similar to the lucanid genera *Pholidotus* Macl., *Lamprima* Latr. and *Figulus* Macl., with which group the insect probably is to be associated. The measurements of the insects [2] are:

	length × width, in millimeters		
	♂ (No. 796)	♂ (No. 4635)	♀ (No. 4906) [3]
Overall	29.0	24.4	26.9
Mandibles	4.4	3.1	2.6
Head	4.8 × 10.7	3.1 × 8.8	3.8 × 8.4
Prothorax	6.8 × 11.9	6.0 × 10.2	7.0 × 11.1
Elytra	13.1 × 11.6	11.5 × 10.3	14.6 × 11.5

The species ranges from the 35th degree southern latitude southward, along the eastern and western slopes of the Cordilleras, in Argentina and Chile, subsisting, according to Ruiz (1924), on beech (*Nothofagus obliqua*). Kriesche (1922), in recording some lucanid species from Argentina, apparently overlooked Bruch's "Catalogo sistematico de los coleopteros de la Republica Argentina," when he states: "On this occasion I would like to communicate, as hitherto no lucanids were known from Argentina, the geographically interesting fact that the Berlin Museum has *Sclerognathus bacchus* Hp. *caelatus* Blanch., *femoralis* Guer., and *vitatus* Eschsch. from Neuquen." Bruch recorded all these, plus *fairmairei* Parry, eleven years earlier, from Rio Negro, N. Huapi, and Neuquen.

Also assigned to *Apterodorcus,* solely on its comparison with *bacchus,* is Deyrolle's *tristis,* described in following fashion: "Allied to *S. Bacchus,* as regards size and form, but more depressed, and more opaque. Mandibles somewhat similar, but

[2] Deposited in the Academy of Natural Sciences, Philadelphia.
[3] Figures 10, 9 and 7, respectively.

presenting a kind of inclined plane from the external margin to the interior teeth, with a rounded tubercle in the middle of this plane in lieu of the ridge which exists in *S. Bacchus.* Head nearly similar, except the post-ocular tubercles which are less developed laterally, and much more so posteriorly. Prothorax with its sides more parallel, especially behind; its posterior angles, although likewise truncate, are much more pronounced. Scutellum half the size of that of its congener. Elytra flatter, more opaque, punctuation similar to that of *S. Bacchus.* Beneath much more opaque. Finally, this species is distinguished by its general form, its more quadrate prothorax, its very small scutellum, and its generally more opaque aspect. Hab.—Chili. Coll. Mniszech. (H. Deyrolle.)"

The species is unknown to the writer, and Dr. Arrow, from whom data were sought on the insect, states (letter Nov. 8, 1944): "I am inclined to think it must be something quite unknown to me. It is, I suppose, in the Oberthur collection." Only critical comparison of the typical material will prove whether the species is distinct; however, we are strongly inclined to consider it synonymous with *bacchus,* as some characters mentioned in the description are actually lacking, the ridge, for example, being non-existent.

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Further Observations on the Psyllidae of Cuba (Homoptera)

By LEONARD D. TUTHILL, Iowa State College, Ames, Iowa

Herewith are presented observations on some psyllids received from S. C. Bruner of the Estacion Experimental Agronomica, Santiago de las Vegas, Cuba, since the publication of the author's previous article on Cuba Psyllidae.[1]

PLATYCORYPHA new genus

Head large, wider than thorax. Vertex with distinct medial suture, rounded smoothly into frons. Frons visible between genae as narrow sclerite. Genae swollen ventrally, not conical. Antennae long and slender. Thorax broad, flat dorsally. Mesoepisternum strongly produced ventrad. Proximal segment of metacoxa with two black claws. Forewings large, broadly rounded apically, vein R_1 very short, with large pterostigma, cubital cell broad.

Genotype: *Platycorypha princeps* n. sp. A member of the subfamily Pauropsyllinae, the species for which this genus is erected shows affinities to both *Heteropsylla* and to *Paurocephala magnifrons*. The principal points of difference from the latter are the very broad head, distinctly wider than the thorax, the narrow frons, the very short R_1 and broad cubital cell in the forewing. It differs from *Heteropsylla* in the much greater size, larger head, wing venation and type of genitalia.

Platycorypha princeps new species

Length to tip of folded wings 3.5–4 mm.

Color: Females entirely green except antennae dark apically and tip of genital segment dark. Males usually with thorax, at least, yellow. Wings hyaline.

Structure: Head large, wider than extreme width of thorax including wing bases. Vertex short and broad, rounded down anteriorly, smoothly continuous with frons, a sharp suture between vertex and genae, medial suture prominent. Lateral

[1] ENTOMOLOGICAL NEWS, 55: 93–96, 1944.

ocelli large, borne on raised prominences of vertex at posterior angle of eyes. Frons nearly covered by enlarged genae. Median ocellus large. Genae swollen ventrad, somewhat angularly produced, not conical. Clypeus prominent, broad. Antennae very long and slender, 3.3 times as long as width of head, longer than body. Eyes large, deep constriction around base. Thorax broad, moderately arched dorsally. Pronotum long. Mesoepisternum very strongly produced ventrad. Metacoxa with small caudal spurs, not produced anteriorly. Metatibia with large basal spine, several black spines apically. Proximal segment of metatarsus with two black clawlike spines. Forewings large, broad, rounded apically; basal vein short, M and Cu with common petiole, R long, R_1 very short to large pterostigma, Rs sinuate, long, marginal cells large, cubital much larger than medial, Cu_1 strongly arched. Venation of hind wings prominent, R and M with common petiole.

Male genitalia small. Proctiger short, produced caudad as blunt lobes. Forceps as long as proctiger, stout, simple, black-tipped; in lateral view somewhat turned caudad apically; in caudal view broad, arched, apices almost touching. Female genital segment small, much shorter than rest of abdomen, dorsal valve high, abruptly narrowed to short, upturned styliform apex, ventral valve nearly as long as dorsal, sharp apically.

Holotype, male, *allotype* female, 5 male and 7 female *paratypes,* 1 fifth instar nymph collected at Santiago de las Vegas, Habana, Cuba, June 22–28, 1944, by S. C. Bruner and V. Barry on *Myroxylon toluiferum* H. B. K., "Balsamo de Guatemala." Two additional female paratypes are from Mexico, one bearing the data, "Finca Esperanza, Chiapas, June 29, 1938, Dr. R. Nettel col." the other, "Jalapa, Veracruz, March 30, 1933, Alfonso Dampf col."

The holotype, allotype and paratypes are in the author's collection, paratypes are also in the collections of the Estacion Experimental Agronomica and Alfonso Dampf.

Heteropsylla cubana Crawford

Several specimens collected by J. Acuña and S. C. Bruner at Santiago de las Vegas, Havana, February 6, 1944, were breeding on *Leucaena glauca* (L.) Benth., "aroma blanca." These are identical with Crawford's specimens which were collected at Havana from the same host plant. The specimens which Crawford included as paratypes taken from *Poinciana regia* at Santiago de las Vegas are distinct and represent a species apparently undescribed. As no type specimen was selected by Crawford one of the males from Havana is being selected as the type.

Epicarsa sp.

One female specimen belonging to this genus was collected by S. C. Bruner at Santiago de las Vegas, November 16, 1923. This is apparently distinct from *Epicarsa corniculata* described from one male from Para, Brazil, but due to the condition of the specimen and the paucity of information available concerning this genus it is not described at this time.

Coelocara new name

The author's prior use of this name (Ent. News, 55: 93, 1944) is a nomen nudum under the amended International Rules of Zoological Nomenclature. This name is proposed to replace *Freysuila* Schwarz which was described in the Proceedings of the Entomological Society of Washington, 4: 196, 1899. Schwarz did not have the same insect before him as that originally described by Aleman under the name *Frey-suila dugesii*. The latter is a member of the Psyllinae. The type species of the genus *Coelocara* is *Coelocara schwarzi* (new name for *F. dugesii* Schwarz).

Mitrapsylla cubana Crawford

Several males and females from Victoria de las Tunas, Oriente Province, March 29, 1916, collected by J. R. Johnston, appear to be this species. The specimens are mostly quite teneral but are without indication of host plant. The male forceps are similar to those described by Crawford for *M. albalineata*.

Katacephala grandiceps Crawford

Bruner writes that this species, which has not previously been recorded from Cuba, is evidently rather common in the lowland forest growth. Specimens at hand are from Cojimar, Havana Province, July 29, 1928, collected by S. C. Bruner.

Katacephala tenuipennis Tuthill

One specimen of this form is from Santiago de Cuba, Oriente Providence, October 4, 1928, F. Silvestri and S. C. Bruner collectors.

Notes on the Genus Cryptostemma with a New Record for Georgia and a New Species from Puerto Rico (Hemiptera: Cryptostemmatidae)

By Robert L. Usinger, University of California

The genus *Cryptostemma* H. S. 1835 (= *Dipsocoris* Haliday, 1855) is well known in Europe where the type and only species, *alienum* H. S., is apparently quite common. Butler (1923) describes the habits of *alienum* in Britain as follows: "The favorite haunts of *Dipsocoris* are the large banks of shingle that are to be met with here and there beside most of our Scottish rivers. In such places, on turning over stones near the edge of the water, one is almost certain to see the little creature gliding swiftly along among the damp gravel, and hiding itself in some crevice. As far as I have seen, it does not appear to like too much wet, and I have never noticed it, as Haliday seems to have done, on the water, nor flying. When alive, the wing-cases are purplish-brown with a whitish bloom-like gloss produced by the fine adpressed hairs with which they are covered."

In 1925 McAtee and Malloch first recorded the genus from the Western Hemisphere, describing three new species as follows: *pedunculatum* from Panama (one specimen); *smithi* from the Island of Grenada, B.W.I., (two specimens); and *uhleri* from Mexico and the island of St. Vincent, B.W.I., (two specimens). Nothing was added on the biology of these American species.

I can now record the collecting of large numbers of these insects along streams in the mountains of North Georgia and high up in the Sierra Palm Forest on El Yunque in Puerto Rico. In both cases the bugs occurred under conditions identical with those described by Butler. It seems clear that *Cryptostemma* will prove to be a widely distributed genus when collectors concentrate on its particular microhabitat.

Cryptostemma uhleri McAtee and Malloch

Found commonly beneath stones along the banks of the stream which forms the outlet to Lake Trahlyta, Vogel State Park, Georgia, Sept. 9, 1943. Both nymphs and adults were taken. The adults resembled small Collembola superficially and moved so fast that it was necessary to stop them with a little pressure of a finger before picking them up with forceps.

These specimens key out to *uhleri* and agree with the female holotype, No. 27576, U.S.N.M., Cordoba, Vera Cruz, Mexico, April 11, 1908, A. Fenyes Coll., which I have examined, in size, pronotal proportions, and hemelytral venation but differ in being slightly darker in color. When males of the Mexican species are collected it may be found that genitalic differences exist between Mexican and Georgian forms. Meanwhile, the name *uhleri* must be used since the females show no significant differential characters.

The male genital claspers of Georgia specimens are described below. The right clasper is a broadly expanded plate-like appendage, half as broad as long, with the sides sinuate and the upper or inner apical angle slightly produced. The left clasper differs from the left clasper of *pedunculatum* in being more uniformly slender throughout, obliquely bent at apical fourth, and not enlarged at apex. Presumably these large, asymmetrical claspers are homologues of the basal pair of large, symmetrical clasping organs "emanating from lateral margins of the segment in front of base of the hypopygium proper" (McAtee and Malloch, pp. 3 and 4). Smaller appendages occur on the dorsal surface of the capsule itself but details of these will have to await a comparative study of the male genitalia in this entire group. I find no similarities or even homologous structures in the single damaged male of *alienum* H. S. before me.

Cryptostemma pratti new species

Relatively short and broad with costal margins of hemelytra expanded, sinuate subbasally and constricted at cuneal fracture. Color fulvous with whitish testaceous clavi, except apically and narrowly at bases. Discal and apical cells of hemelytra narrow at point of contact, neither separated by a longitudinal vein nor by a distinct transverse vein.

Head almost half again as broad as long, 18::13, the eyes one-fourth as wide as interocular space, 3::12, slightly less than twice as long as broad, $5\frac{1}{2}$::3, upper surface strongly convex, impressed at base of convex clypeus. Rostrum not reaching apices of front coxae, stout at base, tapering apically. Antennae approximately twice as long as width of pronotum, 50::24, proportion of segments one and two, $3\frac{1}{2}$::7, the third and fourth segments subequal, each about three times as long as second.

Pronotum slightly longer than head, 12::11, twice as broad as long, the anterior angles and humeral angles rounded. Anterior and posterior margins nearly straight, lateral margins straight but flaring posteriorly. Disk moderately elevated, calli indistinguishable except for a short transverse impression behind each antero-lateral angle. Scutellum broader than long, 14::9, the sides straight and disk flat.

Hemelytra two and one-half times as long as width of pronotum, 59::24, the corium comprising half the length and the cuneus comprising one-fourth of the total length along costal margin. Costal margin roundly expanded just behind base, then briefly straight along expanded embolium. Broadly arcuate behind basal sixth to cuneal fracture. Fracture very deep, reaching middle of corial disk, slightly oblique. Venation as in *pedunculatum* except that the discal and apical cells are strongly narrowed at point of contact, the apical cell not pedunculate but narrowly joined to basal cell.

Male genitalia strongly asymmetrical, without the plate-like appendage of the right side as described for *uhleri*. The left clasper is narrow and slightly arcuate, four times as long as wide, with a subapical bristle arising from one side and curving out beyond rounded apex. A pale mediodorsal arm projects backward from the base of the capsule and this may be homologous with the small "clasper" illustrated by McAtee and Malloch for *pedunculatum*. The structure is broader throughout and expands into short rounded propections at apex. There are two tapering immovable arms, one short and sinuate and directed to the left at middle of base and the other long and straight, tapering to an acute apex, arising from the left side of capsule at apical third and directed to the right.

Color uniformly pale brown to fulvous except for stramineous disk of clavus and white wings beneath this area, the extreme base and broad apex of clavus fulvous, however. Eyes reddish. Legs, rostrum and antennae testaceous.

Size: Length 1.36 mm., width (pronotum) 0.41 mm.

Holotype, male, *allotype,* female, and seven *paratypes,* collected beneath stones at a mountain waterfall, El Yunque, PUERTO RICO, April 29, 1945. The species is named after Dr Harry Pratt who did so much to facilitate my work in Puerto Rico. The types have been deposited in the U. S. National Museum.

This species is certainly closest to *pedunculatum* but that species has a pedunculate apical cell, unicolorous hemelytra, and entirely different left genital claspers.

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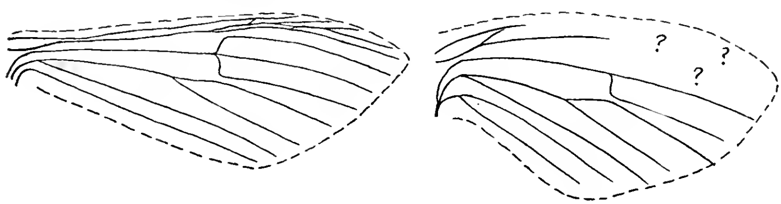
The Geometrid Tracheation

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

I am not aware that any tracheation of this family has been published, and the interpretation of the radial system is a little uncertain. Through the kindness of Mr. Lawrence Rupert I have two fresh pupae of *Semiothisa granitata,* that show most of the tracheation very clearly, though the transparency is not sufficient to show a couple of important points.

In both wings the basal connections are clear: *Sc* and *R* are each separate stems from the base of the wing, but run parallel; median is separate, but definitely belongs to the posterior group of tracheae, curving up from behind; *1st A* is from the base of *Cu,* separating about where the joint of the wing would be in the adult, and the other anals are on a separate stem, the two anals of the hind wing separating abruptly at base of wing.



Pupal Tracheation of Semiothisa granitata

In the fore wing radius shows its forking very clearly in the younger pupa, which has R_{4+5} and R_{2+3} separate, but R_1 arising out of the base of the stalk of R_{2+3}; in the later one R_1 has fused with *Sc,* except for a very short oblique piece, and R_3 and $_4$ have fused for a substantial distance. The accessory cell, then, is the true one (*1st* R_3) and the missing radial branch in this form is R_1 (except for the minute fragment which becomes the "cross-vein" between the accessory cell and *Sc*).

The stem of media forks abruptly into three at the point which would represent the end of the cell, but this may be assumed to be a secondary condition, since there is no likelihood that the discocellulars are deflected portions of M_1 and M_3. *First*

A shows its trachea plainly, but there is only one more trachea, *3rd A* being unrepresented.

In the hind wing, so far as it can be seen through the pad of the fore wing, R_1 can be seen plainly arising out of the *R*-trachea near its base and joining *Sc*; and the media is so far as visible like the fore wing, but unfortunately M_1 could not be seen. As the upper of the two visible tracheae is exactly in line with the base it is probably the trachea of the missing vein M_2. *First A* is normal, and *2d* and *3rd A* simple, there being no sign of the forking of *3rd A* which some primitive forms show.

Whether this tracheation is normal for the whole family is of course a question, since the Geometridae are notoriously unstable in venation—closely related forms, and even individuals of the same species, often showing quite different arrangements of the radial branches. In fact the condition of the very primitive South American Hedylinae suggests that the true acc. cell (*1st* R_3) is on the way to obliteration, and that the two accessory cells may in some groups be *1st* R_1 and *1st* R_2. The Hedylinae also have preserved the third anal in fore wing as a distinct vein, and should have an interesting tracheation.

More on the Origin of Flight

By Chapman Grant

Dr. William T. M. Forbes says, in "The Origin of Wings and Venational Types in Insects," that the lateral extensions which later developed into wings "served to plane through the air, more or less like a flying squirrel or a flying fish, before true flight was developed."

This is a thought that one often sees expressed and I believe that it is opposite to what really happened. In a note which appeared in "The Auk" covering this subject, I pointed out that in the case of soaring animals such as fish, squid, marsupial, squirrel, snake and lizard the gliding apparatus was perfected and no musculature for flapping was developed. In this case the mortality by natural selection would eliminate the individuals less apt at soaring, thus perfecting this art; e.g., if any soaring individual had made any attempt to flap instead of soar, it would have been less efficient at the moment with fatal results. Hence, once a soarer, always a soarer.

On the other hand, animals that progressed on water, and possibly on land also, and were used to escaping by frantic efforts in the use of their limbs, were starting with muscle-activated organs. Individuals that, by the fortuitous flattening of the fore or of all four appendages used in swimming or otherwise, were able to sustain themselves in the air for one or two beats were on the right road to true flight. The individuals that could sustain themselves for three flaps survived, whereas their two-flap brethren fell. This, I believe, was the true origin of flight.

How then did insects fare? Apparently their wings never were ambulatory organs? Turn again to Dr. Forbes who says, p. 382: ". . . we must call special attention to two leg-muscles running from the edge of the pleura to the coxa. . . ." So we do have a direct connection between the leg muscles and the tissues that were to develop into wings. Dr. Forbes now visions, p. 383, "According to one school the pre-flying condition took the form of a strongly flattened insect, essentially like an apterous cockroach . . . that developed the habits of climbing up the trunks of the Devonian trees and planing off to a new locality. . . . Others would have in mind an insect that was at home in the water, and developed the habit of leaping out from time to time like a flying fish." Dr. Forbes follows the flying squirrel school of thought and goes on to say, p. 385, ". . . contraction of the basalar muscle . . . would obviously pull the front of the wing down as well as move the leg. . . ." We see that he now desired to dissociate the wing from the leg. So we are back to a creature that really flapped by muscular efforts of its appendages and not a planer.

I resubmit that once a soarer always a soarer: That true flight developed rrom creatures that could sustain themselves by violent exertion for a very short distance. My belief is that this did not happen on land, but that, as with birds, flight started in the water with the use of fin-like appendages, used for swimming. Certain groups took to surface swimming, pelagic life, and those which jumped clear and planed never learned to fly, whereas those that struggled along the surface by flapping did develop true flight by the escape of those which at first could sustain themselves for just one or two flaps.

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Grant, Chapman, On the origin of flight, The Auk, vol. 44, 1927, p. 121.

Personals

Dr. C. T. Brues. A dinner was given on October 3 at the Faculty Club of Harvard University in honor of Dr. Brues, professor of entomology, on the occasion of his retirement with the title of emeritus. There was an attendance of eighty. A bound book, containing letters of appreciation and a silver bowl were presented to him. Dr. F. M. Carpenter, who will succeed Dr. Brues as professor of entomology, presided.

Dr. Charles P. Alexander, professor of entomology and head of the department of entomology and zoology, has been appointed acting dean of the newly established School of Science at the Massachusetts State College.

Dr. Angelo M. da Costa Lima, distinguished Brazilian entomologist, formerly of the Instituto Oswaldo Cruz, on August 31 was awarded the degree of Doctor of Agronomy, *honoris causa,* by the Universidade Rural of Rio de Janeiro, being the first to receive this degree. Since Brazilians are not allowed to hold two positions in government-operated institutions, Dr. Costa Lima was obliged, some years ago, to give up his paid post at the Instituto Oswaldo Cruz while retaining his post as Professor of Agricultural Entomology in the Escola Nacional de Agronomia. He has, nevertheless, continued to work at the

Oswaldo Cruz three days a week without remuneration. Dr. Costa Lima is the author of "Insetos de Brazil" of which six volumes have been prepared and published. For this work, and by a government decree, he has received a monetary award of 140,000 cruzieros, with which sum he plans to travel in the United States, and if possible, also in England and on the Continent. In 1943, the Entomological Society of America elected him an honorary fellow, he being the first and only foreigner to receive this honor.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

"How Long Do Entomologists Live?" Reconsidered. It is doubtful that it would be worth while to write a scientific article to demonstrate that nonagenarians tend to die at an older age than babies in general. Nevertheless, Mr. Weiss ("How Long Do Entomologists Live?", Entomological News, LVI, 1945, pp. 189, 190) has found it at least interesting to point out, in a not too complimentary fashion, that entomologists tend to die at an older age than babies in general.

The average age at death for 2,187 entomologists born between 372 B.C. and 1920 A.D. was found to be 65.48 years, and for the 1,600 entomologists born between 1500 and 1859, the average age at death was 69.09 years. These are thought to be high averages. Confining our attention, for the moment, to the latter group, I should think it might be more fruitful to point out that, if entomologists lived *no* longer than people in general, they would have had to live by and large to at least age 54, according to the Breslau table cited (Halley's data) to be classified as famous entomologists, and to age 40, according to the U. S. life table (1930–39) for white males. In other words, for those who attain age 40, the average age at death is 69.

One further note on the group of 2,187 entomologists. Assume that, in general, age 40 must be attained before a person is a good enough entomologist to be listed in this group, even though, no doubt, many of them were listed for work done at a much later age. The following table gives the percentage distribution of deaths found for the entomologists by Mr. Weiss and the corresponding distributions from the Breslau Data, the American Experience Table, and the table for U. S. white males, 1930–39, for those who attain age 40.

Age at death	Percentage of Entomologists dying at given age	Percentage of those attaining age 40 dying at given age		
		Breslau Data (Halley)	American Experience Table	U. S. white males (1930–39)
Under 60	30	46	26	23
60 and under 70	23	22	25	24
70 and under 80	29	22	30	31
80 and over	18	10	19	22
Total	100	100	100	100

All this is not to prove that entomologists live no longer than people in general who have attained the age which is required by entomologists to be classified as such in an historical document. It is hoped that they do. A much more refined study than that made by Mr. Weiss is required, however, to yield even tentative conclusions. Certainly, before giving too much credit to the parents of entomologists, one should examine the factors which differentiate entomologists from babies.—E. Douglass Burdick.

Philippine Journal of Science. Dr. C. P. Alexander has received a letter from the distinguished chief of the Division of Publication of the Philippines, D. Eduardo R. Alvarado. With minor omissions, the very informative account of the fate of a leading scientific journal that the latter gives is as follows:

"We are very glad to hear again from you after a lapse of about four years. Already we have started reorganizing the Division of Publications which had remained closed during the

Japanese regime, and have begun recalling all our prewar personnel.

"We suffered terribly in this war, our losses being very great. This is particularly true in the city of Manila. Besides the loss of a great number of lives, private and public buildings, including educational and scientific institutions, among them the Bureau of Science—the repository of collections of great interest and importance to the scientific world, as well as publications—were completely destroyed. Among the destroyed publications was the Philippine Journal of Science,—printed copies, manuscripts, illustrations, etc. It pains us to think of such losses. In our program of reorganization we have included the revival of the Journal of Science, as well as other publications, and as soon as funds, facilities and materials are available, we shall start printing them. As usual, we shall be glad to receive your contributions for publication in said journal.

As we have said, this war has brought us untold sufferings and privations. Fortunately for most of us, we have survived such terrible experience, and from scratch we will try to begin where we left off before. God helping, we hope we shall get on our feet again.

Snakes. Major Grant, publisher of "Herpetologica," calls out attention to the blind snake that lives in the nests of termites and adds that entomologists seem to have more information on the association of reptiles and termites and ants than is available in herpetological works. He would be glad to publish papers on these two subjects or to assemble notes, giving full credit to the source, in "Herpetologica." Please write Major Chapman Grant, 2970 Sixth Avenue, San Diego 3, Cal.

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 and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—On the type of the genus *Hypselopus* Burmeister, 1835. [87] 3: 67–76. On the status of names *Pompilus* Fab. and *Psammochares* Lat. [87] 2: 377–396. Use of new name. [87] 3: 131–136. Suspension of the rules for *Euthalia* Hübner. [87] 2: 401–409. On Article 30 of the International Code. [87] 2: 149–156. Need for the suspension of the rules for *Strymon* Hübner, 1818. [87] 2: 361–374. Suspension of the rules for *Euploea* Fab., 1807. [87] 2: 337–345. Suspension of the rules for *Bracon* Fab. (1804–05). [87] 2: 321–332. Suspension of the rules for Argynnis Fab., 1807. [87] 2: 309–318. Twenty-one names in the Orthoptera added to the official list of generic names in zoology. [87] 2: 147–160. **Bolivar Urrutia, Ignacio**—Necrologia [104] 12: 336–38. **Bromley, S. W.**—Insect enemies of the house fly, Musca domestica. [6] 53: 145–52. Robber fly and Japanese beetle. [19] 40: 44–47. **Burr, M.**—Current note: American entomologists and the War. [21] 57: 91–92. **Davis, William Thompson**—Biographical note. [6] 53: 127–35, port. **Dean, Smith & Kelly**—Fourteenth or 1944 annual insect population summary of Kansas. [103] 18: 85–99. **Donisthorpe, Horace**—Ants as carriers of disease. [8] (4) 6: 185. **Eyles, E. D.**—How does a fly land on the ceiling? [107] 20 (1–3): 14–15. **Goldschmidt, R. B.**—Mimetic polymorphism, a controversial chapter of Darwinism. [Quart. Rev. Biol.] 20: 147–164. **Grensted, L. W.**—Pleuron, pleura and pleurite. [8] 81: 162–63. **Gunton, Williams, Slater & Uvarov**—Insects and weather. [109] 10: 19–21. **Hemming, Francis**—A list, with prices, of publications by the "International" Commission on Zoological Nomenclature since 1938. [7] 38: 298–300. **Madden, A. H.**—A brief history of medical entomology in Florida. [39] 28: 1–7. **Miller, David** (see also under Diptera). **Mosely, Martin E.**—The designation of certain genotypes in the Trichoptera. [108] 14 (3–4): 46–47. **Poulson, D. F.**—Chromosomal control of embryogenesis in Drosophila. [90] 79: 340–363. **Roebuck, A.**—How shall we name insects? [20] 32: 185–86. **Scharrer, Berta**—Experimental tumors in an insect. [68] 102: 102. **Schwarz, H. F.**—Wax of stingless bees (Meliponidae) and the uses to which it has been put. [6] 53: 137–44. **Smith, H. M.**—Categories of specific names in zoology. [68] 102: 185–189. **Steyskal, G.**—Remarks upon spatial relationships in entomological descriptions. [19] 40: 57–59. **Weiss, H. B.**—Insect food habit ratios of the Lloyd-Cornell Reservation. [6] 53: 167–68. William Thompson Davis—1862–1945. [6] 53: 127–135, ill. **Wellington, W. G.**—(See under Anatomy, etc.) **Wright, S.**—Genes as physiological agents (Drosophila). [90] 79: 289–303.

ANATOMY, PHYSIOLOGY, MEDICAL—Alpatov, V. V.—Parthenogenetic females among certain races of the honey bee. [Advances in Mod. Biology, Moscow] 19: 281–82. (Russian.) **Christophers, S. R.**—Structure of the Culex egg and egg-raft in relation to function. [36] 95: 25–34, ill. **Dodge, H. R.**—Notes on the morphology of mosquito larvae. [7] 38: 163–167, ill. **Ewer, R. F.**—Effect of grain size on the oviposition of Calandra granaria (Curcul.). [107] 20: 57–63. **Goldschmidt, R.**—The structure of podoptera, a homoeotic mutant of Drosophila melanogaster. [57] 77: 71–104, ill. **Hill, D. L.**—Carbohydrate metabolism during embryonic development (Orth.). [Jour. Cell. & Comp. Physiol.] 25: 205–16. **Lyman, F. Earle**—Reactions of certain nymphs of Stenonema (Ephemeroptera) to light as related to habitat preference. [7] 38: 234–236, ill. **Murray, D.**—Senses of moths. [21] 57: 61–63, ill. **Newton & Pratt**—Experiments to determine whether infective larvae of Wuchereria bancrofti can migrate from the abdomen of the mosquito intermediate host. [17] 31: 266–68. **Nicholson, H. P.**—The morphology of the mouthparts of the non-biting blackfly, Eusimulium dacotense D. & S., as compared with those of the biting species, Simulium venustum Say (Diptera: Simuliidae). [7] 38: 281–297, ill. **Park & Davis**—Further analysis of fecundity in the flour beetles, Tribolium confusum Duval and Tribolium castaneum Herbst. [7] 38: 235–244, ill. **Querci & Romei**—Effects of the reflected solar radiation on insects. [39] 28: 20–21. **Richards & Weygant**—Selective penetration of fat solvents into the nervous system of mosquito larvae. [6] 53: 153–66. **Stojanovich, Č. J., Jr.**—The head and mouthparts of the sucking lice (Insects: Anoplura). [117] 10 (1): 1–46. **Strickland, E. H.**—Method for permanently reducing the number of blowflies in screened houses. [19] 40: 59–60. **Tauber, Drake & Decker**—Effects of different food plants on egg production and adult survival of the grasshopper Melanoplus bivittatus. [43] 19: 343–59. **Villee, C. A.**—Developmental interactions of homoeotic and growth rate genes in Drosophila melanogaster. [57] 77: 105–18. **Wellington, W. G.**—Conditions governing the distribution of insects in the free atmosphere. III: Thermal convection. [4] 77: 44–49. **Wiltshire, E. P.**—Is the diapause in insects eradicable? [21] 57: 49–51. **Yeager, J. Franklin**—Blood picture of the Southern Army worm (Prodenia eridania). [47] 71: 1–40. **Zukel, J. W.**—Marking Anopheles mosquitoes with fluorescent compounds. [68] 102: 157.

ARACHNIDA & MYRIOPODA—Araújo Feio, J. L. de—Victorwithius monoplacophorus n. gen., n. sp. da subfamília Withiinae Chamberlin, 1931. [32] n. s., Zoologia, no. 28: 1–7, ill. (S). **Auguston, G. F.**—New gen. n. sps. of dermanyssid mite from Texas. [38] 44: 46–48, ill. **Feio, J. L.**—Victoewithius monoplacophorus n. g., n. sp. da subfamilia Withiinae. [32] no. 28, 7 pp., ill. (S). **Hoff, C. C.**—New sps. and records of cheliferid Pseudoscorpions. [119] 34: 511–22. **Laing, F.**—Interpretation of some early collembolan gen. names. [8] 81: 134–39. **Mello-Leitao, C.**—Algumas aranhas da regiao Amazonica. [32] no. 25: 12 pp. (*).—Aranas de la Prov. de B. Aires y de las Gobernaciones de la Pampa, Neuquen, R. Negro y Chubut. [122] 2, Zool.: 1–62, ill. 1942 (*). Las aranas de Cordoba, la Rioja, Catamarca, Tucuman, Salta y Jujuy. [122] 2, Zool.: 99–198, ill. 1942 (*). Aranas de la Prov. de Santa Fe. [122] 2, Zool.: 199–225, ill. 1942 (*). Aranas del Chaco y Santiago de Estero. [122] 2, Zool.: 381–427, ill. 1942 (*). Aranas nuevas de Mendoza, la Rioja y Cordoba. [122] 3, Zool.: 101–21, ill. 1943. Aranas de la Prov. de Buenos Aires. [122] 3, Zool.: 311–93, ill. 1944 (*). Consideracões sôbre o genero Eusarcus Perty e descrição de quatro novos laniatores. [15] 17 (2): 149–162. **Muma, M. H.**—New and interesting spiders from Maryland. [95] 58: 91–102, ill. **Nevin, F. Reese**—Immature forms of the mite, Caeculus pettiti. [7] 38: 195–198, ill. **Pereira & de Castro**—Morfologia externa e analise dos caracteres taxonomicos de Pycnochernes eidmanni (Chernetidae) das panelas de lixo dos formigueiros de Atta sexdens. [14] 15: 239–261, ill. **Smith, C. N.**—Biology of Ixodes dentatus Neumann (Ixodidae). [7] 38: 223–233. **Soares, B. M.**—Alguns reparos a "Notas sôbre opiliões—V a XIII." [77] 4: 309–312 (S). Notas sôbre opiliões. [77] 4: 243–275 (S). Opiliões do Alto da Serra. [77] 4: 277–302, ill. Opiliões do Alto da Serra. [77] 4: 221–241 (*). Aracnídeos de Monte Alegre. [77] 4: 151–168, ill. (*S). Mais alguns Opilioes de Boracéa. [77] 4: 177–185 (*S). Notas sôbre aranhas. [77] 4: 319–320. Um novo opilião da Bahia. [77] 4: 33–36, ill. **Soares, H. E. M.**—Um novo opilião do Parana. [77] 4: 321–324, ill. (S). **Wharton, G. W.**—Trombicula frittsi n. sp. [17] 31: 282–83, ill.

THE SMALLER ORDERS—Borror, D. J.—A key to the New World genera of Libellulidae (Odonata). [7] 38: 168–194, ill. **Brown, E. S.**—Nymphal stage of Capnia atra, with a descr. of certain distinguishing features. [107] 20: 50–53, ill. **Crawford, J. C.**—North Amer. sps. of the gen. Isochaetothrips. [10] 47: 179–82 (*k). **Fraser, F. C.**—Note on the importance of Eolestes synthetica in the phylogeny of the Odonata. [107]: 20: 54–56, ill. **Guimaraes, L. R.**—Um novo Malófago do surucuá Trogonurus aurantius (Spix). [77] 4: 71–77, ill. (S). Sôbre os Menoponidae encontrados em tinamiformes. [77] 4: 105–116 (*S). Mais um caso de Associacão entre Mallophaga e Hippoboscidae. [77]: 4: 79–84. **Jellison, W. L.**—Siphonaptera: a n. sp. of Conorhinopsylla from Kansas. [103] 18: 109–11, ill. **Kimmins, D. E.**—Note on some specialized hairs in the Palparinae (Myrmelionid). [9] 78: 97–99, ill. A new species of Odonata from Ecuador. [75] 12: 187–189, ill. (S). **Laing, F.**—The interpretation of some early collembolan generic names. [8] (4) 6: 134–139. **Traver, J. R.**—Notes on Brazilian mayflies. [32] no. 22: 53 pp., ill. (*k). **Williner, G. J.**—Cinco esp. n. Misioneras del gen. Psocus. [104] 12: 235–43, ill. **Wright M.**—Dragonflies predaceous on the stablefly Stomoxys calcitrans. [39] 28: 11–13. **Wygodzinsky, P.**—Sôbre uma nova espécie de Plusiocampa do Brasil (Thysanura). [77] 4: 301–308 (S).

ORTHOPTERA—Collins, G. B.—Some observations on macropterism in Chorthippus parallelus (Acridid). [8] 81: 179–82. **Hepper, H. C.**—Notas ecologicas, sistematicas y ge zoogeograficas de acridios de la Argentina. [104] 12: 280–98, ill. **Meiners, E. P.**—"Cockroach" versus "roach." [19] 40: 56. **Rehn, J. A. G.**—Man's uninvited fellow traveler.—The cockroach. [54] 61: 265–276. **Rehn & Rehn**—Studies of certain Cyrtacanthracridoid gen. III. Buckellacris, another new No. Amer. gen. of Holarctic type. [1] 71: 1–45, ill. **Soukup, J.**—Los Proscopidos del Museo de Hist. Nat. "Javier Prado." [66] 8: 242–59, ill. **Strohecker, H. F.**—Notes on and descriptions of Mexican Orthoptera. [7] 38: 207–215 (*).

HEMIPTERA—Beamer, R. H.—Genus Kelisa in Amer. north of Mexico (Fulgorid). [103] 18: 100–108, ill. (*k). **Cook, W. C.**—The relation of spring movements of the beat leafhopper (Eutettix tenellus Baker) in central California to temperature accumulations. [7] 38: 149–162, ill. **DeLong, D. M.**—A new genus Acunasus and eight new species of Mexican leafhoppers (Cicadellidae). [7] 38: 199–206, ill. **Essig, E. O.**—Hyalopteroides pallida, an aphid new to No. Amer. [55] 21: 119–20. **Fennah, R. G.**—Tropiduchidae of the Lesser Antilles (Fulgorid). [10] 47: 137–67, ill. (*k). The Fulgoroidea, or Lanternflies, of Trinidad and adjacent parts of South America. [50] 95: 411–520, ill. **Griffith, M. E.**—The environment, life history and structure of the water boatman, Ramphocorixa acuminata (Uhler) (Hempitera, Corixidae). [45] 30: 241–365, ill. **Knowlton, G. F.**—Rabbitbrush aphid notes. [19] 40: 43. **Knull, D. N.**—Eleven new leafhoppers with notes on others. [43] 45: 103–10, ill. **Lepage & Giannotti.**—Algumas esp. n. de coccideos do Brasil. [14] 15: 299–306, ill. **Thomas, I.**—Synonymy of Aphididae. [20] 32: 187.

LEPIDOPTERA—d'Almeida, R. F.—Nota supplementar a "Revisao do genero Phoebis." [32] no. 27: 16 pp. Sôbre a nomenclatura de alguns grupos superiores da ordem Lepidoptera. [77] 4: 312–318. Nota suplementar à "Revisão do gênero Phoebis Huebner." [32] n. s., Zoologia, no. 27: 1–16. **Bourquin, F.**—Notas sobre matamorfosis de Hyalosticta prope obliqualia (Pyralid). [104] 12: 248–52, ill. Observaciones sobre metamorfosis de Neobourquinia bifasciata (Notodon). [104] 12: 257–59, ill. **Breyer, A.**—Lista parcial de lepidopteros coleccionados en Salta. [104] 12: 310–12. Notas lepidopterologicas (Saturn). [104] 12:

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104.—Revista Soc. Ent. Argentina. 107.—Proc. R. Entom. Soc. London (A). 108.—Proc. R. Entom. Soc. London (B). 109.—Proc. R. Entom. Soc. London (C). 112.—Anals Inst. Biol. Mexico. 117.—Microentom., Stanford Univ. 119.—Amer. Midland Nat. 122.—Revista Mus. de La Plata, B. Aires.

The Diptera or True Flies of Connecticut. Fasc. 1. External Morphology; Key to Families Tanyderidae, Ptychopteridae, Trichoceridae, Anisopodidae, and Tipulidae. By G. C. Crampton, C. H. Curran and C. P. Alexander; with an Introduction by R. B. Friend. Hartford, 1942. Connecticut State Geological and Natural History Survey, Bulletin No. 64. 509 pp., text-figures and 4 plates.

This work is part six of the Guide to the Insects of Connecticut; the previous parts included the orders Euplexoptera, Orthoptera, Hymenoptera, Hemiptera and Odonata. In the present part, Dr. Crampton gives a lengthy chapter of 111 pages in which will be found very thorough analysis of, and discussion on, the various terms applied to the sclerites, etc., of the Diptera, including the genitalic structures of both sexes, and fourteen figures and thirteen pages of bibliography. This chapter I consider one of the most valuable features of the work. Dr. Friend has four pages and three plates on the wing venation; and a key to the families of Diptera is given by Dr. Curran. The remainder of the work is Dr. Alexander's taxonomic treatment of the families included, and gives keys to the genera and species, with figures illustrating important features of some species. References to original descriptions, published illustrations, and Dr. Alexander's own descriptions, the known distribution, and Connecticut records, are also given of each species. If subsequent fascicles of this work are produced along these lines, we will have a valuable contribution to the Diptera of North America. E. T. Cresson, Jr.

Obituary

Mr. Fd. Le Cerf died during the past winter after a short illness due in part to lack of heat and insufficient nourishment. His collection and his library are now at the Muséum National d'Histoire Naturelle.

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.

Lepidoptera—Am still collecting here and have only fine specimens for exchange. H. W. Eustis, Woodbine Rd., Augusta, Ga.

Wanted—Viennese Entomological Printing Press, for printing 3, 3½ and 4 type data labels. Kent H. Wilson, 430 Ridgewood Road, Fort Worth 7, Texas.

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Arctic Lepidoptera on hand, including Erebia, Oeneis and Brenthis. R. J. Fitch, Lloydminster, Sask., Canada.

Odonata—Will buy or exchange North and Central American species, both imagos and nymphs. Also will exchange other orders for Odonata. Carl Cook, Crail Hope, Kentucky.

I want to collect Rothschildia farbesi, agapema, galfina and io moths for interested persons. E. Frizzell, Route 4, San Benito, Texas.

Wanted—Information as to the existence and present location of a copy of Solodonikov, S. V. Contribution à l'étude de la faune et de la biologie des larves des Libellules du Donetz et de certains de ces affluents. [In Ukrainian.] Trav. Soc. Nat. Charkow 52: 249–268. 1929. [Quoted from Zool. Rec. 1936, Ins. p. 147, No. 3114.] P. P. Calvert, P. O. Box 14, Cheyney, Penna.

Wanted—Crane-flies (Tripulidae) of New Guinea, New Caledonia and Neighboring Islands, for revisional purposes. Also, names and addresses of individuals or institutions possessing any of these flies. Correspondence solicited. Chas. P. Alexander, Fernald Hall, Amherst, Mass.

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ENTOMOLOGICAL NEWS

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Sawfly Genitalia: Terminology and Study Techniques

By Herbert H. Ross, Illinois State Natural History Survey, Urbana, Illinois

During the past two decades several hypotheses have been advanced regarding the derivation and homologies of parts of sawfly genitalia, including the genital capsule of the male and the saw of the female. The proponents of each hypothesis have frequently indicated a preference for a new or modified terminology to be applied to the various parts. In the development of the taxonomy of the sawflies, characters of both male and female genitalia have assumed continually greater importance in evaluation and diagnosis of both genera and species. With this development there has arisen a need for a stable terminology for parts of the saw and male genital capsule, a set of names which are uninomial for easy use, which apply definitely to the various parts as they exist in the group, and which can be applied by both taxonomist and morphologist regardless of differing theories of evolutionary development.

A terminology is here presented which has been designed to fill this need. The names have been selected on the following basis: (1) elimination of homonyms, that is, identical names which have previously been used for some other part of the insect body; (2) priority of uninomial latinized names, with the elimination of phrases, as a designation for well-defined morphological units; (3) tempering consideration of priority with weight of usage over a long period, or with application of a term to a homologous structure in several insect orders. The resultant terminology for the male genitalia agrees in many respects with that proposed by Crampton (1919) as enlarged by Peck (1937), with the addition of a few names for certain parts. Many of the more recent terms proposed by Snodgrass (1941) are antedated by other available names. The terminology of the saws is a modification of that proposed by Ross (1929).

Terminology

Male Genitalia, figs. 1–5

The genitalia of male sawflies form a well-organized capsule, in repose retracted within the apical segments of the abdomen. The capsule articulates with these segments by means of a flexible membranous tube. Primitively the surface bearing the volsellae or ossicles is ventral; in certain groups, however, soon after adult emergence, the genital capsule undergoes a twisting of 180° so that this surface becomes dorsal. It is therefore convenient to orient surfaces in relation to the volsellae; the surface bearing them is the *ossicular* side, the opposite the *abossicular* side.

The genital capsule, figs. 1 and 2, is divided into four principal parts, a gonocardo, gonoforceps (paired), volsella (paired), and aedeagus. The latter three are subdivided further.

Gonocardo (*gc*).—This sclerite forms a ring around the base of the capsule. *Basal ring, cardo,* and *lamina annularis,* are other terms which have been used by various authors.

Gonoforceps.—Arising above the gonocardo is a pair of lateral clasper-like appendages. Each is a *gonoforceps.* In most sawflies the apical portion forms a distinct, articulated segment, *h,* the *harpes,* and the basal portion forms the major sclerite of the capsule, the *gonostipes* (*gs*). In some families the end of the harpes has a membranous suction organ, the *gonomacula* (*gm*). In many forms the mesal margin of the primary dorsal (abossicular) surface of the gonostipes is produced into a definite lobe, the *parapenis* (*pp*); the two opposing parapenes are partially fused at least at the base; this structure formed by the two parapenes is termed the *praeputium.*

Volsella, fig. 3.—On the primary ventral surface of the capsule is a pair of structures, separate on the meson, but each joined laterally by membrane to the gonostipes, and frequently appearing to be implanted on their mesal surface. Each of these structures is a *volsella* (*v*). The flat basal portion of the volsella which is contiguous with the membranous edge of the gonostipes is the *basivolsella* (*bv*). The apex of the volsella bears two definite lobes, projecting beyond any membranous connection with the gonostipes, (1) a lateral *distivolsella* (*dv*) which is an unjointed continuation of the basivolsella, and (2) a mesal *gonolacinia* (*gl*), which usually articulates by a narrow membranous hinge with the basivolsella. The gonolacinia has an apical portion or *apiceps* (*ap*) and a basal prolongation or *basiura* (*ba*). The basivolsella has a longitudinal thickening, the *volsellar strut* (*vs*); its apex marks the point of closest articulation between basivolsella and gonolacinia. Snodgrass (1941) has pointed out that the distivolsella and gonolacinia are opposable, like thumb and forefinger, and function as accessory clasping organs. He proposed the names *crespis volsellaris* and *digitus volsellaris* for these two parts, respectively, but Peck's (1937) names *distivolsella* and *gonolacinia* have priority. Both writers have shown that several workers, including myself, have used the term *sagitta* erroneously for the gonolacinia. Sagitta should be restricted to the lateral sclerotized processes of the aedeagus in Apoidea.

Aedeagus (*ae*).—In the sawflies this central structure is divided into a pair of long *penis valves* (*pv*); their apex is hinged by membrane along the primary dorsal surface, but the primary ventral edges are free. Crampton proposes *penisalva* for penis valve; if a latinized term is desired, this should be employed. The term penis valve, however, has been adopted generally by almost all workers in the field.

It seems desirable at this time to propose names for certain distinctive areas of a penis valve. Each penis valve, fig. 4, has a lateral projection or *ergot* (*e*), for muscle attachment. Basal to the ergot is a tail-like portion, the *valvura* (*vr*), attached to the capsule by both muscle and membrane; beyond the ergot is the head like portion, the *valviceps* (*vc*). The valviceps has a sclerotized mesal thickening or *valvar strut* (*vv*) and may be highly ornamented with teeth or folds. In some genera of Nematinae, fig. 5, it is definitely subdivided at the apex into a mesal flap, the *pseudoceps* (*pc*), and a lateral flap, the *paravalva* (*pr*). The latter bears at its apex a spine or spur, the *valvispina* (*va*).

Female Saw, or *Ovipositor*

The functional units of a typical sawfly ovipository apparatus have been illustrated by Snodgrass (1935, fig. 317). They consist of two pairs of valvifers which are attached to the ninth tergite and which give rise to the other parts; a saw formed by two pairs of articulated processes, one arising from each valvifer; and a sheath composed of a pair of appressed end segments of the second valvifers. The second valvifers and sheath together form a protective structure into which the hinged saw is retracted when not in use. The sheath may function also as a brace during oviposition. The sheath and saw exhibit many useful taxonomic characters.

The sheath is usually simple in structure, each half flat or convex. In certain groups there is a flange-like projection extending along the apico-ventral margin. This flange, or *scopa,* is greatly developed in the Argidae and in many genera appears to form the edge of the sheath; the primary edge is hidden within the opposed scopae.

The saw.—The dorsal pair of blades (each is a *lance,* fig. 7) are processes of the second valvifers; the ventral blades (each a *lancet,* fig. 8) are processes of the first valvifers. Along at least part of the dorsum the two lances are tightly joined by membrane or fused solidly. On each side the lance and lancet are joined together by long rod-like interlocking grooves, or *virgae* (*vi*). The virga of the lance is situated near the ventral margin on the lateral surface; the virga of the lancet is situated on the inner surface near the dorsal margin. These allow the lancet to slide back and forth. The lances are articulated at the base and swing in an arc from this stationary pivot point. At their base the two lancets are joined by membrane to a triangular external plate, or *ligamentum,* which allows some movement of the lancets back and forth under the lances.

The *lance,* fig. 7, is divided into segments by seam-like *sutures* (*s*). The large basal segment, or *radix* (*ra*), bears the articulation with the valvifer. The apical blade-like portion or *lamnium* (*la*) is usually simple in structure, with 10 to 30 segments.

The *lancet,* figs. 6 and 8, has a long membranous *radix* (*ra*) bearing the dorsal sclerotized virga and a ventral sclerotized cord or *tractium* (*tr*); this latter is frequently enlarged where it connects with the ligamentum, the enlarged portion forming a heel plate or *tangium* (*ta*). The apical portion forms the *lamnium* (*la*) which is divided by sutures into definite segments. The ventral margin of each segment usually forms a definite toothed *serrula* (*se*). Each *suture* (*s*) may bear a comb-like row of spines to form a *ctenidium* (*ct*), or a wing-like projection or *ala* (*a*). The ala usually terminates ventrad in a spur, the *alaspicula* (*ad*), and may bear small spines or *alaspinulae* (*ac*) on its free edge. Near the ventral margin there is frequently a definite spur, the *spiculella* (*sr*); between spiculella and alaspicula may be a group of *subalar spines* (*sa*). The sclerotized ventral border of the blade is the *sclerora* (*so*), which is traversed in each segment by one or more pores; a section of the sclerora between two pore groups may be termed an *abscissa* (*aso*). The membrane on the mesal side of the lancet usually forms a long crease, or *crepidium* (*cr*); frequently this terminates basally in a sclerotized tongue or *examium* (*ex*).

Study Techniques

Sawfly male genitalia and saws can be studied to the best advantage if removed from the specimen and cleared. For this, use specimens which have been killed dry, pinned, and allowed to harden for at least two weeks. These can be relaxed in a damp sand-carbolic acid relaxing chamber. The male genitalia may be extracted with a needle, the saws cut out with a pair of very fine optical scissors. With the saws, care must be taken to make the cuts at the extreme base of the saw in order to obtain a complete preparation. Preparations clear readily

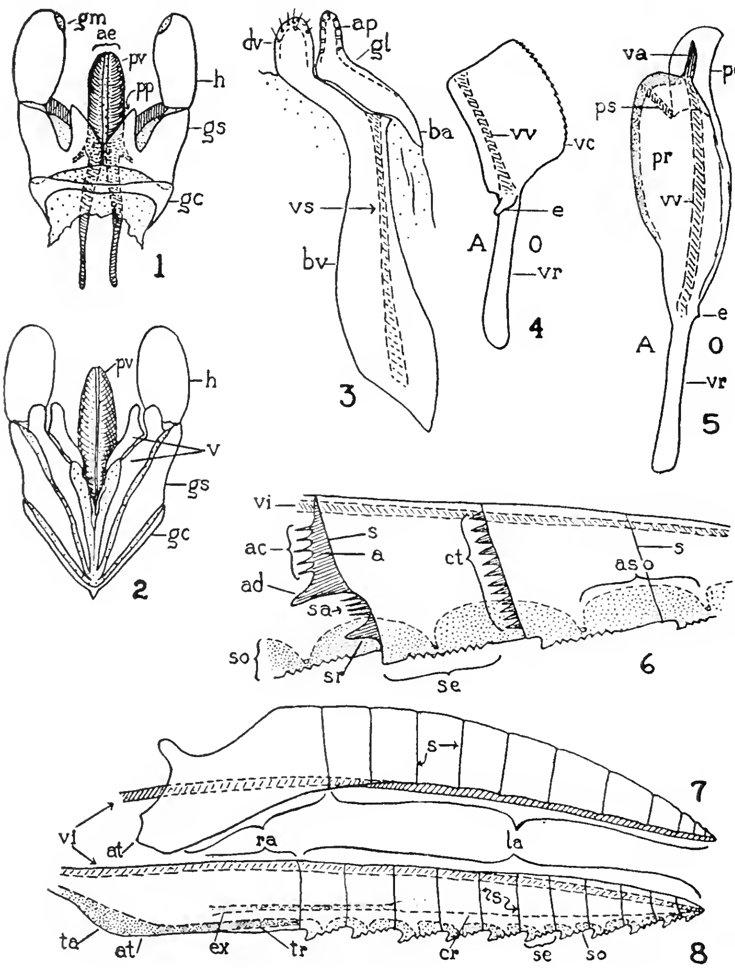

PLATE I

Hypothetical figures of sawfly genitalia

Fig. 1. Male genital capsule, primitively dorsal (abossicular) aspect.
Fig. 2. Male genital capsule, primitively ventral (ossicular) aspect.
Fig. 3. Volsella.
Fig. 4. Penis valve, simple type.
Fig. 5. Penis valve, Nematine type.
Fig. 6. Portion of lancet.
Fig. 7. Lance.
Fig. 8. Lancet.

in 5 per cent NaOH or KOH. Soaking for three to five hours in cold solution is usually sufficient. If this does not give adequate clearing, heat the clearing solution in a water bath for not more than five minutes. Clear only to the extent of removing muscle tissue, but not enough to cause marked desclerotization. Wash the preparation in distilled water and clean in 80 per cent alcohol.

Lancets and lances should be separated and mounted in Damar balsam as permanent slide mounts. It is necessary to have perfectly flat mounts of the lancets. Since the lances are frequently much thicker, it is desirable to mount the two lancets under one cover and the lances under another. Delicate saws should be stained; acid fuchsin has proven very satisfactory for this purpose. Male genital capsules and unusually thick lances may be studied in glycerin. In some cases it is advantageous to mount the penis valves as a permanent slide mount.

List of abbreviations

a—ala
ac—alaspinulae
ad—alaspicula
ae—aedeagus
ap—apiceps
aso—abscissa of sclerora
at—attachment point to valvifers or ligamentum
ba—basiura
bv—basivolsella
cr—crepidium
ct—ctenidium
dv—distivolsella
e—ergot
ex—examium
gc—gonocardo
gl—gonolacinia
gm—gonomacula
gs—gonostipes
h—harpes
la—lamnium
pc—pseudoceps
pp—parapenis
pr—paravalva
ps—paravalvar strut
pv—penis valve
ra—radix
s—suture
sa—subalar spines
se—serrula
so—sclerora
sr—spiculella
ta—tangium
tr—tractium
v—volsella
va—valvispina
vc—valviceps
vi—virgae
vr—valvura
vs—volsellar strut
vv—valvar strut

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New Syrphid Flies from Mississippi

By F. M. Hull, University of Mississippi

Several new species of Syrphids have been collected in Mississippi during the past year. This paper describes these species.

Mallota mississipensis n. sp.

Flies with the femora, the tarsi and hind tibiae wholly black, the male eyes rather widely separated, the thoracic pile reddish orange and the pile of the abdominal segment alternating yellow and black. Related to *illinoisensis.*

Male. Length 12 mm. *Head:* Eyes bare, the vertex shining brassy black, rather convex, the eyes separated by a distance between facets equal at least to the apical width of the second antennal segment in the lateral view. Pile of upper occiput and vertex light yellow, the frontal hair which arises from that part of the front above the narrowest portion is subappressed and directed upward and backward; pile of the lower front and face nearly white. Face with a shining middle stripe and the cheeks black. The sides of the face are widely yellowish white pubescent with abundant similar colored pile. The three segments of the antennae wholly black, the arista quite short, about as long as the last two antennal segments, much thickened and reddish brown, the apex sharpened. *Thorax:* mesonotum black, overlaid with pale brownish yellow pollen and very dense, orange reddish pile. Ground color of the scutellum subtranslucent, light brownish yellow, its pile orange reddish. Squamae pale brownish yellow with orange brown border and yellowish fringe. Pleural pile thick, pale yellowish white. *Abdomen:* shining black, the pile of the first segment reddish yellow, upon the second segment brownish yellow except upon the apical fourth where it is black widely through the middle, almost to the sides. The third segment is similarly pilose, the black pile beginning in the middle about half way down the length of the segment and expanding outward as an obtuse triangle almost to the posterior corners. The fourth segment has similar black pile but beginning a little closer to the base. *Legs:* The femora are shining black with chiefly yellowish white pile. Upon the massively thickened hind femora there is some black pile at the extreme apex above and again subapically along the outside and extensively along the entire ventral and medio-ventral surface. The only light coloration upon the femora is the quite linear apical margin which is light brown. Anterior tibiae upon the basal fourth and middle tibiae upon the basal third light brown which quite diffusely shades into the remaining black part of these tibiae. Hind tibiae quite black including the knees. Tibial pile chiefly pale yellow with some black intermixed especially towards the apex on all three pairs. Hind tibiae considerably flattened. All of the tarsi wholly black and black pilose dorsally but with reddish yellow or brown pile ventrally. *Wings:* greyish hyaline, the veins upon the basal third yellowish brown, the third and fourth veins beyond the middle dark brown. There is a pale brownish cloud at the base of the submarginal cell extending above and below it and more faintly upon the end of the second basal cell. There is a very strong stigmal cross vein but the stigmal cell is greyish hyaline.

Holotype: a male, Oxford, MISSISSIPPI, March 11, 1945. (F. M. Hull collector.) Caught on wild plum blossom quite high up at the top of the tree. In Curran's key to *Mallota* species, this fly would go to *illinoisensis,* differing in the black legs and banded pile. I have compared it with specimens of *illinoisensis* before me.

Volucella anastasia n. sp.

A small blackish species with considerably reduced pattern and related to *fasciata* Macquart. There are no yellow spots upon the sternopleura or propleura.

Male. Length 6.5 mm. *Head:* Vertex black, the front widely yellowish along the eyes but shining sepia black on the anterior half before the antennae. The face is polished black with on either side a wide, pale yellow stripe which becomes attenuated and a little more brownish towards the sharply conical epistoma. The posterior part of the cheeks is divided by a narrow, obscure, reddish brown vitta; pile upon the black middle stripe black, upon the sides of the face brownish yellow. The antennae are sepia brown. The pile of the eyes is dense, long and blackish brown with some pale hair posteroventrally and a middle vertical band of denser blackish pile. *Thorax:* Mesonotum shining black with long thick pile which is chiefly black; there is some yellowish pile anteriorly before the suture. The humeri, and a diagonal, sublateral yellowish vitta which is divided by a crease and a much narrower posterior extension which lies beyond the suture and which is evanescent just before the post calli, are all pale yellow. There is a fairly large yellow spot on the posterior part of the mesopleura, a yellow spot on the metapleura immediate beneath the yellowish squamae and a tiny yellow spot diagonally below in front of it which may be upon the extreme upper part of the hypopleura. The scutellum is yellowish, the disc subtranslucent brown, the pile very thick and black. Just before the scutellum are a pair of tiny yellowish brown spots. Halteres with cream colored knobs. *Abdomen:* black, the second segment with a narrow, medial, quite widely separated yellowish brown fascia. Third segment with a posteriorly indented fascia of the same color; the basal margin of the fourth segment is linearly yellowish brown, the posterior margin quite black; pile of the abdomen pale yellowish straw colored, black upon the hypopygium. Venter with a pair of basal, medially separated, subtranslucent yellowish spots which do not reach the sides; third strenite black, its extreme base linearly yellowish. *Legs:* black, first two segments of the first four tarsi and first three segments of the posterior tarsi reddish yellow; basal third of all of the tibiae and the apex of their femora yellow. Pile of legs black everywhere except upon the yellow segments of the tarsi where it is golden. Wings with a fasciate pattern similar to *fasciata* Macquart. The apex of the marginal cell is less protuberant and the brown of the wings a little more smoky.

Holotype: a male, University, Mississippi, May 30, 1944 (F. M. Hull collector).

Brachypalpus margaritus n. sp.

A large blackish fly, brassy yellow pile, distinguished from *oarus* Walker by the black tarsi, the black antennae and the spots on the cross veins and apex of wing. Length 9–12 mm.

Female. *Head:* Vertex and upper part of front shining bronze, the lower part of the front black with a slight brassy appearance; a small triangle of yellowish pubescence lies just above the antennae and there is a similar transverse band across the middle of the front. The face is deeply concave, shining brassy black, with a narrow band of yellowish pubescence from the antennae to the eye and a similar, slightly widening band from the lower part of the eye margin to the epistoma. All three segments of the antennae are wholly black, the arista thickened, orange brown basally, more yellowish apically. All the pile of the head yellow. *Thorax:* Mesonotum brassy black with four slender more or less opaque black vittae, the outer pair interrupted at the suture and these vittae narrowly margined with copper or bronze. The scutellum is brassy black. All of the thoracic pile is brownish yellow. Squamae yellowish white with yellow border and fringe; halteres light yellowish brown. *Abdomen:* Broad, oval, wider than the thorax and shining black but slight brassy along the sides of the segments. The dense pile is erect and pale brownish yellow. *Legs:* The femora are black with a slightly brassy cast upon the hind pair which are rather thickened. The anterior and middle tibiae are brownish black except upon the basal fourth which is brownish yellow, and merges quite diffusely into the dark brown remainder. The hind tibiae are blackish; only the extreme base yellowish brown. All of the tarsi are black. The pile of the legs is brassy yellow, the hind femora with two or three rows of sharp, small, black spines upon the distal two-thirds of its length. *Wings:* Venation typical of *Brachypalpus;* the stigma is dark brown and there is a conspicuous dark brown cloud at the base of the submarginal cell spreading also above and below it and a similar brown cloud over the anterior cross vein and the end of the second basal cell. In addition, the apical fourth of the wing apex above the middle of the first posterior cell is rather strongly tinged with grey.

Holotype: a female, Oxford, Mississippi, March 10, 1945 (F. M. Hull collector). Caught on wild plum blossoms close to the ground. Paratypes: two females, March 11–13. Also on low blossoms of plum.

The Position of Epione mollicularia (Lep. Geometridae)

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

Epione mollicularia Zeller was described in the Verh. zool.-bot. Ges. Wien, xxxviii, 481, 1872, on the basis of a male from Boll (we presume from the vicinity of Dallas, Texas) in the Museum of Comparative Zoology. The Packard collection, now also in the M. C. Z., has a second male, probably of the same lot, though without locality or collector label, and the only other specimen I have seen is one in the American Museum of Natural History from Arkansas, about half as old. Zeller's placing was reasonable for the time, since then venational characters were not much used in the geometers, and the appearance is closely like females of *E. apiciaria* and *parallelaria,* which still typify the genus. Hulst, in his generic revision of the Geometridae (Trans. Am. Ent. Soc., xxiii, 373, 1896), placed it in Hyperetis (which he misspelled Hyperitis) apparently on pure hunch, since he evidently had no data on the venation, and the wing form as figured by Packard (Monog. Phal., pl. 11, fig. 57) is not at all like Hyperetis. Perhaps the pink and yellow coloring, as in *H. nepiasaria,* suggested the reference. Barnes and McDunnough in the 1917 check-list mysteriously sunk it as a race of *H. amicaria,* in spite, again, of the totally different wing-form and pattern, and it still stands so in the new (1938) checklist.

In the meantime Grossbeck had received the Arkansas specimen, had recognized it, and set it aside as not a Hyperetis, and presumably a new genus, though the reference was never published.

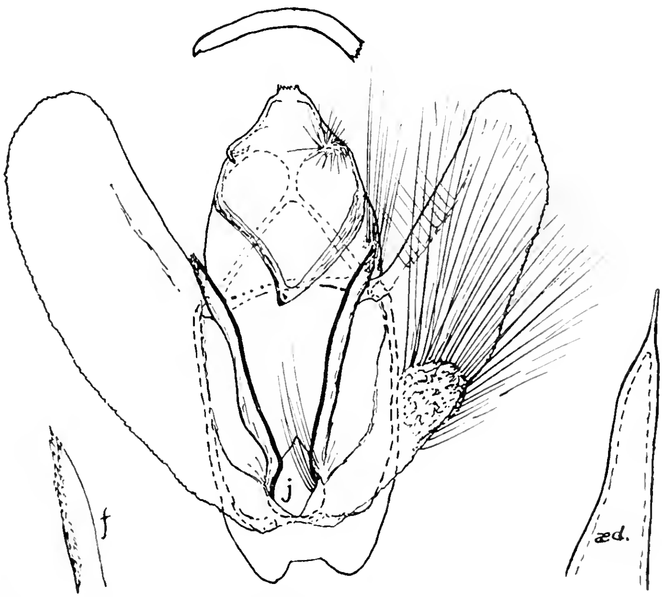
Recently I have been trying to clarify my ideas on the classification of the ennomid geometers, with the use of any new characters that could be found; and have studied the antenna (Psyche, xxxii, 106), the pupa (Jour. N. Y. Ent. Soc., liii, 177), the gena and chaetosema (in press) and most of all the male genitalic characters; in the latter case parasitizing my colleagues on a large scale, and specially Mr. Hahn Capps of the National Museum, and my own student Capt. J. G. Françlemont, now of the Southwest Pacific. I believe that true grouping characters are becoming clear, and so far as the present problem goes, think there can be defined a tribe *Anagogini,* based on the following characters:

Pupa with eight hooks on cremaster, with a setulose callosity marking the position of the first spiracle; without flange-plate, and with femur concealed. Imago with antenna pectinate; male genitalia (see figure) with juxta proper reduced to a deep cup, bearing a pair of long spinulose processes (the furcae); gnathos strong, beaked, with terminal spines which usually lie in a vertical row or longitudinal cluster; coremata usually present, located at the articulation of valve and vinculum, as normally when they occur in the Ennominae.

This group divides into two separate subgroups, one of the three closely related genera Anagoga, Plagodis and Hyperetis, the other a more varied remainder. The latter group are distinguished by the pupa, which has a deep denticulate groove between the 9th and 10th segments dorsally, and by the imaginal antenna which has the pectinations naked, attached to the segments basad of their middle, and extending within a segment or two of the apex. Most of the genera also have besides the usual two divergent apical setae on each pectinuation, a third seta on many of the pectinations of the anterior series, well back from their apices. These setae need fairly high power, but can be seen with 100 diameters of the binocular without mounting. The venation of the Anagoga group has a single trapezoidal accessory cell (the first) while the other group almost always has vein R_1 free, and frequently R_2 also, the second accessory cell, if either, being developed. The genera which concern us may be keyed as follows:

1. Radius arising by three roots from discal cell, the first two (R_1 and R_2) being normally entirely free.............2
   Radius arising by two roots only, R_2 being stalked on R_{3-5} *Cepphis* (*Priocycla*) and *Epione*
2. Fore wing with M_1 connate or stalked with R_{3-5} from upper angle of cell; a transparent discal lunule; antenna with apical and subapical setae only; ædœagus with strong cornuti ....*Selenia*
   Forewing with M_1 free, there being a short but distinct upper discocellular vein; no transparent discal lunule.........3
3. Tongue obsolete; antenna with apical and subapical setae only; ædœagus with strong cornuti; furcae short and close together ....*Slossonia*
   Tongue well developed; antenna with a lateral as well as apical setae on many of anterior pectinations; furcae arising from opposite sides of the pit-like juxta; ædœagus with cornuti only in *M. inatomaria*........................4
4. Thorax with smoothly imbricated scaling only; male genitalia with furcae reduced (*determinata*) or with cornuti on ædœagus (*inatomaria*), pupa strongly flattened.*Metanema*
   Thorax with normal vestiture, with hairs intermixed; male genitalia with well developed, usually unequal furcae, the ædœagus with terminal spine only and no cornuti. Pupa cylindrical ....*Metarrhanthis*

We may add that in Metarrhanthis, Cepphis and Epione, the wing form tends to be different, there being a strong tendency to have the teeth at veins R and M_1 of the hind wing strong with a deep concavity between, with the fore wing less strongly angled; while in the residue, the strongest angle is at M_3 of the fore wing.



Male genitalia of *Metarrhanthis mollicularia* Z.; with uncus drawn detached in side view. *j*, cup of juxta proper; *f* and *aed.*, apices of furca and ædœagus on a larger scale. The coremata lie behind the valve and the right one is shown as if by transparency.

Coming to *mollicularia*: this species shows all the characters of Metarrhanthis, so far as they appear on the male imago, including the fully pectinate antenna, with bristles on the anterior row of naked pectinations, radius arising by three roots, with the first two free, and the distinctive hind-wing form well marked. It is easily separated from any of our other species by the bright yellow median area of fore wing as well as basal area of hind wing; and in the genitalia by the long, slender and equal furcae, as shown in the figure. It is evidently the most distinct species of the genus, and occupies the extreme southwest fringe of the humid Atlantic area, to which the genus is limited.

The coloring of the specimens suggests the possibility of a racial difference, since both the Texas specimens are clear yellow with bright rose shades on basal and outer areas, while the Arkansas one has a deeper and duller yellow and the rose area duller rusty; but this specimen was much fresher when caught, and the Texas ones are rubbed and possibly faded. The genitalic drawing is from the Packard specimen by courtesy of the staff of the M. C. Z.—since the type has lost most of its abdomen.

Food Preferences of the Cockroach, Blatta orientalis Linn.

By Phil Rau, Kirkwood, Missouri

A dozen dome-shaped, wire cockroach traps (3 inches high by 6½ inches in diameter) had just been purchased, and while they were still new and clean, it was thought that they offered an opportunity to learn something of the food preferences of the cockroach. It seemed that a test of this kind could not safely be made with old contaminated traps, because the odor left by previous occupants would probably be the attractant, rather than the food itself.

Seven traps were therefore baited on May 13, placed in a row, six inches apart, on the floor of a moderately infested room, and observed for eleven days. The traps were baited as follows:

1—Fresh celery, stalks and leaves.
2—Hard-boiled egg, yellow and white.
3—Bacon.
4—Boiled potato.
5—Cinnamon bun.
6—Sliced banana, fruit and skin.
7—White bread.

It was found that the trap with bacon was completely ignored during the eleven days, for not one cockroach entered that trap. The hard-boiled egg, too, was unpopular, for only one roach was taken, and that one entered the trap only on the tenth night. Almost equally unpopular was the celery, for it attracted only two nymphs, and they came in on the eighth night. Banana was more popular, and lured the adults of both sexes into the traps on the eighth night. Cooked potato was much more in favor, and attracted 22 adults, the first ones (9 in number), however, not coming in until the sixth night, when the potato was becoming moldy. Plain white bread was more attractive, and caught 44 adults of both sexes, the first ones (11 in number) coming in on the third night of the experiment. The sugary, fragrant cinnamon bun, however, brought in 65 adults during the experiment, the first 29 of which also entered the trap on the third night.

To summarize, we find that in the experiments covering eleven nights, 144 roaches entered the traps in the following order:

Bait	No. of nights before first ones entered trap	Number
Cinnamon bun	Third night	65
Bread	Third night	44
Cooked potato	Sixth night	22
Banana	Eighth night	10
Celery	Eighth night	2
Boiled egg	Tenth night	1
Bacon	Eleventh night	0
	Total	144

We must therefore conclude that starchy foods are practically the entire choice of oriental cockroaches. It is also interesting to note that the longer time it took roaches to be drawn to a certain bait, the fewer were finally attracted to it.

Of course, it might be said that after the first few roaches had entered the traps, others followed, not by reason of the food odor, but because of the odor of the other roaches. In order to test this, and also to know whether for experiments of this kind old, odorous traps are as good as new, clean ones, the following controls were set up.

Two traps were baited with live cockroaches, but without food; one trap contained seven adult females, and the other seven adult males. During this period of eleven nights, no roaches came to these traps; it is evident that roach odor is not an attractant, and the roaches that came into the traps did so in response to the lure of food. Also, it is evident that re-used, odorous traps would have given the same results in testing food preferences as did the new traps.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Sequel to the Rape of the Wasmann Collection of Ants: Dr. C. Willemse, of Eygelshoven, Holland, the noted Dutch Orthopterist, in a recent letter (November 18, 1945) passed on to me the most interesting and pleasing sequel to the story of scientific "schrecklichkeit" revolving around this famous collection. The following is quoted from his letter:

"The collections and libraries of all the museums in Holland are safe and had no damage. Perhaps you heard the story of the collection of ants of the late Rev. E. Wasmann. This collection was stored in a small provincial museum at Maastricht. . . . On a certain day there came Prof. Bischoff (a well-known hymenopterist) from Berlin, aided by Gestapo agents, and 'took' (= stole) this unique collection to Berlin, pretending that it was a German collection and that it was much safer in Berlin! About a month ago the collection happily returned to the museum (in Maastricht), brought back by one of your fine soldiers, Major Prof. Dr. J. W. Bailey, from the University of Richmond, who found where the collection was in Berlin and who loaded it on his jeep and brought it back to Maastricht. Honor to the U. S. Army!"—James A. G. Rehn.

How big is a group? There has been a good deal of argument as to what is the best size for a group, in the classification of insects, but I think little really serious thought. It seemed interesting to consider the idea that each step of subdivision should be (on the average, of course) equal, to make the most efficient classification. How large should the average group be, to carry out this idea?

Let us assume that there are a million (or perhaps 500,000) species in the class *Insecta*. Our classification uses commonly 11 steps, of which four are used everywhere, while the other seven are only utilized when finer subdivisions are needed to handle a larger number of species. These are: CLASS, Subclass, ORDER, Suborder, Superfamily, FAMILY, Subfamily, Tribe, GENUS, Subgenus, Species-Group, and SPECIES. There is one school of thought that refuses to admit any category between genus and species, save as a temporary expedient, but this point of view looks silly to the writer.

Calculate the 11th and 4th roots of 1,000,000 (or 500,000) and we get 3.50 (3.04) and 31.6 (21.2). It would appear, then, that the ideal size for a species-group would be between 3 and 4 species, a subgenus 3 or 4 species-groups, a genus 3 or 4 subgenera, and so on up the line. Or considering the species in a genus, the ideal number would appear to be about 20 or 30.

Actually, of course, the numbers in a proper classification would not be definite, but would vary enormously; but I think those workers who admit the use of subgenera and species groups are working closer to these figures than they realize.—WM. T. M. FORBES.

Obituary

Dr. Jean Carl, Sub-director of the Museum of Natural History of Geneva, Switzerland, and an entomologist of distinction, died on June 7, 1944, we have been informed. He was born in 1877 and spent his entire life in zoological activities, from 1900 until his death in connection with the Geneva Museum. Dr. Carl's scientific publications number eighty-two titles and dealt largely with entomology, particularly the Collembola and Orthoptera. His contributions to our knowledge of the isopods and diplopods were also of very great importance. He was deeply interested in zoogeographic problems, and in addition to important field work in his native Switzerland he conducted field researches in central Africa and southern India.

Dr. Ralph Henry Smith, professor of entomology and entomologist in the Agricultural Experiment Station of the University of California, died on September 22 at the age of fifty-seven years.

Dr. Theodore Henry Frison, the well-known hymenopterist, director of the Illinois State Natural History Survey since 1931, died on December 9. He was fifty years old.

Current Entomological Literature

COMPILED BY CHARLES HODGE IV, EDWIN T. MOUL, MAURICE E. PHILLIPS AND HENRY K. TOWNES JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—On interpreting Article 30 of the Code. Opin. & Declar. Intern. Com. Zool. Nomen. 2: 411–430. **Beall, G. & Williams, C. B.**—Geographical variation in the wing length of Danaus plexippus (Lep. Rhopalocera). [107] 20: 65–76. **Beaumont, J. de.**—L'Origine et l'évolution des sociétés d'insectes. [126] 52: 329–338. **Costa Lima, A. da.**—Insétos do Brasil. [Escola Nac. de Agron.

Sér. Didática] No. 7—1945, 379 pp. 5.° Tomo—Capítulo 28. **Curran, C. H.**—Insects in the House—The Fall Webworm. [128] 54: 332. **Curran, C. H.**—A camouflage artist among Caterpillars. [128] 54: 360–363, ill. **Curran, C. H.**—DDT. [Natural History.] 54: 401–405, ill. **Davis, W. T.**—Obituary. [10] 47: 230–235. **Frost, S. W.**—Insects feeding or breeding on Indigo, Baptisia. [6] 53: 219–225. **Ghilarov, M. S.**—Principal properties of injurious insects surviving to field crop rotation. [99] 47: 211–214. **Hemming, F.**—Importance of facsimile reproduction of rare works. Bull. Zool. Nomen. of Intern. Com. Zool. Nomen. 1: 119–120. **Jones & Piper.**—Insect photography with limited equipment. [65] 47: 275–282. **Kalmus, H.**—Correlation between flight and vision, and particularly between wing and ocelli, in insects. [107] 20: 84–96, ill. **Levene, H. & Dobzhansky, T.**—Experiments on sexual isolation in Drosophila. [41] 31: 274–281. **Minkiewicz, S.**—Obituary. [4] 77: 116. **Rosillo, M. A.**—Enumeracion de Insectos vinculados a la Economia de Entre Rios. [Memorias del Museo de Entre Rios] No. 22, Zoologia. 82 pp. **Seamans & Rock.**—Starvation of early instar of Agrotis orthogonia Morri, in control. [4] 77: 57–60. **Strickland, A. H.**—Survey of the Arthropod soil and litter fauna of some forest reserves and Cacao estates in Trinidad, British West Indies. [97] 14: 1–11. **Zikan, J. F.**—Considerações sôbre a Metamorfóse dos Insétos. Rio de Janeiro, 1944. 37 pp.

ANATOMY, PHYSIOLOGY, MEDICAL—Abbott, C. E.—Oviposition in Phaenicia (Lucilia) sericata Meig. [6] 53: 227–230. **Beament, J. W. L.**—Cuticulae lipoids of insects. [33] 21: 115–131, ill. **Buxton, P. A.**—Experiments with DDT in solutions and emulsions against mosquito larvae in West Africa. [22] 36: 165–175. **Canals, J.**—Descr. de n. gen. y esp. de opiliones de la subf. Pachylinae. [124] 8: 1–21, ill., 1943 (S). **Carter, W.**—Oral secretions of Pineapple Mealybug. [12] 38: 335–338. **Cockayne, E. A.**—Peroneural defect in Brenthis euphrosyne L. [21] 57: 109–110. **Cooper & Whitenall.**—An arsenic resistant tick. [31] 156: 450–451. **Dampf, A.**—Notas Sobre Pulgas I a VII. [35] 6: 47–70, ill. **DeMeillon, Goldberg & Lavoipierre.**—Nutrition of the larva of Aedes aegypti L. II. Essential water-solvent factors from yeast. [33] 21: 90–96. **Deoras, P. J.**—On the comparative morphology and evolution of adult Trichoptera. [123] 6: 35–48. **Dos Passos & Grey.**—A genitalic survey of Argynninae (Lepidoptera:

Nymphalidae). [40] 1296: 1–29, ill. **Geigy & Aboim.**—Gonadenentwicklung bei Drosophila nach frühembyonaler Ausschaltung der Geschlechtszellen. [126] 51: 410–417, ill. **Gibson, N. H. E.**—On the mating swarms of certain Chironomidae. [36] 95: 263-294. **Gloor, H.**—Phänokopie einer Letalmutante von Drosophila melanogaster. [126] 51: 394–402, ill. **Hadom & Graber.**—Über einen Drosophila-Stamm mit veränderten Spermatheken. [126] 51: 418–423, ill. **Kalmus, H.**—Correlations between flight and vision, and particularly between wings and ocelli in insects. [107] 20: 84–96. **Kennedy, J. S.**—Observations on the mass migration of desert locust hoppers. [36] 95: 247–262. **Lyman, F. E.**—Reactions of nymphs of Stenonema to light. [7] 38: 234–236. **Marlowe, R. H.**—Effect of foods on ovarian development in the melon fly. [12] 38: 339–340. **Muma, M. H. & Jeffers, W. F.**—Studies of the spider prey of several mud-dauber wasps. [7] 38: 245–255. **Nicholson, H. P.**—Morphology of mouth parts of non-biting blackfly, Eusimilium dacotense, cf. with biting species, Simulium venustum Say. [7] 38: 281–297. **Pal, R.**—Nephrocytes in some Culicidae. [123] 6: 143–148. **Park, T. & Davis, M. B.**—Further analysis of fecundity in flour beetles. [7] 38: 237–244. **Parkin, E. A. & Green, A. A.**—The toxicity of DDT to the housefly. [22] 36: 149–162. **Rakshpal, R.**—On the structure and development of the male reproductive organs in the Lepidoptera. [123] 6: 87–93. **Reiff, M.**—Fertilitätstypen bei Seliktionsstämmen, ihr Verhalten bei Kreuzungen und Transplantationsversuchen. Drosophila melanogaster. [126] 52: 155–211, ill. **Reiff, M.**—Fertilitätstyphen bei Selektionsstämmen von Drosophila melanogaster und ihr Verhalten bei Kreuzungen. [126] 51: 424–430. **Ris & Crouse.**—Structure of the salivary gland chromosomes of Diptera. [Proc. National Acad. Science] 31: 321–327, ill. **Sevastopulo, D. G.**—Effect of overcrowding larvae (Lepid.). [9] 78: 117–119. **Soenen, M. A.**—L'organe de Johnston des Diptera Brachyceres. [Annales Soc. Sci. de Bruxelles] 9–22, ill. **Webb, J. E.**—On the respiratory mechanism of Melaphagus ovinus L. (Diptera). [93] 114: 218–250, ill. **Wellington.**—Conditions governing distribution of insects in free atmosphere. [4] 77: 69–73. **Wigglesworth, V. B.**—Transpiration through the cuticle of insects. [33] 21: 97–114, ill. **Zikan, J. F.**—Considerations on the metamorphosis of insects. Rio de Janeiro, 1944, pp. 52, 14 pls.

ARACHNIDA AND MYRIOPODA—**Arthur, D. R.**—Hatching of the eggs of Ixodes ricinus. [31] 156: 538.

Chamberlin & Ivie.—Some Erigonid spiders of the genera Eulaira and Diplocentria. [Bull. Univ. Utah] 36: 3–19, ill. **Cloudsley-Thompson, Capt. J. L.**—Behaviour of the common centipede Lithobuis forficatus. [31] 156: 537–538. **Cooper & Whitnall.**—(See under Anatomy.) **Goodnight, C. J. & M. L.**—Phalangida from the U. S. [6] 53: 239–245 (*). **Hoff, C. C.**—The pseudoscorpion subfamily Olpiinae. [40] 1291: 1–30, ill. (k*). **Hoff, C. C.**—Two new pseudoscorpions of the genus Dolichowithius. [40] 1300: 1–7, ill. **Holm, A.**—Studien über die Entwicklung und Entwicklungsbiologie der Spinnen. [127] 19: 1–214, ill. **Holm, A.**—Über Gynandromorphismus und Intersexualität bei den Spinnen. [127] 20: 397–414, ill. **Kaston, B. J.**—New spiders in the group Dionycha with notes on other species. [40] 1290: 1–25, ill. **Kaston, B. J.**—New Micryphantidae and Dictynidae with notes on other spiders. [40] 1292: 1–14, ill. **Lawrence, R. F.**—A new parasite mite from the golden mole. [93] 114: 302–306, ill. **Mello-Leitão, C. de.**—Considerações sôbre o Genero Eusarcus Perty E Descrição de Quatro Novos Laniatores. [15] 37: 149–162, ill. (S). **Nevin, F. R.**—Immature forms of the mite Caeculus pettiti. [7] 38: 195–198. **Schubart, O.**—Alguns diplopodos novos do ceara colecionados por alcides L. Gomes. [125] 5: 275–281, ill. (*). **Smith, C. N.**—Biology of Ixodes dentatus Neum. [7] 38: 223. **Stahnke, H. L.**—Scorpions of the genus Hadrurus Thorell. [40] 1298: 1–9.

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HEMIPTERA—Atkins & Dahms.—Reaction of small-grain varieties to green bug attack. [U. S. D. A. Tech. Bull.] 901: 1–30, ill. **Balduf, W. V.**—Bionomic notes on Menecles insertus (Say). [19] 40: 61–65. **Beamer, R. H.**—Four new species in the genus Bakerella. [103] 18: 149–154. **Brown, E. S.**—Corixidae of the Faeroe Islands, with observations of the geographic distribution of Corixidae in neighbouring parts of the world. [93] 114: 490–506. **Bruch, C.**—(See under Coleoptera.) **Carvalho, J. C. M.**—Mirideos neotropicais: XVIII. Novo genero e nova especie de "Dicyphinae" (Hemiptera). [125] 5: 303–306, ill. **Carvalho, J. C. M.**—Mirideos neotropicais. [105] 16: 158–186 (*). **China, W. E.**—A completely blind bug of the family Lygaeidae. [108] 14: 126–128. **Christensen, J. R.**—Nota sobre Agalliana ensigera (Homopt.). [124] 7: 27–36, ill., 1942. **Cook, W. C.**—Relation of spring movements of beet leafhopper in central Calif. to temperature accumulations. [7] 38: 149–162. **Costa Lima, A. da & C. A. Campos Seabra.**—Stenopodinae da coleção do Instituto Oswaldo Cruz. [111] 41: 507–510. **Costa Lima, A. da.**—Descr. de Nuevo Reduvidae de la Argentina. [124] 6: 499–500, 1941. **DeLong, D. M.**—A new genus Acunasus and 8 new species of Mexican leafhoppers. [7] 38: 199–206. **Drake & Hambleton.**—Concerning Neotropical Tingitidae (Hemiptera). [91] 35: 356–367 (*). **Drake & Harris.**—Concerning the Subfamily "Vesciinae" (Hemiptera: Reduviidae). [125] 5: 155–156. **Drake & Harris.**—Concerning the genus "Metrobates" Uhler (Hemiptera: Gerridae). [125] 5: 179–180 (*). **Drake & Harris.**—Notas sobre Hebridae del hemisferio occidental. [124] 8: 41–58, 1943 (*S). **Drake, C. J. & Harris, H. M.**—Two new species of American Sirthenea. [46] 4: 53–56. **Drake, C. J. & Hurd, M. P.**—New American Tingitidae. [46] 4: 123–128. **Fennah, R. G.**—External male genitalia of Fulgoroidea. [10] 47: 217–229. **Fennah, R. G.**—The Cixiini of the Lesser Antilles (Homoptera: Fulgoroidea). [95] 58: 133–146, ill. (*k). **Fennah, R. G.**—Tropiduchidae and Kinnaridae from the Greater Antilles. [5] 52: 119–138. **Harris, H. M. & Drake, C. J.**—A new Brachymetra from Peru with a list of known species. [10] 47: 211–212. **Hurd, M. P.**—Monograph of the genus Corythaica Stal (Hemiptera: Tingidae). [81] 20: 79, ill. (K). **Knowlton & Allen.**—Amphorophora studies. [4] 77: 111–114, ill. (K*). **Kullenberg, B.**—Für Kenntnis der Morphologie des männlichen Kopulations-apparates bei den Capsiden (Rhynchota). [127] 20: 415–430, ill. **Lizer y Trelles, C. A.**—La coleccion Coccidologica de Pedro Jorgensen. [124] 7: 69–80, ill., 1942 (*S). **Lizer y Trelles, C. A.**—Descr. de cuatro psilidos filocecidogenos. [124] 8: 151–165, ill., 1933 (*S). **Maltais, J. B.**—Simple method of mounting aphids on Microscope slides. [4] 77: 103–104. **McAtee, W. L. & Malloch, J. B.**—Identity of Tetyra lateralis Fab. [10] 47: 212–213. **McKenzie, H. L.**—Revision of Parlatoria and closely allied genera (Homoptera: Coccoidea: Diaspididae). [117] 10: 47–121, ill. (K*). **Metcalf, Z. P.**—Fulgoroidea (Homoptera) of Kartabo, Bartica District, British Guiana. [18] 30: 125–143. **Monte, O.**—Tres novos Tingitideos. [105] 16: 249–251. **Palaez, D.**—Estudios sobre Membracidos. V. Las especies Mexicanas del genero Sphongophorus Fairmaire (Hemiptera-Homoptera). [102] 4: 53–146, ill. **Torre-Bueno, J. R. de la.**—Random notes on Thasus acutangulus. [19] 40: 83. **Torres, B. A.**—Algunas interesantes alteraciones en el pan de la nerviacion alar en Cicadidae. [124] 6: 519–530, ill., 1941. **Torres, B. A.**—Sobre un n. gen. y cuatro n. esp. del gen. Tettigades (Cicad.). [124] 7: 253–263, ill. (S). **Torres, B. A.**—Sobre la supuesta variacion de Tettigades chilensis y cinco n. esp. del genero citado (Cicadid). [124] 9: 453–74, ill., 1944 (S). **Wygodzinsky, P.**—Two new species of Ploiaria and Rothbergia. [105] 16: 244–248. **Wygodzensky, P.**—Notas e descricoes de "Emesinae" Neotropicais (Reduviidae: Hemiptera). [125] 5: 247–262.

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Review

BRAZIL, ORCHID OF THE TROPICS. By Mulford and Racine Foster. Jaques Cattell Press. 6 + 308 pp. Illus. Index. $3.00.

This book is an interesting account of two expeditions made to southern and southwestern Brazil by the authors to collect bromeliads and orchids, both as living and herbarium specimens. These two groups of plants are particularly difficult to dry, because of their fleshy structure, and the authors were remarkably successful in getting good herbarium preparations. Many species were successfully transplanted to the Fosters' orchidarium in Florida but also many were killed by Government fumigation on entry. Their descriptions of the wealth of beautiful bromeliads, including many new species, are vivid and enthusiastic. There are numerous good accounts of the collecting localities, which would have been more valuable if a detailed and adequate map of the region studied had been included. References to insects and other animals are few and rather general, so that the book will hardly serve as a guide to zoological collecting, but enough is said of the tenants of bromeliads to show how much is still to be learned about them. There are 137 black and white photographs, four beautiful kodachromes and 32 line drawings.

This is a fascinating narrative of "botanizing" in a little-known part of a country that has always beckoned naturalists.—AMELIA S. 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.

Lepidoptera—Am still collecting here and have only fine specimens for exchange. H. W. Eustis, Woodbine Rd., Augusta, Ga.

Wanted—Viennese Entomological Printing Press, for printing 3, 3½ and 4 type data labels. Kent H. Wilson, 430 Ridgewood Road, Fort Worth 7, Texas.

Wanted—Heteroptera from all parts of the world, all families except Miridae. Will buy, exchange or determine. S. and C. Amer. species esp. desired. John C. Lutz, 6623 Lansdowne Ave., Philadelphia 31, Pa.

Wanted—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

Arctic Lepidoptera on hand, including Erebia, Oeneis and Brenthis. R. J. Fitch, Lloydminster, Sask., Canada.

Odonata—Will buy or exchange North and Central American species, both imagos and nymphs. Also will exchange other orders for Odonata. Carl Cook, Crail Hope, Kentucky.

I want to collect Rothschildia farbesi, agapema, galfina and io moths for interested persons. E. Frizzell, Route 4, San Benito, Texas.

Wanted—Information as to the existence and present location of a copy of Solodonikov, S. V. Contribution à l'étude de la faune et de la biologie des larves des Libellules du Donetz et de certains de ces affluents. [In Ukrainian.] Trav. Soc. Nat. Charkow 52: 249–268. 1929. [Quoted from Zool. Rec. 1936, Ins. p. 147, No. 3114.] P. P. Calvert, P. O. Box 14, Cheyney, Penna.

Wanted—Crane-flies (Tripulidae) of New Guinea, New Caledonia and Neighboring Islands, for revisional purposes. Also, names and addresses of individuals or institutions possessing any of these flies. Correspondence solicited. Chas. P. Alexander, Fernald Hall, Amherst, Mass.

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Dragonflies (Odonata) Collected in Pennsylvania and New Jersey in 1945

By George H. Beatty, III, Merion, Pennsylvania

From 6 April to 8 October, 1945, the writer collected dragonflies in central and southeastern Pennsylvania and in the southern half of New Jersey. 2251 specimens representing 93 species were obtained. Four other species [1] were positively identified in the field but were not captured, and three species,[2] including one of these four, were collected by a companion but not by the writer. Four other species,[3] not collected by the writer, were secured in the territory covered by this paper, in 1945, by another collector.

Date and locality records are occasionally augmented by those of another odonatist, Mr. John Gillespie, when they provide an extension of seasonal or geographic range or are otherwise significant.

The writer is responsible for all specific determinations, though in some cases confirmation was made by Dr. Philip P. Calvert. With the exception of specimens deposited in the Academy of Natural Sciences, Philadelphia, and a few presented to other dragonfly students, this collection has been retained intact, each specimen being carefully preserved with complete data. It is available to students who wish to examine it.

[1] *Epiaeschna heros, Epicordulia princeps, Dorocordulia lepida,* and *Libellula julia.*

[2] *Dorocordulia lepida, Argia bipunctulata,* and *Enallagma recurvatum,* all collected on 24 June by John Gillespie.

[3] *Cordulegaster obliquus, Epicordulia princeps, Libellula vibrans,* and *Enallagma carunculatum.*

The following list of collecting stations includes only those which were visited by the author himself. Except for those in Centre County, Pennsylvania, and Cape May, New Jersey, all of the localities are well within a fifty-mile radius of Philadelphia.[4] A number of species are recorded from this Philadelphia region for the first time in this paper and others are the first from their respective states. A few dragonflies are being recorded for the first time for the faunal zone in which they were collected this year. In the annotated list which follows, many of these extensions of geographic range are noted and seasonal extensions are likewise pointed out.

1945 COLLECTING STATIONS

ALBERTSON BROOK, Hammonton Twp., Atlantic Cy., N. J. 5 Sept.

This typical small cedar stream, about three miles south of Atsion, was inspected only near the highway. *Agrion apicale, Hetaerina americana, Argia violacea, Enallagma weewa,* and *Ischnura posita* were the dragonflies collected here.

ATSION LAKE, Shamong Twp., Burlington Cy., N. J. 5 Sept.

Only *Libellula pulchella, Sympetrum vicinum* and *Argia violacea* were found at this large artificial pond. In a small cranberry bog in the woods nearby, *Anomalagrion hastatum* occurred in swarms.

BATSTO POND, Washington Twp., Burlington Cy., N. J. 5, 7 Sept.

A large artificial pond, formed by damming the Batsto River on the site of a former cedar swamp. The pond has narrow sandy beaches beyond which there is a shallow zone with a

[4] A list of dragonflies known to occur within fifty miles of Philadelphia is being prepared. Dr. Calvert, in his Catalog of the Odonata of the vicinity of Philadelphia [Trans. Amer. Ent. Soc., XX: 152a–272, 1893], established a twenty-mile radius for the "Philadelphia Odonate Fauna." However, so many dragonfly habitats near the city have ceased to exist or have been ruined by pollution since the collecting days of Calvert, Laurent, Daecke, and Aaron, that today's collector must go farther afield to find the same species which were formerly abundant in and near Philadelphia.

dense growth of rushes. Among the rushes, *Perithemis domita, Celithemis eponina* and *monomelaena, Libellula incesta, Sympetrum ambiguum, rubicundulum,* and *vicinum, Pachydiplax longipennis, Lestes vigilax,* and *Enallagma geminatum* were collected.

At a small mill-pond near the outlet of Batsto Pond, the following were noted: *Anax junius, Celithemis martha, Sympetrum rubicundulum* and *vicinum, Lestes vigilax, Argia violacea, Enallagma geminatum, E. aspersum,* and *Ischnura posita.*

Bear Meadows, Harris Twp., Centre Cy., Penna. 16 June.

This locality consists of a large sphagnum bog at an elevation of 1824 feet, surrounded by higher mountains. The bog is covered with a dense growth of Kalmia, Rhododendron, Vaccinium, and Gaylussacia, and through its center flows a deep slow stream about ten feet wide. Along the stream and elsewhere in the bog twenty-two species of dragonflies were found, including *Gomphaeschna furcillata, Basiaeschna janata, Cordulegaster diastatops, Cordulia shurtleffi, Libellula julia, L. quadrimaculata, Leucorrhinia intacta, L. hudsonica, Amphiagrion saucium, Nehalennia irene, N. gracilis, Chromagrion conditum,* and *Enallagma hageni.*

Branch of Friendship Creek, Southampton Twp., Burlington Cy., N. J. 31 Aug., 4, 7 Sept.

A small cedar-stained stream flowing slowly over a sandy bottom. It was examined only where it is crossed by the highway about one mile west of Fisher's Dam, where it is dammed to form a small pond. *Libellula incesta, Lestes vigilax,* and *Ischnura verticalis* occurred at the pond, while *Argia violacea, Enallagma weewa,* and *Ischnura posita* were found along the stream.

Broomall, Marple Twp., Delaware Cy., Penna. 6, 9 Apr., 17, 22, 25, 29 May, 6 June, 16, 20, 23, 26 July, 1, 2, 3, 4, 5, 7, 8, 10, 11, 16, 27, 29, 30 Aug.

The chief collecting ground consisted of several acres of waste fields, overgrown with small sassafras, dogwood, and tulip trees, which lie at the edge of a woodland area of about ten acres containing many tall tulip trees and various smaller trees. This woodland forms a screen across the head of the narrow valley of Langford Run, a small, clear stream which flows into the larger and polluted Darby Creek about three quarters of a mile below. The screen of trees apparently stops the progress of most of the dragonflies which come up the valley and causes them to settle down in the bordering fields.

Gomphus lividus, Dromogomphus spinosus, Boyeria vinosa, Aeschna umbrosa, Macromia illinoiensis, Somatochlora tenebrosa and *filosa, Perithemis domita*, and *Sympetrum semicinctum* are among the nineteen species found at this unusual and interesting locality.

CAPE MAY CITY, Lower Twp., Cape May Cy., N. J. 22 Sept.

Many dragonflies, apparently part of the autumnal migration, were seen flying about a weedy plot of about ½ acre near the beach. These included *Anax junius, Epiaeschna heros, Sympetrum rubicundulum, Pachydiplax longipennis, Pantala flavescens, Tramea carolina*, and *Enallagma civile*. Dragonflies were evident in lesser numbers throughout the town.

CAPE MAY POINT, Lower Twp., Cape May Cy., N. J. 22 Sept.

Migrating dragonflies were collected among the wooded sand-dunes near the beach.

CECIL, Gloucester Cy., N. J. 5 Sept.

At a small, shallow, artificial lake near N. J. Highway No. 42, many dragonflies were collected. These were found among the emergent vegetation which extended for ten to fifty feet from the shore and included *Nannothemis bella, Celithemis martha, Sympetrum vicinum, Hetaerina americana, Lestes vigilax, Enallagma signatum, vesperum*, and *pictum, Ischnura ramburi*, and *Anomalagrion hastatum*.

CENTRAL SQUARE, Newtown Twp., Delaware Cy., Penna. 22, 25, 29 May, 6 June, 8, 10 Aug.

At a small artificial pond of about 1 acre, containing practically no vegetation, but many fish, twenty-one species were found but none was of particular interest.

Clark's Brook, Hammonton Twp., Atlantic Cy., N. J. 7 Sept.

About one mile north of Albertson Brook, this small cedar stream proved to be unusually well populated by dragonflies. *Boyeria vinosa*, *Agrion apicale*, *Argia tibialis*, *A. violacea*, and *Enallagma weewa* were collected.

At Sleeper Brook, about 100 yards north of Clark's Brook, *Argia violacea*, *Enallagma weewa*, and *Ischnura posita* were found.

"Crum Creek Farm," Newtown Twp., Delaware Cy., Penna. 8 Aug.

The artificial pond of about one acre lies about two miles west of Newtown Square and about fifty yards east of Crum Creek. It is used for swimming and boating but nevertheless supports an interesting dragonfly fauna. Thirteen species were found at the pond, but *Agrion maculatum* was the only dragonfly seen along Crum Creek nearby.

Darby Creek, Radnor Twp., Delaware Cy., Penna. 27, 29 Aug.

This rather large, polluted stream has not proved to be a good collecting ground for dragonflies. Most of the collecting was done at a point about two miles northeast of Newtown Square. *Boyeria vinosa*, *Sympetrum rubicundulum*, *Agrion maculatum*, *Hetaerina americana*, and *Argia violacea* were the only species occurring here.

Davis Lake, Cape May Point, N. J. 22 Sept.

At this artificial sand-pit pond, few dragonflies were seen except *Enallagma civile* and *Ischnura ramburi*.

"Echo Valley Farm," Newtown Twp., Delaware Cy., Penna. 8 Aug.

About 1½ miles west of Newtown Square, a few dragonflies were collected at a tiny pond formed by damming a small stream. The pond was choked with emergent vegetation and surrounded by alders. Only common species such as *Sympetrum rubicundulum*, *Erythemis simplicicollis*, *Agrion maculatum*, *Lestes rectangularis*, and *Ischnura verticalis* were taken.

ERMA, Lower Twp., Cape May Cy., N. J. 22 Sept.

A few dragonflies, including *Sympetrum ambiguum* and *S. obtrusum*, were collected at a small sphagnum bog which was nearly dried up at the time of the writer's visit.

FISHER'S DAM, Southampton Twp., Burlington Cy., N. J. 21, 28, 31 Aug., 4, 7 Sept.

A chain of small lakes was formed when dams were erected to flood a cut-over cedar swamp. The lakes are now almost completely dried up, but the odonate fauna is extremely rich and varied. Among the twenty-three species taken at various points about the lakes, canals, bogs, and streams are *Hagenius brevistylus, Boyeria vinosa, Somatochlora tenebrosa, Celithemis eponina* and *martha, Libellula incesta, Agrion apicale, Argia tibialis, Enallagma geminatum, E. pictum, E. weewa,* and *Anomalagrion hastatum.*

FOLSOM, Atlantic Cy., N. J. 5 Sept.

Dragonflies were collected in a swampy field about one mile southwest of Folsom.

FRIENDSHIP CREEK, about 300 feet west of "Branch of Friendship Creek," described above. 4, 7 Sept.

At this large cedar stream, *Enallagma weewa* was abundant. *Agrion apicale, Argia violacea,* and *Boyeria vinosa* also occurred here. This is the same stream which flows out of the lower lake at Fisher's Dam. Its banks are densely overgrown, so it was examined only near the highway. At that point the stream is about twenty feet wide and at least four feet in depth. Most of the bottom was covered with Vallisneria, on the floating leaves of which *E. weewa* often came to rest.

HOLMES, Ridley Twp., Delaware Cy., Penna. 13, 21 Sept., 5 Oct.

The collecting locality here consists of two shallow pools on the site of a former brickyard with a combined area of less than an acre. They contain an abundance of sedges, cattails, and many other aquatic plants and are depressed below the level of the surrounding land, providing a very sheltered habitat for dragonflies. Only a fraction of the total yearly population is represented by the following September and October captures: *Anax junius, Aeschna umbrosa, A tuberculifera, A. verticalis, Sympetrum obtrusum, S. vicinum, S. rubicundulum, Tramea carolina, Lestes forcipatus, L. rectangularis, L. unguiculatus, Enallagma civile, E. aspersum, Ischnura posita, I. verticalis,* and *Anomalagrion hastatum.*

Many other species have been found to occur here on other dates by Mr. John Gillespie, who has studied this locality exhaustively for a number of years.[5]

LILY LAKE, Cape May Point, N. J. 22 Sept.

Except for *Ischnura ramburi,* which was abundant, few dragonflies were seen at this pond of about 10 acres.

PENN VALLEY, Lower Merion Twp., Montgomery Cy., Penna. 8 June, 30 Aug., 2 Sept.

The collecting area here consisted of several small swampy pools in an overgrown meadow. They were fed by springs and contained sedges, cattails, and other vegetation in various degrees of density.

POND NEAR FISHER'S DAM, Southampton Twp., Burlington Cy., N. J. 31 Aug., 4, 7 Sept.

This pond, about half an acre in area, is located on a side road, about one mile north of N. J. Highway No. 40 and about two miles west of Fisher's Dam. Most of the pond is choked with vegetation and the banks are overgrown with small willows and other trees. Among the dragonflies occurring here were *Anax junius, Libellula incesta, Sympetrum vicinum, Pachydiplax longipennis, Lestes congener, L. forcipatus, L. vigilax, Enallagma geminatum, E. aspersum,* and *E. doubledayi.*

SLAB CABIN RUN, College Twp., Centre Cy., Penna. 17 June.

This is a small, turbid stream, ten to fifteen feet wide, which flows over a very rocky bed. At the time when it was visited only *Gomphus descriptus* and *Agrion maculatum* were found along a mile or more of its course.

[5] See "Notes on the Odonata of Delaware County, Pennsylvania," by John Gillespie [Ent. News, LVI: 59–64, Mar., 1945].

SPRING CREEK, Benner Twp., Centre Cy., Penna. 18 June.

Dragonflies were scarce along this stream which drains a wide area and is one of the largest in Centre County. About four miles northeast of State College, where the stream flows through a wooded valley with occasional precipitous rocky slopes, the following dragonflies occurred: *Basiaeschna janata, Epicordulia princeps, Libellula pulchella, Sympetrum rubicundulum, Agrion maculatum, Argia violacea,* and *Ischnura verticalis.*

STATE COLLEGE, College Twp., Centre Cy., Penna. 17, 19 June.

Dragonflies were collected at a small artificial pond, evidently very polluted, less than a mile north of the college campus. At one end of the pond was an extensive swampy area, choked with vegetation, where five species of *Lestes* were found as well as *Nehalennia irene, Chromagrion conditum,* and *Ischnura verticalis.* About the banks of the pond proper, *Anax junius, Tetragoneuria cynosura, Perithemis domita, Libellula luctuosa, pulchella,* and *lydia, Sympetrum rubicundulum, Leucorrhinia intacta, Pachydiplax longipennis, Enallagma hageni, cyathigerum, civile,* and *aspersum, Ischnura posita* and *verticalis,* and *Anomalagrion hastatum* were among the species noted. *Gomphus villosipes, Tetragoneuria canis. Lestes congener,* and *Enallagma carunculatum* have been taken here on other dates.

Though it did not occur at the pond, *Amphiagrion saucium* was found in prodigious numbers in a swampy field about one mile to the north.

TINICUM MARSHES, Darby Twp., Delaware Cy., Penna. 26, 29 Sept., 5, 8 Oct.

At the northern edge of this extensive tidal marsh area, bordering the Delaware River, several interesting dragonflies were collected in the autumn. *Aeschna constricta, Sympetrum obtrusum,* and *S. rubicundulum* were abundant. *Anax junius, Aeschna umbrosa, Sympetrum vicinum, Pantala flavescens,* and *Tramea carolina* were found in small numbers at the marshes and in nearby fields.

UPTON, Pemberton Twp., Burlington Cy., N. J. 29 Apr., 5, 13, 20 May.

Along sandy roads in a typical pine-barren area, the following species were found in the spring: *Gomphaeschna furcillata, Cordulegaster maculatus, Tetragoneuria semiaquea,* and *Libellula deplanata, semifasciata,* and *lydia.* Nearby was a wide variety of habitats including deep streams, swamps, sphagnum bogs, sand pits, ditches, and small ponds. Most of the dragonflies, however, were found along the roads and in clearings among the pines, rather than these aquatic situations.

UPTON PONDS, Pemberton Twp., Burlington Cy., N. J. 20 May, 24, 29, 30 June, 8, 22 July, 12 Aug.

At two small artificial ponds near the railroad at Upton, thirty-six species of dragonflies were collected. The locality and the collections made there are being described in detail in another paper. Among the most interesting species are *Anax longipes, Nannothemis bella, Celithemis martha, C. ornata, Libellula deplanata, L. a ripennis, Leucorrhinia frigida, Nehalennia integricollis, Enallagma divagans, E. pi tum, E. doubledayi,* and *E. traviatum.*

WESTTOWN LAKE, Westtown Twp., Chester Cy., Penna. 3 Sept.

This artificial pond of ten or twelve acres is used extensively for fishing, boating, and swimming. The banks are wooded in most places but the shoreline is constantly disturbed by fishermen during the summer. On 3 September, the following species were collected or seen: *Dromogomphus spinosus, Perithemis domita, Libellula luctuosa* and *lydia, Sympetrum rubicundulum, Argia apicalis, A. violacea, Enallagma signatum* and *exsulans,* and *Ischnura verticalis.* On a small stream at the outlet of the lake *Agrion maculatum, Hetaerina americana, Argia violacea,* and *Enallagma exsulans* were collected.

WHITESBOG, Pemberton Twp., Burlington Cy., N. J. 29 Apr., 20 May, 24, 29 June, 8, 22 July, 12 Aug.

Dragonflies were collected in the cranberry bogs, along nearby streams, and at a small pond beside the general store. Occurring at the drainage ditches of the bogs were *Progomphus obscurus, Libellula cyanea* and *flavida, Pachydiplax longipennis, Lestes vigilax, Argia violacea,* and *Ischnura posita.*

Elsewhere, in and near the bogs, *Dorocordulia lepida, Nannothemis bella, Celithemis elisa* and *martha, Libellula deplanata* and *semifasciata, Sympetrum vicinum, Leucorrhinia intacta, Nehalennia gracilis, Enallagma pictum, Ischnura posita* and *verticalis,* and *Anomalagrion hastatum* were captured or observed. *Gomphus exilis, Agrion maculatum,* and *Argia violacea* were found along nearby cedar-stained streams.

WYOLA, Newtown Twp., Delaware Cy., Penna. 26 Apr., 17, 22, 25, 29 May, 6 June.

Dragonflies were collected in four or five acres of woodland about two miles north of Newtown Square, Penna. There were many fallen beech and oak trees in clearings in the woods and about them, in sunlit spots, *Gomphus lividus, Lanthus parvulus, Basiaeschna janata, Cordulegaster diastatops, Didymops transversa,* and *Libellula semifasciata* were found. A very small stream, fed by springs farther up in the woods, was the only aquatic habitat in the collecting area.

(*To be continued*)

A New Phyllophaga from Alabama and Georgia (Scarabaeidae: Coleoptera)

By O. L. CARTWRIGHT,* Clemson, South Carolina

It is a pleasure to name the following new species of Phyllophaga after Prof. T. H. Hubbell of the University of Florida who has collected this and so many other fine Coleoptera in the southern states.

Phyllophaga hubbelli n. sp.

Holotype male.—Length 12.4 mm., width 5.3 mm. Elongate, subcylindrical, parallel, shining, glabrous, castaneus, the head darker and pronotum slightly darker than elytra. Antennae 8-jointed, club subequal to stem. Clypeus deeply emarginate, sides arcuate, margin widely reflexed, suture impressed, angulate, surface with moderately coarse strong punctures separated

* Technical Contribution No. 125 from the South Carolina Agricultural Experiment Station, Clemson, S. C.

by their diameters or less. Head two-thirds as wide as pronotum, similarly punctate, a few punctures densely crowded at angle of suture, others less closely placed each side of these, occiput with a medial smooth area and finer punctures each side. Pronotum not quite three-fifths as long as wide, one-third as long as elytra, evenly convex except for a shallow fovea each side two-thirds the distance from median line and anterior margin, sides weakly subangulate at middle, convergent in apical half, slightly less than parallel to base, margins sparsely weakly crenate fimbriate, anterior angles distinct, posterior sharply right-angled, punctures slightly coarser than on head, separated by one to three times their diameters, the median line impunctate. Elytra parallel, about two-thirds as wide as long; sutural costae strong, discal costae weak but distinct; punctuation slightly finer and closer than on pronotum. Mesosternum evenly finely hairy punctate. Abdomen glabrous, very finely sparsely punctate, flattened longitudinally, penultimate segment with a small posterior median triangular depression, the low surrounding swelling finely granulate, terminal segment with a wide smooth transverse anterior ridge interrupted medially, finely closely granulate posteriorly at middle. Pygidium evenly convex, sparsely shallowly coarsely punctate. Both posterior tibial spurs apparently movable, acute, short, the shorter barely twice as long as wide and about one-fourth the length of the longer, the latter narrow and acuminate. Tooth of claw strong, two-thirds distance from apex. Aedeagus, Fig. 1.

FIG. 1. *Phyllophaga hubbelli* Cartwright
Four views of male aedeagus; one of female genitalia

Allotype female.—Length 12 mm., width 5.6 mm. Club of antennae equaling funicle in length, joints 3, 4, and 5 apparently fused, abdomen evenly convex, posterior half of penultimate and terminal segments finely setigerously punctate, pygidium less convex and more sharply rounded apically, both spurs of hind tibiae thin, slightly curved obtuse, otherwise similar to male.

Holotype and one male *paratype* collected 1.5 miles south of Oxford, Calhoun County, ALABAMA, July 18, 1938, Hubbell and Freauf. *Allotype* female taken on hickory, Summerville, GEORGIA, August 4, 1937, P. W. Fattig. *Paratype* female taken on red oak, Summerville, GEORGIA, August 4, 1937, P. W. Fattig.

Holotype deposited in Museum of Zoology, University of Michigan, paratype male in author's collection, allotype and female paratype in M. W. Sanderson collection.

Phyllophaga hubbelli though not so pallid a species, is allied to *P. longitarsis* (Say) through somewhat similar genitalia and other characters. The very short spur is not longer than adjoining spicules of the terminal fringe.

Ichneumonidae Notes [1]

By WILLIAM F. RAPP, JR.

Recently while reading Dr. Henry Townes' New Catalogue of Nearctic Ichneumonidae [2] I found that I had notes on two items which Doctor Townes was unable to locate. On page 424 of Volume 1, he lists the type of *Conocalama occidentalis bolteri* (Cresson) (*Trogus bolteri*) as being in the Andrew Bolter Collection and states that the Bolter Collection is missing. This collection is at the Department of Entomology, University of Illinois, Urbana. The type specimen was found in a drawer containing the other Ichneumonidae, and has been removed to a special drawer for type material. The specimen is in excellent condition.

[1] Contribution from the Department of Entomology, University of Illinois, Urbana, No. 253.

[2] Memoirs of the American Entomological Society 11.

In Volume 2, page 483, the type of *Eucrosia vierecki* Hertzog is reported as missing. Until September 1944, the specimen was located in the private collection of Mr. P. H. Hertzog, The Peddie School, Hightstown, New Jersey. Some time during that month it was deposited in the insect collection of the Academy of Natural Sciences of Philadelphia. I examined the specimen several years ago and at that time it was in excellent condition.

Notice

Commission for the Study of Damage caused to Entomology by War.

Commission pour l'Étude des Dammages causes par la Guerre a la Entomologie.

HERBERT OSBORN
The Ohio Biological Survey
JEAN LECLERQ
Université de Liége

TO THE DIRECTORS OF ENTOMOLOGICAL LABORATORIES, MUSEUMS AND INSTITUTIONS

Has your institution suffered loss from war:

1. By loss or damage to housing, apparatus, collections or entomological books of value? Have you lost, entirely or in part, noted collections? Types?

2. By expenditures or losses due to special means of protection for collections of special value such as "types"?

3. Have you had to regret the loss or depletion of your scientific personnel? Give the names of your collaborators who have been killed, injured, imprisoned or deported.

TO THE DIRECTORS OR EDITORS OF ENTOMOLOGICAL PUBLICATIONS:

Have you, due to acts of war, had to interrupt publication of your periodicals? Have any of your staff been killed due to acts of war?

Reply to: M. Jean LeClerq,
Université de Liége, 17 Place Delcour,
Liege, Belgium.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Notes on Recent Opinions of the International Commission on Zoological Nomenclature. Between 1939 and the end of 1945, The International Commission on Zoological Nomenclature issued 48 opinions upon which action had been taken long prior to World War II but whose appearance had been delayed for various reasons. Inasmuch as these opinions are perused chiefly by specialists, and because their appearance during the war years has undoubtedly caused them to be overlooked or neglected in many cases, it may be of interest to both taxonomic and economic entomologists to call attention to action taken in cases where the names involved are familiar and widely used. Characteristic of the opinions is the obvious desire of the International Commission to avoid disturbing long-accepted usage, particularly of names that are widely known and used for large and common groups of species.

1. Family names: With reference to the long standing controversy of whether the accepted family name should be that based on the oldest included genus, or on the oldest proposed family name, the views of the Commission as expressed in Opinion 133 (Oct., 1936) were even more clearly outlined in Opinion 141 (Jan. 30, 1943). The Commission reaffirmed the official position that the oldest available generic name "*need not* be taken as the type genus of the family." The use of any generic name in forming the name of a family automatically constitutes the designation of the familiotype, or type genus for that family.

2. Decisions were rendered on the official form of certain family names:

a. The family founded on *Merope* (Neuroptera) is Meropeidae, and that on *Merops* (Birds) is Meropidae, thus avoiding similarity in the forms of two existing family names (Opinion 140).

b. The family name of the lace bugs is Tingidae, rather than Tingitidae, Tingididae, or Tingiidae (Opinion 143).

3. A number of familiar generic names in entomology, many of them the basis of well known family or subfamily names, have been placed on the "Official List of Generic Names in Zoology" in their commonly used and generally known meaning. In many cases, "suspension of the rules" was required in order to avoid the confusion and lack of uniformity that would have resulted by strict application of the rules of nomenclature:

ORTHOPTERA (sens. lat.): *Gryllotalpa* Latr. (Gryllotalpidae, mole crickets), *Hemimerus* Walk. (Hemimeridae), *Labia* Leach (Labiidae, earwigs), *Mantis* L. (Mantidae, praying mantis), *Myrmecophilus* Berth. (Myrmecophilinae, ant-loving crickets), *Oedipoda* Latr. (Oedipodinae, grasshoppers), *Stenopelmatus* Burm. (Stenopelmatidae, sand crickets), and *Tridactylus* Oliv. (Tridactylidae, pigmy mole crickets), all in Opinion 149; *Locusta* L. (Locustidae, grasshoppers), in Opinion 158. In the last named, under Suspension of the Rules the genotype was declared to be the Old World migratory locust, *Locusta migratoria* (L.). The name is therefore proper for the short-horned grasshoppers, rather than for the katydids and their relatives.

LEPIDOPTERA: *Morpho* Fab. (Morphoidae), *Helicopis* Fab., and *Pontia* Fab. (butterflies), in Opinion 137; *Satyrus* Latr. (Satyridae, grayling and meadow brown butterflies), in Opinion 142; *Colias* Fab. (sulphur butterflies, common alfalfa butterfly), in Opinion 146; *Vanessa* Fab. (red admiral and other butterflies), in Opinion 156; and *Argynnis* Fab. (fritillary butterflies), in Opinion 161.

HYMENOPTERA: *Cephus* Latr. (Cephidae, wheat stem sawflies), and *Astata* Latr. (Astatidae, sphecoid wasps), in Opinion 139; *Crabro* Fab. (Crabronidae, crabronid wasps), and *Cimbex* Oliv. (Cimbicidae, cimbicid sawflies), in Opinion 144; *Lasius* Fab. (common genus of ants), and *Anthophora* Latr. (Anthophoridae, hairy flower bees), in Opinion 151; *Bethylus* Latr. (Bethylidae, bethylid wasps), and *Dryinus* Latr. (Dryinidae, dryinid wasps), in Opinion 153; **Torymus* Dalman (Torymidae, seed chalcids), in Opinion 155 (the name *Callimome* Spin., cf. Callimomidae, for the same group, is rejected in this Opinion); *Cryptus* Fab. (Cryptinae, ichneumon wasps), *Arge* Schrank (Argidae, sawflies), and *Diprion* Schrank (Diprionidae, sawflies), in Opinion 157; **Ichneumon* L. (Ichneumonidae), **Pimpla* Fab. (Pimplinae), and **Ephialtes* Grav. (all ichneumon wasps), in Opinion 159; **Bracon* Fab. (Braconidae, braconid wasps), in Opinion 162; **Pompilus* Fab. (Pompilidae, the spider wasps), in Opinion 166 (the name *Psammochares* Latr., cf. Psammocharidae, for the same group, is suppressed in this Opinion).—CURTIS W. SABROSKY.

On directing the flight of bees. No insect had been so much studied as has the honey bee, no insect has been the subject of so much discussion, of so many books and articles. Yet there is still a great deal to be learned. For example, it was not until the year 1923 that the significance of a peculiar "dance" of the bees became known, a "dance" consisting of certain shaking and circling movements that bees, individually, perform on the combs. Although quite commonly observed and frequently remarked on by beekeepers, it required, finally, the work of Karl von Frisch, one of the really outstanding biologists of to-day, to solve this age-old riddle along with that other problem of how a bee informs its hive-mates of a newly found source of food.[1]

It may be recalled that in one of his earlier papers [2] von Frisch had demonstrated that bees readily distinguish the scents of various flowers from each other. This ability plays an im-

* Cases where objection was voiced by a group of American taxonomists, and where usage is not uniform in the American literature.

[1] K. v. Frisch, 1923, Über die "Sprache" der Bienen. Zool. Jahrb. Abt. allg. Zool. u. Physiol. 40: 1–186. (Also in book form, Jena, 1923.)

A lecture on the subject, by Professor von Frisch, was printed under the title, "The language of bees," in Science Progress, vol. 32, July 1937 and reprinted in the Anual Report Smithsonian Inst. for 1938, pp. 423–431.

[2] K. v. Frisch, 1919, Über den Geruchsinn der Bienen und seine blütenbiologische Bedeutung. Zool. Jahrb. Abt. allg. Zool. u. Physiol. 37: 1–238. (In book form, Jena, 1919.)

portant rôle in the means of communication within the hive, i.e., in the "language" of the bees.

When a bee has found a good source of nectar, that bee will spread the news of the discovery to her hive-mates by means of these circling "dances" that she performs on the combs. These dance performances attract the attention of the other bees to the discoverer and to the flower scent that clings to her body. Thus the hive-mates are "told" that there is a nectar-source with the particular odor and they are persuaded to search until, finally, all the blossoms having that odor and within the flight range of the hive are being exploited for nectar.[3]

A few years later, in 1927, von Frisch suggested that this phenomenon might have a practical application. If, for example, a few bees are fed sugar solution in the presence of the scent of red clover blossoms (by placing a little dish with the sugar on a layer of blossoms covered by a coarse screen), these bees will, by means of their "dances," stir up many others in the hive to go out and search for the clover scent and thus come to frequent the clover fields. This idea was put to use by the Rus-

[3] This behavior of bees is easily demonstrated by the following experiment, after von Frisch. Near a bee hive, set up a feeding station consisting of a watch-glass containing sugar solution (equal parts sugar and water) and resting upon a filter-paper covered piece of cardboard upon which has been placed several drops of oil of bergamot or other available essential oil. Now start a dozen bees from the hive feeding at this station and allow them to return to the hive again and again, meantime keeping the watch-glass filled. After the feeding is under way, place upon the grass, in a different direction from the hive and about 150 feet distant, a number of similar cardboards but without solution. These may be placed about 6 feet apart. One of the cards should be scented with oil of bergamot, as is the training card, the others with other scents such as oil of melissa and oil of fennel. Professor von Frisch permitted only the original 12 bees (marked) to visit the sugar and removed any newcomers. In the first hour of the experiment 216 bees visited the baitless bergamot card, only 3 visited the fennel card and a single bee the melissa card. If more bees are allowed to feed at the training station and if the time of training is extended the number of visitors to unbaited cards having the same scent will be correspondingly more striking. In the event that there is a heavy honey flow at the time the experiment is tried there may be difficulty in interesting the bees in the sugar solution at the training station.

sians, beginning about 1936. In order to encourage the flight of bees to the red clover fields to improve the seed crop, the Russian practice is to soak clover blossoms in the sugar solution that is used in training the bees. The solution is fed within the hives and at night, in order not to incite "robbing." Recently,[4] von Frisch has been checking the results obtainable by the Russian method against those gotten by his own original method as well as with several modifications. Preliminary work indicates that both methods work well with clover but that the outdoor training method is more economical of sugar. However, not all flowers will impart their scent to a sugar solution; rape is a case in point and the blossoms themselves must be used for training. Also to be noted is that the training scent must be identical with the flower scent, not merely similar. Oil of thyme, for example, is useless for training bees to visit thyme.

These methods of directing the flight of bees to certain plants by training them to the scent are useful, reportedly, in increasing bee visits to plants that would otherwise be relatively neglected by reason of poor nectar secretion or competition with other plants. The aim, generally, is to secure more effective cross-pollination. During a heavy nectar flow from some dominant honey plant it may not be possible to train bees to a lesser source. However, success may even then be achieved by the use of colonies containing many young bees that have not yet begun to gather nectar.

The method may also be used to persuade bees to visit flowers that are without odor. In one case bees were trained by feeding 100 cc. of sugar solution to which one drop of oil of lavender had been added. About 30 drops of the same oil were distributed here and there on the blossoms of a nearby potato field. During the first hour of training 36 bees were counted on the field although before the training began no bees at all could be found. They visited not only the flowers to which the oil had been applied but searched diligently wherever the air was

[4] K. v. Frisch, 1943, Versuche über die Lenkung des Bienenfluges durch Duftstoffe. Die Naturwissenschaften 31: 445–460. (The footnotes and literature in this paper refer to ca. 20 papers and books on training bees for pollination. Most are in Russian.)

scented. Only rarely, however, did a bee actually try to suck nectar from a blossom. Thus, although the method will direct bees to blossoms, visits that are really effective from the standpoint of pollination cannot be secured in the absence of yield.

German experiments on red clover in two different localities also illustrate this point. At Poing, directive pre-training was unsuccessful in establishing bee visits to the clover, while at Markt Schwaben, 4 km. distant, visits were increased 22-fold. It was found that at Markt Schwaben the corolla tubes averaged 7.16 mm. in length; at Poing 8.08 mm. Thus, the tubes at Poing were 0.9 mm. longer and the nectar probably out of reach. The average amount of nectar per flower was about the same, or slightly greater at Poing, being 0.030 mg. per flower per 24 hours as compared with 0.023 mg.

Other results of the training are that the bees may be made to begin work on a given species of plant sooner, that they will work more intensively and may extend their working hours. Some beekeepers have reported an increase in honey production and there should be a better seed crop.—R. G. SCHMIEDER.

A New Entomological Publication. In December, 1945, there appeared No. 1 of Vol. I of a new Japanese entomological periodical, THE TRANSACTIONS OF THE NIPPON LEPIDOPTEROLOGICAL SOCIETY. It is published in Kyoto and its editor is Yoshio Okada. Unfortunately for foreign lepidopterists, the papers in the first number are in Japanese, with no English summaries. The following conditions are listed regarding the Transactions (transl.):

"1) The Transactions are issued irregularly throughout the year. Each volume will contain 4 parts. 2) The price of each volume (10 yen) should be paid in advance. 3) Manuscripts are limited to papers written or introduced by members. 4) Manuscripts are accepted only on the subject of Lepidopterology. 6) All manuscripts should be sent to the editor: Yoshio Okada, Yanagida-cho, Saga, Kyoto."

The Society appears to be newly organized and plans to publish literature on Lepidoptera in addition to the periodical Transactions. The charter membership list of 86 men includes such names as Sugitani and Shirozu, indicative of support from such recognized authorities on Japanese Lepidoptera.

The editor, Mr. Okada, is a very young man just entering his twenties, but he appears to be an enthusiastic lepidopterist of precocity and ability. The first number of the Transactions contains 26 pages. The five papers and two notes are all from the brushes of Mr. Okada and his brother, Mr. Torii, including a translation from TENTHREDO of Sibatani and Ito's revision of "the so-called genus *Zephyrus*." The first paper is on Japanese species of *Coenonympha*, with the description of a new subspecies from a type series of six specimens, and with an excellent photograph of the holotype. The second paper revises the *Erebia niphonica* group in the "Japanese Empire," describing two new subspecies based mainly on differences of the male genitalia. These genitalic differences are clearly figured. In this first number of the Transactions, Mr. Okada does an astounding and heartening thing. He describes an aberrant form of a *Glaucopsyche* and two aberrant forms of *Oeneis*, and actually refrains from creating a new name for them. American lepidopterists may note with perhaps some horror this heretic in their field of interest!

The first criticism of this first number unfortunately holds true for most Japanese entomological literature: there are numerous misspellings among the scientific terms and names printed in Roman type. To be regretted is the absence of Congress language summaries, even of the descriptions of new subspecies. Many Japanese periodicals usually carry these summaries and thus make the papers available to foreign scientists. If this new publication were in English it would be of considerable interest to American lepidopterists, and if future members carry such clear illustrations, they alone may make the periodical useful to us.

All of Japan's important entomological serials ceased publication during the War: INSECTA MATSUMURANA, KONTYU, MUSHI, TRANSACTIONS KANSAI ENT. SOC., TENTHREDO, and ZEPHYRUS. Thus, at present, the new Lepidoptera publication is the only active Japanese entomological periodical.—CHARLES L. REMINGTON, Sapporo, Hokkaido, Japan.

Wheel-Bug vs. Japanese Beetle

By S. W. Bromley, Ph.D., Bartlett Tree Research Laboratories, Stamford, Connecticut

In a very interesting article appearing in Entomological News, vol. LVI, March 1945, page 67, Mr. E. T. Moul reported on the wheel-bug as an enemy of the Japanese beetle in York County, Pennsylvania. This confirmed some observations made by Mr. Herman S. Porter of Orange, New Jersey. On August 2, 1945, Mr. Porter wrote to me regarding the occurrence of the wheel-bug on the estate of Miss Doris Duke at Somerville, New Jersey, as follows:

"The superintendent's son, Mr. Russell Shafer, was telling me about an insect that killed so many Japanese beetles and he took me over to the linden trees to show me the evidence.

"Each tree had hundreds of dead beetles beneath it and I immediately asked if any spraying had been done, as I suspected that this was more than the work of the wheel-bug. His response was in the negative, so I could only draw the conclusion that the wheel-bugs were the killers. I have never seen wheel-bugs so numerous elsewhere and they certainly should be developed as a beetle control if what I observed had no other limiting factor.

"Another story that Mr. Shafer told me was of the work of these insects in killing Japanese beetles on a vine (I do not remember the kind) on his porch. He said that one could sit on the porch and see the beetles fall."

Personals

University of Wisconsin.—Dr. Robert J. Dicke has been appointed assistant professor in research and teaching and began his work January 23. He has just completed four years as a naval officer on malaria control. Mr. E. H. Fisher joined the staff as extension entomologist. He was formerly with Stokely Foods. Dr. J. T. Medler began his duties as assistant professor, January 1, 1946. He was formerly a naval officer on malaria control. Promotions include Dr. T. C. Allen from associate professor to professor, and Dr. J. H. Lilly from assistant professor to associate professor.

Current Entomological Literature

COMPILED BY CHARLES HODGE IV, EDWIN T. MOUL, MAURICE E. PHILLIPS AND HENRY K. TOWNES JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in ENTOMOLOGICAL NEWS are not listed.

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Review

FOUNDATIONS OF PLANT GEOGRAPHY. By Stanley Cain. Harper Bros., N. Y. 556 pp. $5.00.

It is not often that an entomologist finds much to concern him directly in a book on a botanical subject, but here is one that contains a great amount of material of prime interest to any entomologist interested in speciation and geographic distribution. The book is somewhat broader in scope than the title would indicate. It puts a fresh light on some of the problems of insect distribution and suggests other problems not as yet probed in the entomological field, such as that of disjunct distribution between the Atlantic Coast and Great Lakes regions. The searching analysis of the means of speciation is one of the finest features of the work.—GEORGE C. STEYSKAL.

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.

Lepidoptera—Am still collecting here and have only fine specimens for exchange. H. W. Eustis, Woodbine Rd., Augusta, Ga.

Wanted—Viennese Entomological Printing Press, for printing 3, 3½ and 4 type data labels. Kent H. Wilson, 430 Ridgewood Road, Fort Worth 7, Texas.

Wanted—Heteroptera from all parts of the world, all families except Miridae. Will buy, exchange or determine. S. and C. Amer. species esp. desired. John C. Lutz, 6623 Lansdowne Ave., Philadelphia 31, Pa.

Wanted—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

Arctic Lepidoptera on hand, including Erebia, Oeneis and Brenthis. R. J. Fitch, Lloydminster, Sask., Canada.

Odonata—Will buy or exchange North and Central American species, both imagos and nymphs. Also will exchange other orders for Odonata. Carl Cook, Crail Hope, Kentucky.

I want to collect Rothschildia farbesi, agapema, galfina and io moths for interested persons. E. Frizzell, Route 4, San Benito, Texas.

Wanted—Information as to the existence and present location of a copy of Solodonikov, S. V. Contribution à l'étude de la faune et de la biologie des larves des Libellules du Donetz et de certains de ces affluents. [In Ukrainian.] Trav. Soc. Nat. Charkow 52: 249–268. 1929. [Quoted from Zool. Rec. 1936, Ins. p. 147, No. 3114.] P. P. Calvert, P. O. Box 14, Cheyney, Penna.

Wanted—Crane-flies (Tipulidae) of New Guinea, New Caledonia and Neighboring Islands, for revisional purposes. Also, names and addresses of individuals or institutions possessing any of these flies. Correspondence solicited. Chas. P. Alexander, Fernald Hall, Amherst, Mass.

I want to collect Pennsylvania insects from York and Adams Co. E. W. Mange, 307 W. Walnut St., Hanover, Pa.

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ENTOMOLOGICAL NEWS

FEBRUARY 1946

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ENTOMOLOGICAL NEWS

Vol. LVII FEBRUARY, 1946 No. 2

Wasps and Water

By Garland T. Riegel, Capt., Sn. C., A. U. S.

Much has been written about the interesting habits of wasps by observers who have devoted years to this fascinating study. At the suggestion of Mr. Phil Rau, I wish to add a fragment to this mass of information—an observation made in North Africa upon a curious activity of one species.

During the height of the dry season in Tunisia during the summer of 1943, wasps were frequently observed alighting right on the surface of quiet pools and streams, picking up a load of the liquid and, when ready to return to the nest, taking off directly from the water surface. On July 17 near Mateur two of these relatively large insects were collected after they had settled on the water of the Oued el Malah at the village of Sidi Salem. They proved to be females of *Polistes gallicus* (L.) (det. Townes, 1945). I had often observed our American species walk to a pool for water after alighting nearby, but this behavior was new to me. Mr. Rau, however, has recorded this same remarkable procedure for four American *Polistes* (*pallipes, annularis, rubiginosis* and *variatus*), and given observations on their use of the water to cool the nests during hot, dry days in Missouri (1 & 2). Undoubtedly the same use was being made of the water in the semi-desert conditions then prevailing in Tunisia.

Mr. Rau states in a personal communication that there are a few records of Hymenoptera alighting on and taking off from water without breaking the surface tension, and that he has also recorded such behavior in the mining bee, *Anthophora abrupta*, but I have been unable to review the literature.

Polistes gallicus (Fig. 1) apparently has no structure on the tarsi other than eight fairly large setae on or near the claws and the empodium that might assist in preventing the breaking of the water surface. Both the specimens collected are about eleven millimeters long, and after drying over 25 months weighed 17.74 and 20.74 milligrams respectively (after the aver-

FIG. 1. *Polistes gallicus* (L.), female

age weight of a large number of the same size insect pin was subtracted in each case). As insects go, this is fairly large and heavy, and its ability to "land" on water and take off again with a full load arouses admiration in the observer.

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2. ——. 1933. The Jungle Bees and Wasps of Barro Colorado Island (Rau, Kirkwood, Mo.), 324 pp.

Obituary

MR. ROSWELL C. WILLIAMS, JR., research associate of the Academy of Natural Sciences, Philadelphia, and a member of its Council, past recording secretary and past president of the American Entomological Society, student of the Rhopalocera and specialist in the Hesperiidae, died March 7. A sketch of his life will appear in a future issue.

On the Genus Trogloderus Le Conte (Coleoptera: Tenebrionidae)

By Ira La Rivers, Nevada Academy of Natural Sciences, Reno, Nevada

The genus *Trogloderus* Le Conte 1879, among other insects, may be likened to some of the weird extinct mammals exemplified by the titanotheres and uintatheres; like them, its members have embarked on that phase of evolutionary growth which seems to characterize any ancient group in the last stages of its existence—they are developing fluidly and rapidly into grotesque caricatures of their plain and drab ancestors. At first glance, to one uninitiated to the group, their deviation from the parent stock would seem of little moment in contrast to the apparently striking growths achieved by more noticeable elements among the scarabs—but among these latter, there are ready links to fit the chain when the group is viewed as a whole, thus reducing the total effect. The differentiation of *Trogloderus* is nearly as pronounced when the staid drabness of their predecessors is taken into account, and while they have not developed such eccentricities as horns, and probably never will, they have achieved a rugosity of prothorax and a costate elytral condition which will compare favorably with the excrescences which, in other animals, have been taken as indications of an explosive growth phase, generally purporting an early extinction of the line. As an additional indication, animals in this stage of evolution, with small exception, appear to have achieved their maximum adjustment to an environment which has for some time been relatively static—and perhaps this final flareup is merely an external expression of somatic flexibility which, unable to produce any variations of value to a system already in equilibrium, continues to exert its influence in meaningless changes in morphology. It is certain, and quite apparent, that in their initial stages such changes are neutral in character; they perform no useful function in adjustment, but seem not to militate against the adjustment. In the final stages even, they may not be of intrinsic importance in any elimination of the animal from the scene. Probably the greatest operative factor in the death of a line is the changing environment itself. Since all environments change eventually, and often with comparative suddenness, the well-adjusted animal is not able to meet the demands required of it to operate as part of the new flux and succumbs.

Troglodcrus gives further indications of being in the initial phases of this flareup by the state of flux of its members. All subspecies possess pronounced elytral costation with small individual variation, but the rugosity of the prothorax is extremely variable, and almost defies classification. Differentiation has been based exclusively on these prothoracic variations, but they are of such complexity as to present a problem difficult of solution with adults only. There is considerable field-work yet to be done before these variations in the imago can be evaluated—however, enough is now known to indicate reliably the extent of these variables, and the chief objective now is to fill in the gaps, obtain the "missing links" of the line and to verify conclusively that which, until now, we have had to relegate to theory in the absence of all the facts.

When the author first reviewed the genus (1942), he added the species *nevadus* to the already described *costatus* and *tuberculatus*. It was evident that *nevadus* was closely allied to *costatus*, but in the absence of truly transitional elements, although the former was represented by an adequate series (14 specimens), there was no alternative but to give *nevadus* specific status, with the reservation that intermediates might be discovered with more extensive collecting. At that time, there were several specimens of undescribed variables in the collection of the California Academy of Sciences which it was not possible to work out, and so they were not included. A recent perusal of these has convinced the author that, in some respects, they show "missing link" characters still sought in the group, and make it possible to crystallize convictions which had hitherto been held only in theory.

The author is deeply indebted to Dr. E. C. Van Dyke for the privilege of examining the specimens of the California Academy of Sciences and for his kind and unstinting aid.

Subfamily Blaptinae

Tribe Eleodiini

Genus TROGLODERUS Le Conte

Trogloderus Le Conte, 1879, North American Entomologist.
Trogloderus Le Conte & Horn, 1883, Smithsonian Misc. Collections 507.
Trogloderus Blaisdell, 1909, U. S. N. M. Bulletin 63.
Trogloderus La Rivers, 1942, Annals Ent. Soc. Am., 1943, P. C. Jour. Ent. & Zool.

The distribution of the genus includes the western half of Nevada, southern California, northwestern Arizona, southwestern Utah, and southern Idaho. *Trogloderus* was erected to include the first described species, *costatus*. It is peculiar that no specimens have been found in eastern Nevada—*Trogloderi* have been found up to a line which almost exactly bisects Nevada from north to south, but not east of this line; yet their area of distribution curves around southern Nevada into Arizona and Utah. It is probable that they exist in some portions of eastern Nevada and remain to be discovered. Altitudes of collecting localities vary from 900 ft. in southern California to 6,300 ft. at Lake Tahoe, California, and the zonal range is from Lower Sonoran in southern California, Upper Sonoran over most of Nevada and Idaho, and Transition in Nevada and California. The group is primarily an eremophilous one, and is obviously a product of the Great Basin, perhaps much as we know it today, with arenophilous preferences. The most stable subspecies, *tuberculatus*, inhabits the southern limits of the generic range, which is the most static portion, lacking the extremes of temperature prevalent over the northern portions; this and the variable humidities, flora, etc., are reflected in the confusion of variants constituting the remainder of the *costatus* complex. It is also likely, in the case of these latter *costatus* variables, that Pleistocene Lake Lahontan which covered wide areas of west-central and northern Nevada in the geologically-recent past is responsible for much of the variation exhibited. (Geological estimates vary from 10,000 to 50,000 years ago for the last body of water to occupy the Lahontan basin proper.

This ancient inland sea is represented now only by such remnant desert lakes as Pyramid, Walker and the recently-dried Winnemucca, and the vast, white alkali flats known as Deserts or Sinks, stretching for over a hundred miles across northwestern Nevada, and now bearing a thin sheet of water only during the winter and spring rain season, being deserts in the most literal sense of the word during the rest of the year.)

Typical northern *nevadus* has obviously been influenced by the distribution of Lahontan waters. All the author's specimens have been taken within the confines of the old lake itself, while additional specimens are from well within the drainage system supplying the lake. It may be that this preference for the Lahontan system is merely the result of an arenophilous species seeking the best sand dune areas; in this case, the lake itself, which seems to have converted many thousands of tons of surrounding volcanic rock into fine sand along its numerous shores. After final recession of Lahontan, this sand has been gathered here and there, where consistent wind currents prevailed, into aeolian dunes, often of large size and extent, and on these *Trogloderi* have prospered.

Typical *costatus*, the most northern of the complex, is distributed from southern Idaho across north-central Nevada to the mid-eastern edge of California. While it has been found on two sand dune areas, one of which (Paradise Valley) it shared with *nevadus*, it alone of the entire genus, in the author's experience, has been taken in typical Upper Sonoran sagebrush (*Artemisia tridentata*) and Transition pine timber (*Pinus ponderosa jeffreyi*) country. In the vicinity of Reno, it is a common species along the cottonwood (*Populus trichocarpa* and *P. fremonti*) choked Truckee river-bottom, while it has been found at other spots on the eastern face of the humid Sierras, as well as at middle altitudes in the Sierras themselves. It is too early to conjecture on the origin of the group, but their initial invasion of the Sierras at this, the only known point, may have been accomplished by following the Truckee river from its desert mouth to its source in these mountains.

The four new specimens tentatively referred to *nevadus*, and detailed more fully under the discussion of that form, have no connexion with the Lahontan system and are obviously, although seemingly not now technically separable, of different origin than the northern series. Little can be said of *vandykei* since but one specimen is known.

The author's previous key (1942) is modified below to include the new form, as well as to reflect the present status of those remaining.

1. Pronotum entirely tuberculate on dorsum *costatus tuberculatus*
   Pronotum reticulate, at least in the center of the disc....(2)
2. Pronotal median foveae deep, distinct, separate *costatus costatus*
   Foveae absent or faint and connected, appearing as a shallow furrow ....(3)
3. Pronotum entirely reticulate, smoothly rounded on top *costatus nevadus*
   Pronotum tuberculate along marginal bands, dorsum bilobed on cross-sectional view..............*costatus vandykei*

Trogloderus costatus costatus Le Conte

Trogloderus costatus Le Conte, 1879, N. A. Ent., Jan. 1, p. 3, pl. 1, fig. 3.
Trogloderus costatus Le Conte & Horn, 1883, Smiths. Misc. Colls. 507.
Trogloderus costatus Blaisdell, 1909, U. S. N. M. Bull. 63.
Trogloderus costatus La Rivers, 1942, Annals Ent. Soc. Am., 1943, P. C. Jour. Ent. & Zool.

No new distribution records can be added to the published account of this variable, but some diagnostic features should be elucidated. Size within the confines of typical *costatus* varies from 10 mm. to 15 mm. (including both sexes), and color ranges of living mature material are from jet black to a weak purplish-brown, with the teneral light brown commonly met in the field. Pronotal reticulation varies from fine and evenly-spaced to large and irregular. The posterior pronotal margin is evident on most specimens unless the foveation is extreme, when the marked crenulations and buckling of the pronotal dorsum invade and destroy the continuity of the margin. In these cases, the reticulum is markedly elevated above the plane of the side pronotal margins, which are relatively smooth and flat, as a plateau above the surrounding plain. A marked, but never complete, breaking down of the intervening reticula between the foveae is noted in many of these extreme specimens. Generally, the sinuosity of the pronotal marginal outlines is gently and progressively curved, but some of the extreme forms evince the more marked outlines characteristic of an occasional *tuberculatus* and of the lone specimen upon which *vandykei* is based, but these lack the complete marginal serration of *vandykei*—*tuberculatus*.

Trogloderus costatus nevadus La Rivers

Trogloderus nevadus La Rivers, 1942, Annals Ent. Soc. Am., December 4/35: 437–440, 1943, P. C. Jour. Ent. & Zool.

There is no additional distributional datum to be added to the northern forms. The length variation is from 8 mm. to 11 mm., averaging considerably less than *costatus*. The purplish-brown color is much more common than in *costatus*, but black specimens are not rare; the teneral light brown often predominates in many sandy localities where *nevadus* is the only form present. All specimens of *nevadus* examined possess well-defined posterior pronotal borders, and the reticulations are, almost without exception, small and regular, in consequence of which the cross-sectional view of the pronotal dorsum shows a smoothly-curved outline, and appears nearly flattened from above, in contrast to the generally roughly-broken *costatus* pronotum. Nearly all specimens are consistent in the possession of a suggestion of the two distinct median foveae of *costatus* and *tuberculatus*, either as faint depressions caused by a lowering of the reticule walls, or as a widening at front and rear of the narrow median furrow.

Among the California Academy of Sciences specimens recently examined are four I am referring to *nevadus* on the basis of pronotal structure, but which are considerably larger than the average of the specimens hitherto known under the name. The largest of these reaches 15 mm., the maximum of *costatus*, and all are jet black. All came from southern California: Kern County (Randsburg, 5/IV/27, el. 2,500 ft., Thos. Craig), San Bernardino County (Yermo, 9/VI/40, el. 2,100 ft., W. F.

Barr & K. S. Hagen). The author is only generally familiar with the Randsburg locale, but spent a month collecting in the Yermo region, which contains considerable areas of sand dunes and sandy soils, from which these specimens seem to have come; these are similar to typical *nevadus* habitats in Nevada. In fact, the form is known only from such environs. While there is yet little of a concrete nature to bulwark the supposition, it may be that these specimens represent a southern variable in the process of formation, for they are incongruous when assembled with the northern specimens.

Trogloderus costatus vandykei n. subsp.

The jet-black variable is described from a single specimen in the collection of the California Academy of Sciences, taken by Dr. E. C. Van Dyke in San Bernardino County (Baker, 22/V/25, el. 920 ft.). While more material will be needed to evaluate finally the form's position in the complex, the fact that no further specimens have been taken in the 20 years since its initial discovery makes it necessary to utilize this unique in completing a survey of the entire group. Of all the specimens so far unearthed, this alone seems to combine elements of all the other known forms. The conspectus is that of the genus, which has been admirably given by Blaisdell (1909), and the differential diagnostic features are mentioned below. It differs from most other variables in (1) possessing reticulations over the center dorsum of the pronotum and tubercles along the lateral margins, thus suggesting the affinities between *costatus* and *tuberculatus*, and (2) carrying distinct serrations the entire distance of its lateral pronotal margins, which margins in turn are distinctively sinuate, flaring out in a pronounced bulge near its caudad end before bending back sharply to end at the posterior pronotal collar. This pronounced sinuosity plus the entire serrations is found only in *vandykei* and some *tuberculatus*, although, as mentioned, some extreme *costatus* show a similar sinuosity, in which case the posterior half of the lateral edge producing the sinuosity is smooth and free of serrations; in most *nevadus*, and many *costatus*, serrations are common the entire lateral edge of the pronotum, but the sinuosity in these is naturally symmetrical in the manner of an unstrung bow, bulging evenly in the middle, and tapering gently on either side. In this set of characters in *vandykei* can be seen obvious ties between *costatus* and *nevadus*.

Vandykei possesses a shallow median pronotal furrow as in *nevadus*, with a mild but noticeable widening at the posterior end, an incipient fovea. Although *vandykei* has a relatively smooth pronotal surface, as does *nevadus*, unlike the rough dorsum of *costatus*, in cross-section it differs from *nevadus* in exhibiting a bilobed appearance due to two parallel, rounded ridges lying in the center of the disc on each side of the median furrow, whereas in *nevadus*, such a section presents a smooth curve across the center. *Vandykei* also resembles *nevadus* in the relative smoothness of the elytra between their conspicuous costae, both lacking the pronounced cross-ridging usually present in *costatus* and *tuberculatus*. These cross-ridges, however, even when strongest, never compare in height with the costae themselves. Another feature shared between *vandykei* and *nevadus* is the near obliteration of the median elytral costa, especially in the anterior half; this is generally well-developed in *costatus* and slightly less so in *tuberculatus*.

The following table will serve to formulate these differences more fully:

	T. c. costatus	*T. c. nevadus*	*T. c. vandykei*	*T. c. tuberculatus*
TUBERCULATIONS ON PRONOTUM	none to faintly on extreme lateral margins	same as *costatus*	on lateral margins only	entire pronotum
SERRATIONS ON PRONOTAL EDGES	complete to incomplete	complete	complete	complete
SINUOSITY OF PRONOTAL EDGES	regular to irregular	regular	irregular	regular to irregular
MEDIAN ELYTRAL COSTA	prominent	repressed	repressed	prominent
PRONOTAL MEDIAN FOVAE	prominent distinct and separated	obsolescent	obsolescent	prominent distinct and generally separated
ELYTRAL INTRA COSTATE RIDGING	pronounced	repressed	repressed	pronounced

Trogloderus costatus tuberculatus Blaisdell

Trogloderus tuberculatus Blaisdell, 1909, U. S. N. M. Bull. 63: 490–492, pl. 6, fig. 14.

Trogloderus tuberculatus La Rivers, 1942, Annals Ent. Soc. Am.

There is little to be added to what is already known of this variant. It rivals *costatus* in size, and has been diagnostically delineated in the preceding discussions. However, one of the California Academy specimens shows considerable foveal obliteration and coalescence, approaching *nevadus* in this detail; all other specimens seen have possessed deep, distinct foveae resembling those of *costatus*.

In conclusion, it may be said that *tuberculatus* is perhaps the most distinctive and readily-differentiated subspecies of the entire group, and *vandykei* with its partial tuberculation indicates the affinities of *tuberculatus* with the remainder of the *costatus* complex. At the present state of our knowledge of the species, *costatus* is a variable compounding of four recognizable entities and probably others, as yet unknown and undescribed, whose eventual appearance will undoubtedly be of aid in resolving the problem of relationships. Complete solution, however, will depend, in the author's opinion, on a thorough study of larval and pupal chaetotaxy. Many groups of tenebrionids show similar tendencies, particularly the ELEODIINI and CONIONTINI within the author's experience, in which the immature forms possess differential characters completely lost in the adults; even genitalia fail miserably in attempts to analyse satisfactorily the differences between many adults of *Eleodes* and *Coniontis*, and the *Trogloderi*, like certain other ELEODIINI, have a generalized type of genital construction which possesses no adequate specific diagnostic characters.

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Texas Lepidoptera (Rhopalocera: Papilionoidea)

By Don B. Stallings and J. R. Turner, Caldwell, Kansas

When H. A. Freeman moved to Pharr, Texas in 1944, he immediately began to make some remarkable catches of butterflies in that vicinity.* From the butterflies caught at Pharr and the surrounding territory we are of the opinion that this area of the Rio Grande Valley is in the Tropical Zone (the same as Southern Florida) rather than in the Lower Austral Zone. Late life zone maps of North America do not indicate this area to be tropical; however, the life zone map by C. Hart Merriam corrected to Dec. 1897 as published in Bulletin No. 10, U. S. Dept. of Agric., Division of Biological Survey, 1898, shows this area to be tropical. There are other indications which tend to prove this to be true.

Mr. Freeman's interests are chiefly with the skippers (Hesperioidea) and hence he has passed on to us for determination most of the other Rhopalocera. In addition he has contacted several other collectors in the vicinity, all of whom have been most generous with their finest specimens. In as much as a number of these represent new records for the United States, some of which are native, we asked Dr. Wm. P. Comstock of the American Museum of Natural History to check our determinations. We wish to give our thanks for his valuable assistance.

Since many collectors will want references to these new records we have given some data on the literature. To save space we will refer to "Macro-Lepidoptera of the World,"

* See also Ent. News, vol. LVI, No. 1, p. 4, and Ent. News, vol. LVI, No. 4, p. 102.

Vol. 5, edited by Seitz, simply as "Seitz," and "Biologia Centrali Americana" (Lepidoptera-Rhopalocera), by Godman and Salvin as G. & S.

The following list is by no means complete, but includes only the more interesting and unusual catches.

Papilio polydamus L. A number of specimens were collected at Pharr in July, September and October. It can be considered native.

Papilio ornythion Bdv. Thus far only a few specimens have been collected by Mr. Freeman during September, but this species should be native to the area.

Papilio anchisiades idaeus Fabr. Freeman collected two specimens on May 12th, 1945, at Pharr. Seitz gives the food plant of this species as "Citrus," so we see no reason why this should not be native in southern Texas.

Anteos maerula Fabr. A single specimen of this large species was collected in August and a number of other specimens seen. It appears to be native.

Phoebis philae form *obsoleta* Niep. One specimen of this form was collected in August. The species should be native in this region.

Eurema daira Godt. (?). A female albino of this species was collected in October by Freeman. Until other specimens are collected we will not know for sure whether it is of the typical race *daira* or race *lydia* Felder, although we are inclined to think it is *daira*. In any event this specimen can be referred to as form *pallidula* Klots as this name should be sufficient for all albinos of this species.

Eurema proterpia Fabr. Flies in good numbers in September and into October.

Eurema proterpia f. hiem. *gundlachia* Poey. This winter form begins to appear in October.

Eurema nise perimede Pritt. This race appears to be common at Pharr, showing a distinct summer and winter form. The best collecting period is in September and October.

Appias drusilla Cramer. This species until of late has gone under the name of *Appias ilaire* Godt. It is native in this area, collected during August, September and October.

Ascia josephina josepha S. & G. This race was collected in September and October. Undoubtedly native.

Danaus eresimus montezuma Talbot. A series of this race was collected by Freeman at Pharr during September and October. Dr. Comstock advises us that the A. M. N. H. has a series collected at Brownsville, Texas, in December which are considerably smaller than the specimens collected by Freeman. It is probable that this race shows seasonal variation. See Talbot, "Revisional Notes on the Genus *Danaus* Kluk" (Lep. Rhop. Danaidae), Trans. Royal Ent. Soc., London, 93: 115–148. Native in southern Texas.

Heliconius petiveranus Doubleday. This beautiful specimen was collected in August at Pharr by Mrs. J. A. Cook and represents a fine new record for the United States. The species is well depicted on plate 78b Seitz under the name *petiverana* D. & H. This must be considered a stray in the United States.

Dryas julia moderata Stich. This distinctive race is native to the area and is collected during August and September.

Euptoieta hegesia hoffmanni Comstock. This newly described race is native and is in full flight in September. For original description see Comstock, "Insects of Porto Rico and the Virgin Islands," vol. XII, part 4, page 446, note 1.

Melitaea theona thekla Edw. This race is native to the area, being collected in October, March and April.

Melitaea elada callina Bdv. Another native collected during October.

Chlosyne janais Dru. A native species collected during October.

Chlosyne endeis G. & S. A native species collected during October.

Chlosyne lacinia californica Wright. Several specimens of *lacinia* caught at Pharr in October can not be distinguished from California specimens of *californica*, hence at best *californica* is not more than a race of *lacina*, though at Pharr it occurs as a form.

Biblis hyperia aganisa Bdv. A single specimen was collected by Mrs. E. J. Kelso in July at Pharr. This represents another fine new record for the United States. This race has previously gone under the name of *Didonis biblis aganisa* Bdv. For picture see Seitz, Plate 94f. See also, Comstock, "Insects of Porto Rico and the Virgin Islands," page 460. A second specimen was seen by Freeman in February in an orange grove, but for the time being we must consider this as a stray.

Anartia jatrophae luteipicta Fruhst. A native, best flight in September and October.

Anartia fatima Fabr. Common during March and April.

Victorina stelenes biplagiata Fruhst. In flight during August. It should be native.

Victorina stelenes biplagiata f. *pallida* Fruhst. This winter form flies during December and January.

Myscelia ethusa Bdv. Probably a native. Flies in October and December.

Cyclogramma asteria (G. & S.). One specimen collected by D. Ring at Almo, Texas, in July. This is a further new record for the United States, but must be considered a stray. The species is well pictured in G. & S., plate 108, figs. 31–32.

Timetes chiron Fabr. A single stray was collected in February.

Athena petreus Cram. A single stray was collected in February.

Adelpha fessonia Hew. Freeman collected a specimen in August, a second specimen in October and a third in November. There is a chance that this species may be native as the specimens are in good condition. For pictures, see Seitz, plate 109c and G. & S. plate 29, figs. 18–19.

Chlorippe pavon Latreille. Mrs. Freeman had the good fortune to capture the first specimen of this new record for the United States in October. A second specimen was caught in May. These specimens do not look like the figure shown in Seitz on plate 110Bc but are very similar to *laure* Dru. pictured at 110Be. Probably a stray in the United States.

Anaea glycerium Doubleday. A single specimen was collected by Mrs. E. J. Kelso in July at Pharr. This species is shown in Seitz at plate 118c. We would judge that the specimens shown in Seitz represent the winter form as they are darker and more heavily marked than the Pharr specimen. This is another new record for the United States.

Anaea pithyusa Feld. Several specimens (all badly worn) have been caught at Pharr. For picture, see Seitz, plate 118f. One specimen of the winter form of this species was caught at Pharr on March 2nd, 1945. It looks a great deal like *Anaea cubaena* Bsd. as shown by Seitz on plate 118f. We are inclined to treat *cubaena* as the winter form of *pithyusa* however, Dr. Comstock is not so sure of this. In any event *pithyusa* has a winter form that looks just like *cubaena*, as pictured by Seitz.

Apodemia walkeri Godm. Native to the region with main flight in October.

Emesis emesia Hewitson. Mr. Freeman collected a good series of this new record for the United States in October and November at Pharr. This species has a well developed bulge on the costa of the forewing. See "Exotic Butterflies," Hewitson, vol. 4, plate 45, fig. 7.

Lasaia sessilis Schauss. There has been some confusion about this genus and its occurrence in the United States. This particular species is often confused with *Lasaia agesilas narses* Staud. both of which are supposed to be native in Texas, although Freeman has not as yet caught *narses*. *Sessilis* undoubtedly is the species that Holland was speaking about in his "Butterfly Book" when he mentioned *Lasaia sula* Staud. at page 216. Mr. Freeman sent these specimens to us identified as *narses*. The Stallings-Turner Collection had a series of specimens caught at Victoria, Mexico, which we had identified as *sessilis*. Seeing that the specimens we had received from Freeman did not correspond to Holland's picture of *narses* or to our Mexico *sessilis* we decided that the Texas specimens were probably the *sula* mentioned by Holland. The whole mess was passed on to Dr. Comstock who determined the Texas specimens as *sessilis* and our Mexican specimens as *sula*. It might be well to mention that our Mexican specimens agree with the Seitz figure of *sessilis*, much better than do the Texas specimens. Dr. Comstock remarks that the genus is variable and a big series would be needed for study.

Thecla bazochii Godart. Another new record for the United States collected by Freeman in October and May at Pharr. It is a native of the area. This species has usually gone under the name of *Thecla thius* Hbn. For figures see Seitz, plate 145i, k; Geyer, "Zutrage Sammlung Exotische Schmetterlinge," plate 619 (128), figs. 743–744; Hewitson, "Diurnal Lepidoptera," vol. 2, plate 58, figs. 369–370. See also Comstock and Huntington, "Lycaenidae of the Antilles." Annals of N. Y. Acad. of Sciences, vol. XLV, art. 2, page 88.

Strymon simaethis Dru. This species is also native to the area and is collected in October.

Strymon columella istapa Reak. Appears to be common in January, February, March, April, May, September and October.

Strymon laceyi (B. & M.). One female was collected by Freeman in October. This is one of the least known species in North America. So far as we know the type and this specimen are the only specimens known. We have compared this specimen with the pictures of the type and find them alike although the Freeman specimen represents the winter form, being somewhat darker. The type, also a female, was caught at Del Rio, Texas, July 9th. We join with Comstock and Huntington in considering this a good species, although the fact that no males have been caught does suggest the possibility that we may be dealing with a rare female form of some other species.

Strymon clytie Edw. This species which is still rare in most private collections is collected during August, September, December, April, May, June and July.

Strymon azia Hew. This tiny hairstreak is native to the area although nowhere common. Collected in April and May.

Mitoura xami Reak. A series of this native was collected in October.

While this paper is factual it does have some of the characters of a fish story, so it will not be amiss to mention the "one that got away." March 25th, 1945, Mr. Freeman wrote us, "I am still cussing for something I missed this afternoon. Today I chased a *Morpho* and finally lost it in the maze of jungle. It was orange beneath and very shiny blue above."

Dragonflies (Odonata) Collected in Pennsylvania and New Jersey in 1945.

By George H. Beatty, III, Merion, Pennsylvania

(Continued from page 10)

In the following list of species, full data are given for all captures of species which may be of interest. Briefer data are supplied for the better known species for which extensive information on their distribution, etc., is already available. Locality names refer to the preceding list of collecting stations. The location of localities other than those visited by the writer is noted briefly as they occur in the list of species. These supplementary records are indicated by the collector's name which follows them in parentheses. The order of species and, but for a few changes resulting from more recent knowledge, the nomenclature are based upon those of Needham and Heywood.[6]

ANNOTATED LIST OF SPECIES

Progomphus obscurus Rambur.

New Jersey: Whitesbog, 2♂, 24 June; 4♂, 1♀, 8 July; 1♂, 22 July.

This species was found only along the larger drainage ditches of the cranberry bogs where it squatted in characteristic fashion on the little sand bars and beaches. It was most abundant on 8 July when nearly every suitable spot had an *obscurus* squatting on it.

Hagenius brevistylus Selys.

New Jersey: Fisher's Dam, 1♀, 21 August.

The female was captured when it alighted on the sandy shore of the lower lake, near the outlet. Other females of *Hagenius* were ovipositing in the small streams at the outlet on 21 and 28 August, though none of this species was seen on 31 August or 4 September. When not flying over the water, they usually perched on high dead branches near the stream. On such a

[6] A Handbook of the Dragonflies of North America. Charles C. Thomas, Springfield, Ill., 1929. Pp. viii + 378, ill.

perch, one *Hagenius* was found on 28 August, eating a *Libellula incesta*.

Gomphus lividus Selys.

PENNSYLVANIA: Wyola, 1 ♂, 1 ♀, 17 May; 1 ♂, 25 May; 1 ♂, 29 May; 1 ♀, 6 June; Broomall, 1 ♂, 1 ♀, 22 May; 1 ♂, 25 May; 2 ♀, 29 May; Darby Creek, 1 ♂, 6 June.

Gomphus exilis Selys.

PENNSYLVANIA: Central Square, 4 ♂, 7 ♀, 22–29 May.
NEW JERSEY: Whitesbog, 1 ♀, 29 April; 1 ♂, 20 May; Upton Ponds, 1 ♀, 24 June; 1 ♂, 30 June; 1 ♀, 8 July.

Gomphus descriptus Banks.

PENNSYLVANIA: Slab Cabin Run, 1 ♂, 17 June. Field about 1 mile from Slab Cabin Run, 1 ♀, 19 May. (J. Gillespie.)

This species has not heretofore been reported from Pennsylvania though several other collectors have taken it in the state.

Gomphus villosipes Selys.

PENNSYLVANIA: Central Square, 1 ♀, 22 May.

This female is the only *villosipes* seen in 1945.

† **Dromogomphus** sp.

PENNSYLVANIA: Broomall, 1 ♀, 20 July.

The color of the hind femora, which are largely yellow, and differences in venation and the structure of the vulvar lamina distinguish this specimen from *D. spinosus*.

Dromogomphus spinosus Selys.

PENNSYLVANIA: Broomall, 1 ♀, 20 July; 1 ♀, 26 July; 1 ♀, 1 Aug.; seen at Broomall, 7 Aug. and Westtown Lake, 3 Sept.

Although this species is usually found at ponds and lakes, there are no such habitats within several miles of the fields where it was collected.

† After the ms. of this paper was completed, Dr. Calvert and the writer compared this specimen with others of both *spinosus* and *spoliatus* from several localities. Since specimens of a third species, *D. armatus* Selys, are not presently available, and because this specimen differs as much from *spoliatus* as from *spinosus*, no final decision has yet been reached on its identity. The results of further investigation will be published in the near future.

Lanthus parvulus Selys.

PENNSYLVANIA: Wyola, 1 ♂, 1 ♀, 25 May; 3 ♂, 4 ♀, 29 May.

None of this species was found when the same locality was visited on 6 June, though it was abundant on 29 May. It was undoubtedly a case of "explosive" emergence and dispersal such as is frequently reported for gomphines. In sunny clearings in the woods *parvulus* flitted slowly about, the males often perching high up in the small trees while the females stayed close to the ground. This is a new record for the Philadelphia region.

Gomphaeschna furcillata Say.

PENNSYLVANIA: Bear Meadows, 1 ♂, 2 ♀, 16 June.

NEW JERSEY: Upton, 3 ♂, 29 Apr.; 1 ♀, 5 May; 1 ♂, 2 ♀, 13 May.

This was the most abundant species along the pine-barren roads in late April and early May. Many were seen in addition to those captured. At Bear Meadows several pairs in coitu were seen but no oviposition was observed.

Basiaeschna janata Say.

PENNSYLVANIA: Wyola, 1 ♀, 26 Apr.; seen at Bear Meadows, 16 June and at Spring Creek, 18 June.

Boyeria vinosa Say.

PENNSYLVANIA: Broomall, 4 ♂, 23 July–8 August; Darby Creek, 2 ♂, 29 August.

NEW JERSEY: Seen at Fisher's Dam, 28 Aug., 4 Sept.; Friendship Creek, 4 Sept.; Clark's Brook, 7 Sept.

In the fields at Broomall, *vinosa* was very abundant late in July. It flew in the shade and hung up frequently among the leaves of shrubs and small trees, much like many of the tropical Aeschnines. During the period when it was common in the fields, no *vinosa* were found along the nearby streams. It later became extremely abundant along Darby Creek.

Anax junius Drury.

PENNSYLVANIA: Broomall; seen at the following: Central Square, Bear Meadows, State College, Crum Creek Farm, Holmes, Tinicum Marshes, 6 April–8 October.

NEW JERSEY: Cape May City, Cape May Point; seen at Upton Ponds, Pond near Fisher's Dam and Batsto Pond, 24 June–22 September.

Anax longipes Hagen.

NEW JERSEY: Upton Ponds, 1 ♂, 24 June; 1 ♂, 29 June; 1 ♂, 30 June; 1 ♂, 8 July; seen, Upton Ponds, 22 July, 12 August.

On 29, 30 June, this species was very abundant, at least twenty individuals being present at the ponds. They often flew slowly along the banks, hovering here and there, and then dashing far out over the water. After this date, they diminished in numbers until only one or two were left on 12 August.

Epiaeschna heros Fabricius.

PENNSYLVANIA: Seen at Bear Meadows, 16 June.
NEW JERSEY: Seen at Cape May City, 22 September.

Aeschna umbrosa Walker.

PENNSYLVANIA: Broomall, 1 ♀, 27 August; Holmes, 2 ♂, 5 October; Tinicum Marshes, 1 ♀, 8 October.

Seen on many other occasions, until 18 October.

Aeschna constricta Say.

PENNSYLVANIA: Tinicum Marshes, 2 ♂, 2 ♀, 26 Sept.; 3 ♂, 2 ♀, 29 Sept.; 1 ♀, 5 October.

Capture of ovipositing females of *constricta* furnishes evidence that this species breeds as far south as Philadelphia. A number of males have been taken previously, but these females (3 homoeochromatic and 2 heterochromatic) are the first to be recorded from Pennsylvania. They were all ovipositing on young green shoots of Typha which grew at the extreme edge of the marsh and which were in the water only at high tide. When the dragonflies were captured, they were ovipositing on these shoots about six inches above the ground which was at that time dry. Many males flew up and down the edge of the marshes, only a foot or two above the ground.

Aeschna tuberculifera Walker.

PENNSYLVANIA: Holmes, 3 ♀, 13 Sept.; 1 ♀, 21 Sept.

These females were taken as they oviposited on the sedges growing in shallow water.

Aeschna verticalis Hagen.

PENNSYLVANIA: Holmes, 2 ♂, 3 ♀, 13 Sept.; 3 ♂, 3 ♀, 21 Sept.

Cordulegaster obliquus Say.

PENNSYLVANIA: Shingletown Gap, 4 miles southeast of State College, Centre Cy., 1 ♂, 1 ♀, 9 June (J. Gillespie).

Cordulegaster diastatops Selys.

PENNSYLVANIA: Wyola, 1 ♂, 22 May; 1 ♀, 29 May; 1 ♀, 6 June; seen at Bear Meadows, 16 June.

Cordulegaster maculatus Selys.

NEW JERSEY: Upton, 1 ♂, 29 April; 2 ♀, 20 May; seen, Upton, 24, 29 June.

In the early spring, *maculatus* flew very languidly along the sandy roads. Late in June, this species was seen flying along a road at great speed, late in the afternoon.

Macromia illinoiensis Walsh.

PENNSYLVANIA: Broomall, 1 ♂, 5 August.

The only *Macromia* seen in 1945.

Didymops transversa Say.

PENNSYLVANIA: Wyola, 1 ♂, 1 ♀, 26 April; 2 ♂, 1 ♀, 17 May; 1 ♀, 22 May; 1 ♂, 25 May.

Epicordulia princeps Selys.

PENNSYLVANIA: Seen at Spring Creek, 18 June, Westtown Lake, 1 ♂, 23 June (J. Gillespie).

Tetragoneuria cynosura Say.

PENNSYLVANIA: Central Square, Wyola, Broomall, 22 May–6 June.

NEW JERSEY: Upton, 1 ♂, 29 April.

Tetragoneuria semiaquea Burmeister.[7]

NEW JERSEY: Upton, 3 ♂, 29 Apr.; 2 ♂, 1 ♀, 13 May; 7 ♂, 4 ♀, 20 May.

T. semiaquea was abundant and easily collected at this locality. The writer believes that this form is specifically distinct from *T. cynosura*. Wing coloration, size and color of abdomi-

[7] This is *semiaquea* as defined by Muttkowski [Bull. Wisc. Nat. Hist. Soc., 9 (3): 118–122, July, 1911].

nal spots, width of abdomen, and general size all set it apart from *cynosura*, though no structural differences are apparent.

Somatochlora tenebrosa Say.

PENNSYLVANIA: Broomall, 1 ♂, 1 ♀, 16 July; 2 ♂, 1 ♀, 23 July; 1 ♂, 26 July; 3 ♂, 1 ♀, 2 Aug.; 2 ♀, 3 Aug.; 1 ♀, 4 Aug.; 1 ♀, 7 Aug.; 1 ♂, 10 Aug.; 1 ♂, 1 ♀, 11 Aug.; 1 ♀, 16 Aug.; 1 ♀, 27 Aug.

NEW JERSEY: Fisher's Dam, 1 ♂, 4 Sept. (J. Gillespie).

The oviposition site of *tenebrosa* was not discovered, but dried mud on the abdomens of several females indicates that the eggs were laid in mud, probably in a swampy spot. The nearby streams did not have muddy shallows or banks where this species might oviposit. A pair in coitu which was taken on 23 July suggests that oviposition site of *tenebrosa* is not far distant from the fields where it occurred so commonly in late July and early August.

Somatochlora filosa Hagen.

PENNSYLVANIA: Broomall, 1 ♀, 26 July; 1 ♂, 2 Aug.; 1 ♂, 5 Aug.

This is the first Pennsylvania record for *filosa*. It flew with *tenebrosa*, from which it was difficult to distinguish on the wing. The flight of *filosa*, however, is generally more sustained and involves more up and down motion.

Cordulia shurtleffi Scudder.

PENNSYLVANIA: Bear Meadows, 2 ♂, 16 June.

This species was moderately abundant along the sluggish stream which flows through the center of the meadows. It often hovered motionless over the water and then dashed swiftly to another spot a few feet away where it hovered again.

Dorocordulia lepida Hagen.

NEW JERSEY: Whitesbog, 1 ♂, 24 June (J. Gillespie).

Nannothemis bella Uhler.

NEW JERSEY: Upton Ponds, 4 ♂, 24 June; 2 ♂, 29 June; 4 ♂, 8 July; Whitesbog, 8 ♂, 3 ♀, 24 June; 3 ♂, 4 ♀, 29 June; 1 ♂, 1 ♀, 8 July; Whitesbog, 22 July (seen); Cecil, 1 ♂, 5 Sept.

This rather rare species has not been recorded previously for the month of September. This is a significant extension of its seasonal range.

Perithemis domita Drury.

PENNSYLVANIA: Central Square, 2 ♂, 3 ♀, 6 June; State College, 19 June; Broomall, 1 ♂, 20 July; Central Square, 1 ♂, 2 ♀, 10 Aug.; seen at Westtown Lake, 3 Sept.
NEW JERSEY: Batsto Pond, 1 ♂, 5 Sept.; Batsto Pond, 7 Sept. (seen).

Celithemis eponina Drury.

PENNSYLVANIA: Central Square, 1 ♂, 8 Aug.
NEW JERSEY: Fisher's Dam, 1 ♂, 28 Aug.; Batsto Pond, 1 ♂, 5 Sept.; seen at Fisher's Dam, 4 Sept.

Celithemis elisa Hagen.

NEW JERSEY: Upton Ponds, 16 ♂, 7 ♀, 24 June–12 August.

Celithemis monomelaena Williamson.

NEW JERSEY: Batsto Pond, 1 ♂, 5 Sept.; 1 ♂, 7 Sept.

On each occasion, five or more other individuals of *monomelaena* were seen in addition to the one captured. Oviposition was observed on 5 September. These are exceptionally late records for this species.

Celithemis martha Williamson.

NEW JERSEY: Upton Ponds, 5 ♂, 1 ♀, 24 June; 3 ♂, 1 ♀, 29 June; 3 ♂, 1 ♀, 30 June; 8 ♂, 4 ♀, 8 July; 2 ♂, 22 July; 5 ♂, 12 Aug.; Whitesbog, 1 ♀, 29 June; Upton, 1 ♀, 12 Aug.; Fisher's Dam, 1 ♂, 28 Aug.; Batsto Pond, 1 ♂, 7 Sept.

Celithemis ornata Rambur.

NEW JERSEY: Upton Ponds, 1 ♀, 29 June.

Although this species is widely distributed in North Carolina and states to the south, it has never been reported from any point north of that state. This capture extends the range of *ornata* more than three hundred miles, into the Upper Austral life zone. Except for an individual seen on 24 June, which is presumed to be the same one captured on the above date, no other *ornata* were seen.

(*To be continued*)

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

The Number of Species in a Genus. Wm. T. M. Forbes in this journal (vol. 56, p. 279, Dec., 1945) arrives mathematically at the conclusion that "the ideal number would appear to be about 20 or 30" species in a genus, and then states "Actually, of course, the numbers in a proper classification would not be definite, but would vary enormously." The latter is true.

If we plot the numbers of species in the genera of any larger group against the number of genera including those numbers of species, we find on one end of our graph a large number of monotypical genera and on the other end a few very large genera. We furthermore find that the intermediates are distributed in a characteristic "hollow curve." This phenomenon was discovered by J. C. Willis in 1922,[1] recently extended by the same author,[2] and discussed by Sewall Wright,[3] Ernst Mayr,[4] and Stanley Cain.[5]

In Hampson's revision of the moths of the family Arctiidae (Cat. Lepidoptera Phalaenae Brit. Mus., vol. 3, 1901) the numbers of species in the genera are as follows, the number of species in a genus being followed in parentheses by the number of genera including that number of species. 1 (69), 2 (14), 3 (14), 4 (8), 5 (4), 6 (3), 7 (4), 8 (4), 9 (4), 10 (4), 12 (2), 13 (1), 15 (2), 17 (3), 18, 21 (1 each), 22 (2), 24, 25 (1 each), 29 (2), 34, 58, 61, 126 (1 each) = 934 species in 148 genera. This results in an average of 6.3 species to a genus, but as a

[1] Willis, J. C. 1922. Age and area. Cambridge Univ. Press.

[2] ———. 1940. The course of evolution by differentiation or divergent mutation rather than by selection. Cambridge Univ. Press.

[3] Wright, S. 1941. The "Age and Area" concept extended. Ecology 22 (3): 345–347.

[4] Mayr, E. 1942. Systematics and the origin of species. Columbia Univ. Press. See p. 288.

[5] Cain, S. 1944. Foundations of plant geography. Harper Bros. See pp. 224, 310, 315.

matter of fact there are only 3 genera of 6 species and 4 genera of 7 species. The "ideal" number of species per genus would seem to depend upon the phylogenetic nature of the genus.

The Diptera of the subfamily Ulidiinae (Hendel, Gen. Ins., Fasc. 106, 1910) are comprised in 156 species distributed among 26 genera, as follows. 1 (17), 2 (6), 3 (1), 4 (1), 8 (1), 9 (2), 11 (1), 29 (1), 54 (1). This is an average of exactly 6 species per genus, but there is no genus with 6 species and only one each with the nearest numbers to 6.

The family Carabidae in Blackwelder's checklist of the Coleoptera of Central and South America (U. S. Nat. Mus. Bull. 185, 1944) includes 3939 species in 307 genera, as follows. 1 (104), 2 (45), 3 (17), 4 (19), 5 (11), 6 (12), 7 (6), 8 (11), 9 (6), 10 (7), 11 (7), 12 (3), 14 (3), 16 (2), 17 (2), 19 (4), 20 (2), 22 (2), 23 (1), 24 (4), 25 (3), 26 (2), 27 (1), 29 (3), 32, 33, 35, 38, 40 (1 each), 43 (3), 46, 47, 51, 54, 55 (1 each), 57 (2), 74, 80, 101, 112, 115, 124, 141, 167, 221, 330, 332 (1 each). This time the average is 12.8 species per genus.—George C. Steyskal.

Current Entomological Literature

COMPILED BY CHARLES HODGE IV, EDWIN T. MOUL, MAURICE E. PHILLIPS AND HENRY K. TOWNES JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

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Review

THE ADELID MOTHS OF SOUTH AFRICA. THE MOTHS OF SOUTH AFRICA. Vol. IV, Part 2. By A. J. T. Janse.

I suppose most lepidopterists can recall their surprise when they first caught an adelid, one of those minute delicate things with excessively long antennae. Dr. Janse remarks on their strong resemblance to the trichopterids of the family Leptoceridae and speculates on a possible caddis-fly ancestry for them, perhaps more direct than in any other group of Frenatae. The maxillary palpi and the male genitalia tend to support this idea.

About 250 species are described from all over the world, and of these 68 are recorded from South Africa. The genus Adela has only two recorded South African species, but *Ceromitia* has the great majority of its species in that region. Janse divides *Ceromitia* into three groups, based primarily on the male genitalia. He says: "It is doubtful whether one can consider these three groups as true genera, so I here treat them as subgenera, writing, for example, *Agisana turpis,* instead of *Ceromitia (Agisana) turpis.*

Of the S. African Adelidae, two were described by Walker, two by Zeller, four by Walsingham, one by Stainton, 34 by Meyrick and 25 now by Janse. As in all Janse's work, the descriptions are excellent and the drawings of structures are exquisite, while the various moths are illustrated by enlarged photographs. Although this book is on the African fauna it should be in the hands of all lepidopterists, who will learn much from it.—T. D. A. COCKERELL.

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.

Lepidoptera—Am still collecting here and have only fine specimens for exchange. H. W. Eustis, Woodbine Rd., Augusta, Ga.

Wanted—Viennese Entomological Printing Press, for printing 3, 3½ and 4 type data labels. Kent H. Wilson, 430 Ridgewood Road, Fort Worth 7, Texas.

Wanted—Heteroptera from all parts of the world, all families except Miridae. Will buy, exchange or determine. S. and C. Amer. species esp. desired. John C. Lutz, 6623 Lansdowne Ave., Philadelphia 31, Pa.

Wanted—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

Arctic Lepidoptera on hand, including Erebia, Oeneis and Brenthis. R. J. Fitch, Lloydminster, Sask., Canada.

Odonata—Will buy or exchange North and Central American species, both imagos and nymphs. Also will exchange other orders for Odonata. Carl Cook, Crail Hope, Kentucky.

I want to collect Rothschildia farbesi, agapema, galfina and io moths for interested persons. E. Frizzell, Route 4, San Benito, Texas.

Wanted—Information as to the existence and present location of a copy of Solodonikov, S. V. Contribution à l'étude de la faune et de la biologie des larves des Libellules du Donetz et de certains de ces affluents. [In Ukrainian.] Trav. Soc. Nat. Charkow 52: 249–268. 1929. [Quoted from Zool. Rec. 1936, Ins. p. 147, No. 3114.] P. P. Calvert, P. O. Box 14, Cheyney, Penna.

Wanted—Crane-flies (Tipulidae) of New Guinea, New Caledonia and Neighboring Islands, for revisional purposes. Also, names and addresses of individuals or institutions possessing any of these flies. Correspondence solicited. Chas. P. Alexander, Fernald Hall, Amherst, Mass.

I want to collect Pennsylvania insects from York and Adams Co. E. W. Mange, 307 W. Walnut St., Hanover, Pa.

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ENTOMOLOGICAL NEWS

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Undescribed Species of Crane-Flies from the Western United States and Canada (Dipt.: Tipulidae). Part V

By Charles P. Alexander, Massachusetts State College, Amherst, Massachusetts

In the present article I wish to describe three new species of the vast genus *Tipula* from the Rocky Mountain and Pacific states and provinces. Except where indicated to the contrary in the text, the types of the novelties are preserved in my personal collection of world Tipulidae. I am very much indebted to Messrs. Hallahan, Leech, Melander and Michener for their kindly interest in saving these flies.

Tipula (Yamatotipula) jacintoensis n. sp.

♂. Length about 10 mm.; wing 9–9.5 mm.; antenna about 2 mm.

♀. Length about 12–14 mm.; wing 10–11 mm.

Closest of *lanci* in the small size and darkened wings, differing especially in the highly contrasted yellow and black pattern of the thorax and abdomen.

Thorax black, variegated with light yellow, including the pronotal scutellum, pretergites, dorsopleural membrane, median region of scutum, parascutella and the broad posterior portions of the scutal lobes; cephalic two-thirds of mediotergite and the entire anapleurotergite similarly brightened. Pleura dark brown, the pteropleurite and metapleurite light yellow. Legs yellow, the femoral tips narrowly blackened, on the posterior legs including the outer sixth or seventh. Abdomen black, the broad posterior and lateral borders of the tergites, and less evidently of the sternites, bright yellow. Male hypopygium with the median tergal lobe low and broad, without lateral shoulders as in *spernax*.

Holotype: ♂, San Jacinto Mountains, CALIFORNIA, Tahquitz Valley, altitude 8,000 feet, June 3, 1940 *(C. D. Michener)*. *Allotopotype:* ♀; pinned with type. *Paratopotype:* ♂; *paratypes:* 1 ♂, 1 ♀, Round Valley, altitude 8,800 feet, June 14, 1940 *(C. D. Michener)*.

Further collections and study may show that this fly is a race of the northern *Tipula (Yamatotipula) lanei* Alexander (Mount Hood, Oregon).

Tipula (Oreomyza) shoshone n. sp.

Allied to *pseudotruncorum;* antennae black, the apex of pedicel restrictedly yellow; mesonotal praescutum gray, with five dark brown stripes, the median one capillary; male hypopygium with the ninth tergite having a narrow rectangular median notch, the broad lateral lobes produced into a small tooth; margin of lobes with microscopic denticles; outer dististyle gradually narrowed outwardly; inner dististyle long and narrow, with both the beak and lower beak united into a single blackened structure; outer basal lobe entirely pale.

♂. Length about 13.5–14 mm.; wing 14.5–15.5 mm.; antenna about 2.9–3 mm.

Frontal prolongation of head uniformly gray; nasus small; palpi brownish black. Antennae black; scape elongate, gray pruinose; apex of pedicel restrictedly obscure yellow; flagellar segments short-cylindrical, with poorly indicated basal enlargements; verticils long and conspicuous, much exceeding the segments in length. Head gray; vertex with a brown median stripe.

Pronotum gray, with three small brown spots. Mesonotal praescutum gray, conspicuously patterned with dark brown, including five stripes, the sublateral pair broadest; intermediate stripes at anterior end with a narrower backward extension that passes through the pseudosutural foveae and almost reaches the suture behind; fifth stripe a capillary median line; posterior sclerites of notum gray, each scutal lobe with two disconnected dark brown areas; a slightly paler brown median stripe, beginning at the suture, extending almost to the abdomen, narrowly interrupted at the posterior end; parascutella dark. Pleura and pleurotergite light gray, restrictedly patterned with somewhat darker gray; dorsopleural region buffy yellow; propleura yellow, variegated with small brown spots. Halteres yellow, knob brownish black. Legs with the coxae and trochanters gray; remainder of legs black, the femoral bases broadly yellow, more extensive on the fore legs where nearly the proximal third is included, on posterior femora with nearly the basal fifth brightened; claws (male) delicately setuliferous, with a small subbasal tooth. Wings cream-yellow, variegated with pale brown and darker brown areas, the latter most evident at the stigma and as an arcular darkening; the paler brown clouds cover much of the remainder of wing, interspersed with pale ground areas; post-stigmal pale band broadest, especially developed in the holotype, more restricted in the paratype. Venation: R_{1+2} preserved.

Abdominal tergites dark brown, the more basal segments light gray pruinose on sides; at about tergite five and on the succeeding segments, the caudal borders of the tergites narrowly yellow; lateral tergal borders broadly yellow; sternites gray, narrowly darkened medially and sublaterally; subterminal sternites with broad areas on either side of midline; hypopygium relatively large, dark brownish gray, more or less variegated with yellow. Male hypopygium with the ninth tergite broad, transverse, narrowed posteriorly, the caudal border with a narrow rectangular median notch; behind the notch with a dorsal furrow that is provided with numerous microscopic setulae from small tubercles; lateral tergal lobes broad, the outer lateral angle produced into a small tooth; margins of lobes with additional microscopic denticles. Appendage of ninth sternite dilated at base, the outer pendulous portion bearing several long yellow setae, those at apex subequal in length to the outer lobe of the appendage. Basistyle entire, unproduced. Outer dististyle relatively long and narrow, broadest subbasally, very gradually narrowed to the obtuse tips. Inner dististyle long and narrow, the beak blackened, narrowly obtuse; lower beak apparently lacking and evidently fused with the beak; outer basal lobe entirely pale, one face covered with abundant setulae and with a submarginal fringe of longer setae; upper apical angle narrowed into a small glabrous point. Gonapophysis appearing as a flattened dark-colored blade, broadly obtuse at apex. Eighth sternite at apex bearing two low hemispherical lobes that are provided with unusually long yellow setae, the lobes separated from the sclerite by pale membrane.

Holotype: ♂; Adna, Lewis County, WASHINGTON, July 10, 1917 (Melander); in Melander Collection. *Paratype:* ♂; Steelhead, BRITISH COLUMBIA, May 21, 1933 (H. B. Leech).

Although allied to *Tipula* (*Oreomyza*) *pseudotruncorum* Alexander, likewise from the Pacific and Rocky Mountain northwestern states and provinces, the present fly is well-distinguished by the details of structure of the male hypopygium, particularly of the tergite and both dististyles. The hypopygial details of *pseudotruncorum* have been described and figured by the writer in another report (Amer. Midl. Nat., 33: 410; 1945). The present fly is evidently the species described and figured by Snodgrass (Trans. Am. Ent. Soc., 30: 211, pl. 16, figs. 132, 134; 1904) as *T.* (*O.*) *truncorum* Meigen, of Europe. I had formerly believed that Snodgrass's description referred to *pseudotruncorum* (Can. Ent., 52: 229; 1920) but evidently this is not the case.

Tipula (Lunatipula) saxemontana n. sp.

Size medium (wing, male, about 15 mm.); general coloration gray, the praescutum with four dark brown stripes; femora yellow, the tips infuscated; claws (male) toothed; wings with a strong brownish tinge, the stigma darker; conspicuous obliterative areas before and beyond the stigma and across the cord; abdomen orange-yellow, with a broad blackish median stripe and less conspicuous sublateral ones; male hypopygium with the tergite conspicuously notched; basistyle produced caudad into a long flattened blade, its tip obtuse; inner dististyle with the outer basal lobe a large subcircular blade that is produced into two pale points; eighth sternite sheathing, the emarginate apex fringed with abundant yellow setae.

♂. Length about 13–15 mm.; wing 14–16 mm.; antenna about 4.5–5 mm.

Frontal prolongation of head relatively long, nearly equal to the remainder of head, light brown, more pruinose at base; nasus exceedingly short to virtually lacking; first segment of palpi brown, succeeding segments black. Antennae with scape and pedicel obscure yellow; first flagellar segment obscure brownish yellow, the tips narrowly blackened, remainder of organ black; flagellar segments rather strongly incised; longest verticils subequal in length to the segments. Head with anterior vertex buffy, posterior vertex gray, clearer gray on posterior orbits, the areas delimited internally by more blackish lines; a capillary dark brown median vitta.

Pronotum gray, with three brown spots. Mesonotal praescutum gray, with four conspicuous dark brown stripes, the intermediate pair representing the lateral borders of a slightly darker gray median area, the latter in front exceeding four times the width of the brown stripes, narrowed posteriorly; a slight darkening at the humeral region, the extreme margin of which is yellowed; scutum gray, each lobe with two brown areas; posterior sclerites of notum gray, the lateral border of the mediotergite and the pleurotergite more yellowish gray. Pleura gray, the dorsopleural membrane light yellow. Halteres with stem yellow, knob infuscated. Legs with the coxae light gray pruinose; trochanters yellow; remainder of legs variable in color, in some, including type, with the femora yellow, the tips infuscated, more broadly so on fore legs where about the outer two-thirds is included, more narrowly darkened on the fore and middle legs; in other specimens, the femoral tips are about equally darkened on all legs, including about the outer twelfth to fifteenth; tibiae yellowish brown, the tips narrowly blackened; tarsi black, the basitarsi extensively yellowish brown; claws toothed. Wings with a strong brownish tinge, the stigma darker brown; prearcular and costal fields a trifle more yellowish brown; conspicuous white obliterative areas before and beyond stigma and crossing a cord at the fork of M, the last largest; veins brown, pale in the obliterative areas. Venation: R_{1+2} entire; cell *1st* M_2 pointed at outer end; m oblique, a little shorter than the petiole of cell M_1.

Abdominal tergites orange-yellow, with a very broad blackish median stripe that is narrowly interrupted at the posterior borders and again at the similarly narrow yellowish gray bases of the segments; on intermediate segments a much less evident sublateral dusky area, broadly interrupted on the posterior borders; lateral tergal margins broadly pale, more or less pruinose; sternites yellow, the intermediate segments broadly darkened medially, the posterior borders narrowly yellow; hypopygium dark chestnut red to almost blackish. Male hypopygium relatively large and conspicuous. Ninth tergite longer than broad, slightly narrowed outwardly, the posterior border conspicuously emarginate, including a narrow median incision and broader and shallower submedian notches; teeth adjoining the median notch acute; outer lateral angles less evidently incised. Ninth sternite with the appendage conspicuously bilobed, including a large oval lobule provided with abundant curved setae, those at apex shorter and more dense, and a small, more basal lobule that bears very elongate setae which are decussate at the midline. Basistyle entire, the outer portion produced caudad and mesad into a conspicuous flattened blade, its tip obtuse, usually broadly so, in cases approaching subacute. Outer dististyle a dark-colored flattened blade, with abundant long pale setae. Inner dististyle with the beak very obtuse, lower beak more pointed; dorsal crest narrow, its margin irregularly toothed; outer basal lobe very large and conspicuous, appearing a large subcircular blade, the outer portion produced into two conspicuous pale points; surface of blade with numerous long yellow setae. Eighth sternite sheathing but not projecting beyond the other elements of the hypopygium, the posterior border emarginate and fringed with abundant yellow setae.

Holotype: ♂; Grand Tetons, at Arizona Creek, WYOMING, altitude 6,800 feet, July 2, 1941 (C. P. Alexander). *Paratopotypes:* 4 ♂♂, altitude 6,790–6,800 feet, July 8, 1941; July 5, 1942 (C. P. Alexander); *Paratypes:* ♂, Invermere, BRITISH COLUMBIA, August 15, 1927 (A. A. Dennys); ♂♂, Yellowstone, Tower Falls, 6,400 feet, June 23, 1941, 2 ♂♂; Osprey Falls, 7,000 feet, June 25, 1941; Northeast Entrance, 7,200 feet, June 26, 1941 (C. P. Alexander); Rocky Mountain National Park, COLORADO, 11,000 feet, July 24, 1941, taken above timberline, flying above dwarf willows and mountain bog birch, *Betula glandulosa* Michx. (C. P. Alexander); Gothic, Colorado, 10,000 feet, July 15, 1934 (J. D. Hallahan).

This species has long been confused with *Tipula* (*Lunatipula*) *pleuracicula* Alexander 1915 (*arizonica* Alexander, 1916; *monochroma* Dietz, 1919) and I am particularly indebted to Dr. Alan Stone for examining the types of my species, now in the United States National Museum, and thus settling the identity of this well-marked fly. The above names all pertain to a smaller yellow crane-fly that is allied to *T.* (*L.*) *splendens* Doane, 1901, having the basistyle of the male hypopygium produced into a much more slender stiletto-like point than in the present species. In an earlier report (Amer. Midl. Nat., 30: 732; 1943) I had referred to the present fly as being *pleuracicula* and this name should be corrected to *saxemontana*.

Tick Collections at Army Installations in the Fourth Service Command

By Stanley J. Carpenter,[1] Roy W. Chamberlain[2] and Leonora Peeples,[3] Fourth Service Command Medical Laboratory, Fort McPherson, Georgia

Numerous collections of ticks have been made by Army personnel in the seven states comprising the Fourth Service Command during 1943, 1944, and 1945, and forwarded to the Fourth Service Command Medical Laboratory for identification. The states included in the Fourth Service Command are Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina and Tennessee.

The collections are summarized in Table 1. During 1943 to 1945, the following species were taken: *Amblyomma americanum* (Linnaeus), *A. dissimile* Koch, *A. tuberculatum* Marx, *Dermacentor albipictus* Packard, *D. variabilis* (Say), *Haemaphysalis leporis-palustris* Packard, *Ixodes ricinus scapularis* Say, *Rhipicephalus sanguineus* Latreille, and *Ornithodorus turicata* Duges. A total of 3,227 specimens, representing 47 localities, are included.

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[3] SP-5, Medical Technician.

Table 1. Tick Collections in the Fourth Service Command, 1943–1945
(L = larva; N = nymph)

Species and Locality	Date	Host or Source	Number of Specimens Collected			
			L	N	Adults	
Amblyomma americanum						
Florida						
Marianna	5/15–18/44	Dragging			3 ♂	5 ♀
	6/6–8/17/44			3	2 ♂	5 ♀
	9/28/44	Dog		1		
Georgia						
Hinesville	4/9–6/20/44	Man			2 ♂	5 ♀
Mississippi						
Biloxi	March, 1945					1 ♀
Centerville	6/27/44	Man		3	1 ♂	14 ♀
	6/27–8/15/44	Trap	788	714	4 ♂	7 ♀
Gloster	8/1–11/44	Man		2		
Hattiesburg	3/30/44	Man				1 ♀
	4/17/44	Cow				1 ♀
	4/23/44	Man				1 ♀
	5/15–6/10/44	Dog			1 ♂	21 ♀
North Carolina						
Fayetteville	5/10/44				2 ♂	1 ♀
	3/29/44	Deer			3 ♂	
South Carolina						
Charleston	5/14–6/6/44				3 ♂	8 ♀
Debidue Beach	5/4–6/1/44	Man		3	2 ♂	1 ♀
Myrtle Beach	5/26–8/21/44	Man		11	42 ♂	36 ♀
	12/22/44	Fox			1 ♂	
	3/25–5/4/45	Man		13	14 ♂	15 ♀
Amblyomma dissimile						
Georgia						
Hinesville	2/9/44	Tortoise			3 ♂	
Florida						
Boca Raton	2/29–11/2/44	Snake		2	5 ♂	7 ♀
Amblyomma maculatum						
Florida						
Avon Park	8/28/43	Dragging				2 ♀
Georgia						
Hinesville	5/22/44	Man			1 ♂	
	8/31/44	Man			1 ♂	
	9/11/44	Dog				1 ♀
	9/26/44	Man				1 ♀
Macon	8/2/44	Dog			1 ♂	
Valdosta	8/20–9/30/43	Horse		1	6 ♂	13 ♀
Mississippi						
Gulfport	Sept., 1944				1 ♂	
Hattiesburg	6/6–8/10/44	Dog			1 ♂	1 ♀
	8/30/44	Man			1 ♂	

TABLE 1 (*Continued*)

Species and Locality	Date	Host or Source	Number of Specimens Collected L	N	Adults	
Amblyomma tuberculatum						
FLORIDA						
Boca Raton	6/25/43	Tortoise			1 ♂	
	11/2/44	Tortoise			1 ♂	
Carrabelle	5/18/44	Tortoise				1 ♀
	Nov., 1944	Turtle			2 ♂	1 ♀
Dermacentor albipictus						
SOUTH CAROLINA						
Myrtle Beach	12/5/44	Deer			1 ♂	
Dermacentor variabilis						
ALABAMA						
Ozark	5/16/44	Man			1 ♂	
	Oct., 1944				1 ♂	
FLORIDA						
Boca Raton	5/11/43				1 ♂	
	10/27/44	Man			1 ♂	
Panama City	4/14/44	House			1 ♂	
	4/12/44	Dog				1 ♀
	5/20/44				1 ♂	
	3/23/45	Man				1 ♀
W. Palm Beach	8/17–9/27/43	Man			1 ♂	1 ♀
	9/17–11/16/43	Dog			2 ♂	6 ♀
	3/31/44	Opossum			3 ♂	2 ♀
	6/28–7/3/44	Raccoon			8 ♂	8 ♀
	7/20/44	Dog				1 ♀
GEORGIA						
Atlanta	May, 1944				1 ♂	
	8/29/44	Man			1 ♂	1 ♀
Columbus	6/1–7/6/44	Man			1 ♂	5 ♀
Decatur	6/13/45	Dragging			1 ♂	2 ♀
	6/13/45	Dog			23 ♂	7 ♀
Hinesville	4/11–6/27/44	Man			4 ♂	2 ♀
Macon	5/18/44	Man			1 ♂	
	5/22–8/2/44	Dog			6 ♂	1 ♀
Ft. Oglethorpe	4/29/44				1 ♂	
Savannah	5/5–6/28/44	Dog			8 ♂	13 ♀
	May, 1944	Man				1 ♀
Valdosta	8/20/43	Horse			1 ♂	
Warner Robins	May, 1944				2 ♂	1 ♀
MISSISSIPPI						
Hattiesburg	5/15/44	Dog			1 ♂	
	7/5–8/25/44	Man			6 ♂	6 ♀
NORTH CAROLINA						
Durham	7/16/43	Man			1 ♂	1 ♀
	5/2/44	Tent			1 ♂	
	5/16–6/29/44	Man			4 ♂	4 ♀
	6/21/45				1 ♂	

TABLE 1 (*Continued*)

Species and Locality	Date	Host or Source	Number of Specimens Collected L	N	Adults	
Dermacentor variabilis (Cont'd)						
NORTH CAROLINA						
Goldsboro	5/8–7/3/44	Dog			11 ♂	3 ♀
	6/13–22/44	Man			2 ♂	2 ♀
Hoffman	5/24–6/30/44	Dog			44 ♂	41 ♀
	6/1–23/44	Dragging			3 ♂	3 ♀
Maxton	June, 1944					1 ♀
	7/6/44	Man				1 ♀
Swannanoa	5/1–8/7/44	Dragging			7 ♂	5 ♀
Wilmington	6/17/44	Man			1 ♂	2 ♀
	6/9/44					1 ♀
SOUTH CAROLINA						
Columbia	8/9–12/44	Man			3 ♂	2 ♀
	8/18/44	Dog				1 ♀
Florence	July, 1944				1 ♂	
Myrtle Beach	4/2–8/29/44	Man			9 ♂	2 ♀
	7/31–8/14/44	Dog			2 ♂	
	3/28–5/26/45	Man			3 ♂	1 ♀
Spartanburg	6/21/44	Man			1 ♂	1 ♀
Sumter	9/19/43	Man				2 ♀
	4/15–26/44	Dog			3 ♂	1 ♀
TENNESSEE						
Paris	8/11/43	Bridge				1 ♀
	8/3/44					1 ♀
Haemaphysalis leporis-palustris						
FLORIDA						
Boca Raton	May, 1944					1 ♀
GEORGIA						
Macon	10/7/43	Rabbit				1 ♀
	4/3/45	Rabbit				1 ♀
NORTH CAROLINA						
Goldsboro	5/30/44	Man				1 ♀
TENNESSEE						
Bairds Mill	June, 1943	Rabbit			1 ♂	
Ixodes ricinus-scapularis						
FLORIDA						
Apalachicola	11/2/44	Man				1 ♀
Avon Park	Dec., 1944					1 ♀
Boca Raton	3/18/43				1 ♂	
	10/16/43					1 ♀
	1/1–31/45	Man			1 ♂	3 ♀
Daytona	1/6/45	Man			1 ♂	
Panama City	11/22–12/22/44	Man			3 ♂	1 ♀
	5/15/45	Man			1 ♂	
Venice	12/24/43	Man				1 ♀

TABLE 1 (*Continued*)

Species and Locality	Date	Host or Source	Number of Specimens Collected			
			L	N	Adults	
Ixodes ricinus-scapularis (Cont'd)						
FLORIDA						
W. Palm Beach	1/25–2/26/45	Dog				3 ♀
	3/31/44	Opossum			2 ♂	5 ♀
GEORGIA						
Hinesville	5/5–10/8/44	Man		2		1 ♀
Valdosta	2/9/44	Horse			1 ♂	4 ♀
MISSISSIPPI						
Hattiesburg	1/8/44	Dog				1 ♀
	3/19/44	Man				1 ♀
SOUTH CAROLINA						
Myrtle Beach	10/28–12/2/43	Man			4 ♂	7 ♀
	11/2/43	Deer			9 ♂	12 ♀
	11/3/43	Fox			3 ♂	3 ♀
	11/3/43	Dog				9 ♀
	1/27–5/10/44	Man			2 ♂	8 ♀
	12/12–22/44	Deer			6 ♂	7 ♀
	12/22/44	Fox			2 ♂	2 ♀
	1/5–4/17/45	Man				5 ♀
	1/14/45	Cat			2 ♂	2 ♀
	3/12/45	Dog			1 ♂	
Rhipicephalus sanguineus						
ALABAMA						
Selma	9/14/44	House				6 ♀
FLORIDA						
Daytona	11/14/44	Dog			27 ♂	19 ♀
Marianna	3/24/44	Dragging			1 ♂	
W. Palm Beach	8/11–12/26/43	Dog		7	36 ♂	75 ♀
	1/8–10/11/44	Dog			19 ♂	25 ♀
	1/24/44	Man		1		
GEORGIA						
Albany	10/20/43	Dog			4 ♂	3 ♀
Atlanta	6/23/43	Dog			6 ♂	14 ♀
Atlanta	6/26/45	House			1 ♂	
Augusta	8/24/44	Dog		13		
Columbus	9/22/43	Dog			15A	
	Nov., 1943	Dog			6A	
	1/15–6/24/44	Dog		33	70 ♂	110 ♀
	7/3–12/13/44	House		61	61 ♂	60 ♀
	8/29/44	Man				1 ♀
	1/24–3/5/45	House		14	23 ♂	26 ♀
Hinesville	March, 1945	House				1 ♀
Macon	9/18–11/29/43	Dog		2	6 ♂	15 ♀
	3/20/45			13	4 ♂	5 ♀
Savannah	3/15–8/24/44	Dog			3 ♂	4 ♀
Ft. Screven	Oct., 1943				3 ♂	2 ♀

Table 1 (*Continued*)

Species and Locality	Date	Host or Source	Number of Specimens Collected			
			L	N	Adults	
Rhipicephalus sanguineus (Cont'd)						
Mississippi						
Biloxi	8/6/43	House			6A	
Flora	Sept., 1944			14		
Hattiesburg	1/29–6/10/44	Dog		7	37 ♂	68 ♀
Jackson	10/2/43	House			6 ♂	5 ♀
North Carolina						
Fayetteville	2/1/44	House		2		
Swanannoa	8/22/43	House		18	10 ♂	13 ♀
	1/26–3/28/44	Dog			10 ♂	11 ♀
South Carolina						
Columbia	8/29/43	House			3 ♂	10 ♀
Myrtle Beach	2/20/44	House			1 ♂	
Ornithodorus turicata						
Florida						
W. Palm Beach	5/18/44	Tortoise				1 ♀

Dragonflies (Odonata) Collected in Pennsylvania and New Jersey in 1945

By George H. Beatty, III, Merion, Pennsylvania

(*Continued from page 56*)

Erythrodiplax berenice Drury.

New Jersey: Upton Ponds, 1 ♂, 22 July.

This individual had apparently wandered from its normal brackish habitat.

Libellula deplanata Rambur.

New Jersey: Whitesbog, 1 ♀, 29 April; Upton, 2 ♂, 4 ♀, 13 May; 8 ♂, 20 May; 1 ♂, 24 June; Whitesbog, 1 ♂, 1 ♀, 29 June.

Since *exusta* Say and *deplanata* Rambur are evidently forms of the same species, these specimens from New Jersey, the tension zone of the two forms, combine the characters of both. At all manner of small ponds, ditches, and sand pits, *deplanata* was abundant in May.

Libellula julia Uhler.

PENNSYLVANIA: Bear Meadows, 16 June (seen).

Several dragonflies which could be identified as this species with reasonable certainty on the basis of the chalky white stripes on the dorsum of the thorax were seen flying swiftly about over the sluggish stream which flows through the meadows.

Libellula luctuosa Burmeister.

PENNSYLVANIA: Central Square, 1 ♂, 25 May; also seen at the following: Central Square, 29 May, 6 June; State College, 17, 19 June; Crum Creek Farm, 8 August; Central Square, 10 August; Westtown Lake, 3 Sept.

Libellula auripennis Burmeister.[8]

NEW JERSEY: Upton Ponds, 1 ♀, 29 June; seen at Upton Ponds, 30 June, 12 August.

Libellula cyanea Fabricius.

NEW JERSEY: Whitesbog, 1 ♂, 24 June; seen at Whitesbog, 29 June; Whitesbog, 4 ♂, 1 ♀, 8 July; seen at Whitesbog, 22 July.

Libellula flavida Rambur.

NEW JERSEY: Whitesbog, 3 ♂, 1 ♀, 8 July; 1 ♀, 22 July.

This species was seen ovipositing in very small ditches, in the cranberry bogs, which were found to be dried up on 12 August. No *flavida* were seen about the larger ditches.

Libellula semifasciata Burmeister.

PENNSYLVANIA: Wyola, 2 ♂, 1 ♀, 26 Apr.; 1 ♀, 17 May; Broomall, 1 ♂, 1 ♀, 22 May; 1 ♀, 26 July; and seen at Wyola, 22, 25, 29 May; Broomall, 25, 29 May; Bear Meadows, 16 June.

NEW JERSEY: Upton, 1 ♀, 29 Apr.; 1 ♀, 13 May; seen at Upton, 20 May; Upton Ponds, 24, 29, 30 June, 8 July, 12 August; Whitesbog, 24 June, 8 July.

[8] Although the writer is reluctant to discard a name of long standing, *Libellula needhami* Westfall should be probably substituted for *L. auripennis*. See Westfall, M. J., Jr., Synonymy of Libellula auripennis and L. jesseana, and the description of a new species [Trans. Amer. Ent. Soc., 68: 17-31, 1 pl., 1943].

Libellula pulchella Drury.

PENNSYLVANIA: Broomall, Penn Valley, and seen at Central Square, Wyola, State College, Bear Meadows, Spring Creek, and Crum Creek Farm, Holmes, 6 June–21 September.

NEW JERSEY: Upton Ponds, and seen at Whitesbog, Fisher's Dam, Atsion Lake, Folsom, and Lily Lake, 24 June–22 September.

Libellula quadrimaculata Linne.

PENNSYLVANIA: Bear Meadows, 1 ♂, 16 June.

Quadrimaculata was quite abundant and widely distributed in the bog area. Females were seen ovipositing in small pools in the sphagnum moss.

Libellula incesta Hagen.

NEW JERSEY: Upton, 1 ♂, 30 June; Fisher's Dam, 2 ♂, 21 Aug.; 3 ♂, 1 ♀, 28 Aug.; 1 ♂, 31 Aug.; 1 ♂, 4 Sept.; Batsto Pond, 1 ♂, 7 Sept.; and seen at Pond near Fisher's Dam, 31 Aug., 4, 7 Sept.; Branch of Friendship Creek, 31 Aug., 4 Sept.; Batsto Pond, 5 Sept., and Whitesbog, 24 June, 8 July.

Libellula vibrans Fabricius.

PENNSYLVANIA: Glenolden, Delaware Cy., 1 ♀, 31 Aug. (J. Gillespie).

Libellula lydia Drury.

PENNSYLVANIA: Broomall, Wyola; and seen at Central Square, State College, Crum Creek Farm, Westtown Lake, 26 April–3 September.

NEW JERSEY: Upton; and seen at Whitesbog, Upton Ponds, 29 Apr.–12 Aug.

Sympetrum ambiguum Rambur.

NEW JERSEY: Batsto Pond, 1 ♀, 5 Sept.; Erma, 1 ♀, 22 Sept.

These were the only individuals of *ambiguum* seen in 1945. The species was abundant in southeastern Pennsylvania, southern New Jersey, and Maryland in 1944, many specimens having been collected in localities where it had never been seen before.

Sympetrum obtrusum Hagen.

PENNSYLVANIA: Holmes, 1 ♂, 21 Sept.; Tinicum Marshes, 4 ♂, 26 Sept.; 15 ♂, 29 Sept.; 2 ♂, 8 October.

NEW JERSEY: Erma, 1 ♂, 22 Sept.

The intergradation between this and the following species makes positive identification almost impossible in many cases. The notch of the hamuli varies from one sixth to one third of the total length and the facial color varies from pale brown and grayish white to ivory and pure china-white. The difficulty arises when some of the individuals with the whitest faces are found to have deeply notched hamuli and those with very shallow notches to have brown faces. The specimens cited above have been segregated upon the basis of hamular structure alone since both cyanide fumes and drying may have affected the facial color. Such intergradation as this suggests that *obtrusum* and *rubicundulum* are not specifically distinct or that extensive hybridization occurs. The fact that *obtrusum* is on the extreme edge of its geographic range may contribute to this extreme variability. The New Jersey record is from a point which is often considered a part of the Lower Austral (Austroriparian) zone [9] and represents the first recorded occurrence of *obtrusum* in that zone.

Sympetrum rubicundulum Say.

PENNSYLVANIA: Broomall, Penn Valley, State College, Spring Creek, Echo Valley Farm, Darby Creek, Westtown Lake, Holmes, Tinicum Marshes, 17 June–8 October.

NEW JERSEY: Upton, Batsto Pond, Erma, Cape May City, 12 August–22 September.

Sympetrum semicinctum Say.

PENNSYLVANIA: Broomall, 1 ♀, 26 July; 1 ♀, 1 August; Penn Valley, 1 ♂, 30 August; seen at Broomall, 8 August.

Sympetrum vicinum Hagen.

PENNSYLVANIA: Broomall, Holmes, Tinicum Marshes, etc., 16 July–8 October.

NEW JERSEY: Upton, Whitesbog, Upton Ponds, Fisher's Dam, Pond near Fisher's Dam, Batsto Pond, Cecil, and seen at Atsion Lake, Cape May Point, 8 July–22 September.

[9] See Merriam, "Life Zones and Crop Zones of the United States" (1898). On the basis of total growing heat (sum of daily excesses over 43° F.), the Cape May peninsula qualifies as part of the Lower Austral Zone by having a t.g.h. which in most years is slightly over 18,000°. See also Clark [U. S. N. M. Bull. 157: p. 18, 1932], Forbes [Cornell Univ. Agr. Exp. Sta. Memoir 68, p. 17, 1923], Stone [Rept. N. J. State Mus., 1910, p. 41, 1911].

Leucorrhinia intacta Hagen.

PENNSYLVANIA: Bear Meadows, 1 ♂, 16 June; State College, 1 ♂, 17 June.

NEW JERSEY: Seen at Whitesbog, Upton Ponds, 24 June.

Leucorrhinia hudsonica Selys.

PENNSYLVANIA: Bear Meadows, 17 ♂, 6 ♀, 16 June.

Taken for the first time in Pennsylvania, this species was previously known from Maine, Franconia, New Hampshire, northern New York, the upper peninsula of Michigan, northern Wisconsin [10] and northward, and at high altitudes in the western U. S. It is widely distributed in the Canadian Zone but attains its greatest abundance in the Hudsonian, where it occurs in swarming hordes. At Bear Meadows, scores were seen beside those collected, including many ovipositing females and pairs in coitu. This is scarcely compatible with the idea that this locality belongs to the Transition Zone as has been hitherto taken for granted. In spite of its latitude and low altitude (1824′) the affinities of the Bear Meadows are decidedly with the Canadian Zone.

Everywhere in the great sphagnum bog *hudsonica* was in evidence, increasing in numbers throughout the day until at about four o'clock its abundance was positively distracting. Many females were teneral or juvenile, suggesting that peak abundance had not yet been reached. This species outnumbered *intacta* in a proportion of twenty or more to one.

Leucorrhinia frigida Hagen.

NEW JERSEY: Upton Ponds, 1 ♂, 24 June.

This is the first capture of *frigida* in New Jersey and the southernmost but for one in Pennsylvania.[11] It was the only *frigida* seen in 1945.

[10] See Borror [Ent. News, LI: p. 79, 1941], Leonard (Ed.) [Cornell Univ. Agr. Exp. Sta. Memoir 101: p. 56, 1926], Combs [Occ. Pap. Mus. Zool., Univ. Mich., 41: p. 7, 1917], and Muttkowski [Bull. Wisc. Nat. Hist. Soc., 6: p. 112, 1908] respectively, for records of these occurrences which, by their very paucity, indicate that they are on the extreme southern edge of the range of *hudsonica*.

[11] See footnote 5.

Pachydiplax longipennis Burmeister.

PENNSYLVANIA: Broomall, Central Square, Bear Meadows; seen at State College, Crum Creek Farm, 22 May–8 August.

NEW JERSEY: Whitesbog, Upton Ponds, Batsto Pond, Cape May City; and seen at Fisher's Dam, Pond near Fisher's Dam, 24 June–22 Sept.

Erythemis simplicicollis Say.

PENNSYLVANIA: Central Square; and seen at Echo Valley Farm, Crum Creek Farm, 25 May–10 August.

NEW JERSEY: Upton Ponds, Fisher's Dam; seen at Batsto Pond, Lily Lake, Whitesbog, 24 June–22 September.

Pantala flavescens Fabricius.

PENNSYLVANIA: Tinicum Marshes (seen), 26, 29 Sept., 5 October.

NEW JERSEY: Upton Ponds, 1 ♂, 24 June; Cape May City, 1 ♀, 22 Sept.; and seen, Cape May Point and Lily Lake, 22 Sept.

This species was abundant at Cape May, apparently being part of the autumnal migration.

(To be continued)

A Translation of the Introduction and Preface to Meigen's 1800 Paper on Diptera [1]

BY JANET L. C. RAPP

At a time when Dipterists are in danger of losing the familiar family names in favor of those which have so-called priority, it seems worth-while to publish a translation of the introduction and preface to Meigen's 1800 paper on Diptera. A translation in itself might be of little value, since the French is not difficult, were it not for the fact that the paper is not generally available. The copy used for this translation belongs to the University of Illinois Library and is a photostat of an original copy owned by the Academy of Natural Sciences, in Philadelphia.

From a rapid reading alone one can easily understand that Meigen did not intend this for a great work, that it was merely a sample or prologue. Indeed it was not written for the learned

[1] Contribution No. 256 from the Department of Entomology, University of Illinois, Urbana, Illinois.

entomologists of the day, but for the amateurs. For this reason he even used a different system of classification from the one planned for his advanced work, so that they could more readily comprehend. Furthermore, it was only because of the urging of his friend Baumhauer that he even published at that time. Baumhauer believed that the idea would be so well accepted that his friend would drop the study of Botany, which was occupying all of his time, and return to the classifying of Diptera. Note, however, it was the idea of work along this line and not the actual work accomplished that was important.

The author has attempted to gain an English version as close to the original French as possible. Sometimes, of course, this leads to rather stilted English. Occasionally a rather free translation has been substituted for too clumsy a literal one.

This paper appeared as a pamphlet of 40 pages published by J. J. Fuchs in Paris in 1800.

New Classification of Flies with Two Wings (Diptera L.) After an Entirely New Plan

By J. G. Meigen

Introduction

The author of this small sample, Citizen Meigen, having been collecting indigenous insects for a long time, principally applied himself to observing those of the class Diptera, or flies with two wings. The preference which he showed for them, comes from his ardent desire to clarify, by repeated and sustained observations, this interesting branch of entomology, still in the cradle and open to quantity of new discoveries. Consequently, he began to draw all the Diptera which he was able to collect, as well as the most remarkable parts of the body, gross or microscopic, such as the wings, the feet and the proboscis.—In examining these parts in the greatest detail, he soon observed that the genera of Diptera, comprised in the best known methods, were insufficient for adding to them this or that species; that their characteristics were too general, too ambiguous; and that they often included species which did not have any relationship between themselves. Thus, is it necessary to acknowledge that this part of entomology was only outlined and that nothing less than a sustained attention, a patience without bounds, was necessary to examine so scrupulously, not to say minutely, all the visible parts of the insect, in imitation of my friend; and to establish after that and his drawings, the characteristics of each of the genera contained in this sample? Among all the parts which make up the body of a dipteran, the wings, by their singular structure and the branching of their veins infinitely varied but always constant in the species of the same genus, seemed to him more suitable than any other less apparent part to form the essential characteristics of each genus. He imparted to me his plan which seemed to me good and unique. I encouraged him with my best wishes, and gave him some Diptera collected on a journey in Italy, a country extremely rich in insects, but, on the other hand, very poor in zealous or intelligent observers.

Before his work advanced, to my regret, major affairs compelled him to suspend it. I tried at various times to make him take it up again, but uselessly: botany then exclusively occupied all his moments of leisure. This science offered a more vast field for his active and curious spirit. Finally at my return from Paris, where I had had the honor of meeting several distinguished entomologists who liked his plan, I returned to the charge and ended by persuading him to publish, not the entire work (an enterprise so costly it would have exceeded, at the moment, his energies and his means) but at least a kind of preamble, which would be able to serve as the introduction of the work, and which, so as not to anticipate the end, would contain absolutely only the genera. As I had to return to Paris, he gave me the task of having it printed. I will do this with pleasure, knowing by experience that the most insignificant entomological treatise more or less attracts the attention of amateurs.

Thus, here is the small sample that I offer them hoping that it will merit their approbation and that, encouraged by so powerful an incentive, Citizen Meigen will with a new ardour again take up his planned work on the Diptera, and will enrich by his discoveries this part of entomology still so little studied. However, before ending, I ought to fix the attention of the naturalist for a moment on the last genus of the classification, named *Cyanea:* its simple and unique character, *without antennae,* is very striking; also should it seem strange to him, when he knew nothing of it, that until this day, neither Linnaeus nor Fabricius has made mention in their immortal nomenclatures of a single species of Diptera which was devoid of this organ.—This exception to the general rule is, however, although one doubts it, beyond doubt; for, besides the species of which the author speaks, I have discovered another of them in the neighborhood of Aix-la-Chapelle, in the month of messidor, year 6 (10th month of the first republican calendar, beginning on the 19th of June) which will be figured in his time in the planned work.—This important observation, at the same time that it alters the generally held opinion that in the insects the artistically organized antennae serve too as the seat of one or several senses, will again confirm this constant truth, that Nature, in her works, loves to deviate from rules that we attribute to her so freely. In noticing the progressive reduction in the length of the antennae in the different genera of Diptera (for example, Hippobosca which has very small ones), the observer could very well infer the existence of a fly in which the antennae would be lacking or at least imperceptible to our eyes without the aid of better microscopes.

Moreover, if the amateur has some liking for me for having made known to him a zealous entomologist, he will undoubtedly pardon me for saying a word about a small collection of Lepidoptera collected quite some time ago in my native country, and always enlarged on my different journeys in Germany, Italy, and Switzerland. I wait before eventually giving a systematic catalogue of it; while waiting I beg the amateur to be persuaded that I will yield with pleasure to the method of exchanges; a method so simple and so customary, for procuring without cost, the indigenous species which are lacking to one or the other of two parties. Plate 141, Noct. 62 as well as the 84th Contin. Bomb. Tab. 5, fig. 1 of the German work of Esper, on European Lepidoptera where five depicted species are found that I have imparted to the author, among others *Noctua orichalcea* Fabricius which, according to him, is found at Tranguebaren in

Asia, can give connoisseurs an idea of my collection, as well as the richness yet unknown and existing in Italy, their native country.

Paris, Messidor 10, year 7
M. BAUMHAUER

Preface

Seven years have passed since, in contemplating my small collection of flies with two wings, the idea came to me of making a new classification based on the veins or nerves of the wings. I told my idea to several amateurs who approved it. Accordingly, I began to make colored drawings of these small creatures and to arrange them. I soon saw that a system formed after this plan would be in much better accord with the first stages and the metamorphosis of these insects than are all those made up to the present. I planned to publish my observations some day when they would be sufficiently increased. The present sample is regarded as the introduction of this work, with the difference that, instead of taking as the characters of genera the veins of the wings, I have substituted here other characters more within the scope of amateurs. All the species found here have been discovered in our countries, with the exception of a small number, indigenous in Italy, which have been imparted by a zealous amateur, Citizen Baumhauer, from Aix-la-Chapelle. It is evident that by adding exotic species, the number of genera would be much larger; but I do not know any of them except by descriptions or rather inexact figures.

I beg the connoisseurs and amateurs to judge with indulgence this first sample which will be followed, if it secures me their approbation, by a work much more developed and enriched with exact figures, which will all be made after life. Moreover, I will spare nothing to rectify the errors which may have slipped into this small pamphlet, in order to clarify this branch of natural history, insofar as it will depend on me.

Holberg, near Aix-la-Chapelle
The first of Germinal—year 7
(7th month of the calendar of the first French Republic from 21 March to 19 April).

Personal

Dr. R. E. Snodgrass is visiting lecturer at the University of Minnesota during the present quarter. Although he has been on the retired list of the Bureau of Entomology and Plant Quarantine since last summer, Dr. Snodgrass has continued his researches as usual at his new office in the United States National Museum and has also retained his connection with the University of Maryland. His "Anatomy of the Fleas" has just appeared (Smithsonian Miscellaneous Collection, vol. 104, no. 18, 89 pages, 21 plates) and other works are in preparation. Dr. Snodgrass was elected a correspondent of the Academy of Natural Sciences in 1945.

Current Entomological Literature

COMPILED BY CHARLES HODGE IV, EDWIN T. MOUL, MAURICE E. PHILLIPS AND HENRY K. TOWNES JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in Entomological News are not listed.

GENERAL—Anon.—Chronological list of works of Auguste Lameere. [21] 7: 205–268. **dos Passos, C. F.**—Photography of types of Lepidoptera. [9] 40: 166–169. **Heegaard, P.**—Phylogeny of arthropods. [6] 37A (no. 3): 1–15. **Jones, S. E.**—Variations in abundance of invertebrates in Wm. Trelease woods. [1] 35: 172–192. **Kennedy, C. H.**—Use of ether in collecting ants. [20] 46: 10–12. **Knowlton, G. F.**—Cats eat grasshoppers (attracted to lights). [9] 14: 18–19. **Rau, P.**—Encyclopedias again. [9] 41: 6–7. **Wolfenbarger, D. O.**—Dispersion of small organisms. [1] 35: 1–152.

ANATOMY, PHYSIOLOGY, MEDICAL—Airy Shaw, H. K.—Hyalopterus dactylidis Hayh. and Hyalopteroïdes pallida Theob. (Hem.-Hom.). [13] 74: 30-35. **Barnes, S.** —Influence of biological factors on resistance of bed bugs to D.D.T. [10] 36: 419-422. **Brindley, T. A.** et al.—The pea weevil and methods for its control. [Farmers Bull.] No. 1971, U. S. D. A. **Ferreira Lima, A. D.**—Schistocerca paranensis in Brazil. [7] 1: 139-145. **Goodrich, E. S.**—The study of nephridia and genital ducts since 1895. (Continued) Arthropoda. [26] 86: 303-324, ill., 1945. **Hovanitz, W.**—Note on the direction of flight of butterflies in northern Florida. [9] 40: 170-171. **Leclercq, J.**—Effect of atmospheric humidity on eggs of Carausius (Dixippus) morosus Br. [24] 21: 3-5. **Podtiaguin, B.**—Data for the medical and veterinary study of mosquitoes in Paraguay. [27] 6: 51-61. **Rapp, J. L. C. & W. F, Jr.**—Preliminary list of spiders of the great swamp. [9] 41: 4-5. **Rau, P.** —Notes on the behavior of a few solitary wasps. [9] 41: 10-11. **Roonwal, M. L.**—Metasternal interspace a phase character in Schistocerca gregaria (Forsk.). [24] 21: 13-15. **Severin, H. C.**—Grasshoppers ovipositing in a pile of coal. [9] 40: 159-160. **Smith, M. R.**—Ant Host of the fungus Laboulbenia formicarum Thaxter. [23] 48: 29-31. **Watson, J. R.**—Distributional notes on two species of Thysanoptera. [14] 28: 53. **Wellington, W. G.**—Laboratory method for determining the minimum active temperatures of insects. [11] 77: 135-136.

ARACHNIDA & MYRIOPODA—Chamberlin, R. V.—Two new species of the milliped genera Chonaphe and Aniulus. [22] 59: 31-34. **Chamberlin, R. V.**—New American genus in the chilopod family Himantariidae. [22] 59: 35-38 (*). **Clark & Zetek.**—The Onychophores of Panama and the Canal Zone. [25] 96: 205-213. **Ewing, H. E.**—Notes on American chiggers. [22] 59: 21-28 (*). **Farner, D. S.**—Note on a gravid Trombiculid mite. [23] 48: 32-34. **Gertsh & Davis.**—Spiders from Mexico v. [2] 1313: 1-11 (*). **Goodnight, C. J. & M. L.**—Phalangid fauna of Mexico. [2] 1310: 1-17 (*). **Hoff, C. C.**—Notes on pseudoscorpions from Illinois. [28] 38: 103-110. **Jellison, W. L.**—A new mite, Laelaps aplodontiae from Aplodontia, ill. [15] 31: 373-374. **Kaston, B. J.**—North American spiders of the genus Ctenium. [2] 1306: 1-19 (*). **Mello-Leitão, C. de.** —Three new species of Gasteracanthinae. [3] 17: 261-267, +1 table (S). **Rapp, J. L. C. & W. F., Jr.**—(See Anat., etc.). **Wharton, G. W.**—Two new species of Acariscus: A. pluvius and A. anous (Acarinida, Trombiculidae). [15] 31: 401-405, ill.

SMALLER ORDERS AND ORTHOPTERA—**Beatty, G. H., III.**—Odonata collected and observed in 1945 at two artificial ponds at Upton, New Jersey. [9] 40: 178–187. **Boder, R.**—Beitrag zur Kenntnis der Thysanopteren—Fauna von Basel und Umgebung. [29] 53: 136–218, ill. **Ferreira Lima, A. D.**—(See Anat., etc.). **Gisin, H.**—Hilfstabellen zum bestimmen der holarktischen Collembolen. [29] 55: 1–130, ill., 1943 (k). **Handschin, E.**—Materialien zur Revision der Collembolen. Die Gattung Ceratrimeria C. B. sensu Womersley. [29] 53: 265–284, ill. **Hanson, J. F.**—Morphology and taxonomy of Capniidae (Plecoptera). [1] 35: 193–245 (*). **Knowlton, G. F.**—Pygmy mole cricket. [9] 40: 169. **Knowlton, G. F.**—Neuroptera in light trap. [9] 41: 19. **Leclercq, J.**—(See Anat., etc.). **Needham, J. G.**—Some dragonflies of early spring in South Florida. [14] 28: 42–47. **Roonwal, M. L.**—(See Anat., etc.). **Severin.**—(See Anat., etc.). **Silvestri, F.**—Thysanura of Peru, with two new Argentine species. [8] 4: 444–458. **Werneck, F. L.**—Os tricodectideos dos Roedores (Mallophaga). [17] 42: 85–150, ill., 1945 (*).

HEMIPTERA—**Airy Shaw, H. K.**—(See Anat., etc.). **Barnes, S.**—(See Anat., etc.). **DeLong, D. M.**— Mexican species of Idiodonus (Homoptera–Cicadellidae). [20] 46: 13–30. **Drake & Hambleton.**—New species and new genera of American Tingidae (Hemiptera). [22] 59: 9–16. **Drake & Harris.**—A New Mesoveliid from Ecuador. [9] 41: 8–9. **Knowlton, G. F.**—Pseudoepameibaphis Aphid Records. [9] 41: 5. **Knull, D. J.**—Erythroneura of the Obliqua group from Ohio and Tennessee (Homoptera: Cicadellidae). [20] 46: 45–49. **Zavaleta, R. D.**—Siphunculata from birds. [4] 16: 431–434 (S*). **Zavaleta, R. D.**—Gliricola mexicana n. sp. of Gyropidae. [4] 16: 435–444 (S). **Zavaleta, R. D.**—New species of Esthiopterum (Anoplura). [4] 16: 445–449 (S).

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DIPTERA—**Bohart, R. M.**—New species of mosquitoes from the Marianas and Okinawa. [22] 59: 39–46. **Brumpt**

& Dao Van Ty.—Distribution des biotypes d'Anopheles maculipennis en France. [5] 19: 69–73, 1942. **Brumpt, E.**—Mécanisme d'éclosion des Moustiques. [5] 18: 75–94, ill., 1941. **Callot, J.**—Sur Culex hortensis and Culex apicalis à Richelieu (Indre-et-Loire). [5] 19: 129–141, ill., 1942–43. **Callot & Dao Van Ty.**—Localités françaises nouvelles pour Culex Theileri, Culex (Barraudius) modestus et Culex (Neoculex) impudicus. [5] 19: 142–150, ill. **Causey & Damasceno.**—Estudo sobre flebotomus no vale Amazonico. Part II. Descricao de F. dunhami, F. melloi et F. wagleyi. (Diptera: Psychodidae.) [17] 42: 17–29, ill., 1945. **Cerqueira & Paraense.**—Una nova especie de Aedes transmissora de Plasmodium gallinaceum. [17] 42: 11–15, ill., 1945. **Coutinho, J. O.**—Contribucao para o estudo dos vetores de malaria no Brasil, Anopheles (Nyssorhynchus) darlingi Root, em campos, no estado do Rio. [17] 42: 263–280, 1945. **Fattig, P. W.**—Tabanidae of Georgia. [12] 4: 1–26. **Galliard, H.**—Sur le mécanisme d'éclosion des nymphes de Culicides. [5] 18: 247–250, ill., 1941. **Galliard, H.**—Particularités du developpement de la nymphe de Ficalbia metallica. [5] 18: 245–246, ill., 1941. **Hill, R. B. & C. M.**—Phoriomyia hirsuta, a n. sp. from Jamaica. [23] 48: 39–41. **King & Hoogstraal.**—Two n. sp. of Aedes (Finlaya) from New Guinea. [23] 48: 37–38. **Paraense, W. L.**—A transmissao se Plasmodium gallinaceum pelo Aedes. (Ochlerotatus) lepidus. [17] 42: 81–84, 1945. **Pechuman, L. L.**—New species of Glutops. [11] 77: 134–135. **Podtiaguin, B.**—(See Anat., etc.). **Rapp, W. F. Jr.**—Catalogue of the types of genera and subgenera of Psychodidae. [9] 40: 172–177. **Rapp, J. L. C.**—The Stratiomyidae of New Jersey. [9] 40: 188–191. **Ristorcelli & Dao Van Ty.**—Morphologie de la femelle de Phlebotomus panamensis Shannon, 1926. [5] 18: 67–71, ill., 1941. **Ristorcelli & Dao Van Ty.**—II. Phlébotomes d'une region de Colombie où la veruga du peron est devenue endemique depuis trois ou quatre ans. [5] 18: 72–74 1941 (*). **Ristorcelli & Dao Van Ty.**—III Phlebotomes d'une region de Colombie ou la verruga du peron est devenue endemique depuis deux ou trois ans. [5] 18: 251–269, ill. (*). **Seguy, E.**—Étude biologique et systematique des sarcophagines myiassigenes du genre Wohlfahrtia. [5] 18: 220–232 (k*) ill., 1941. **Seguy, E.**—Insectes diptères du genre Hippelates Loew recueillis en Colombie et au Venezuela—liste et caractéres des espéces. [5] 18: 233–244 (k) ill., 1941. **Wilcox, J.**—New Nicocles with a key to the species (Diptera, Asilidae). [9] 40: 161–165.

COLEOPTERA—Balfour-Browne, J.—Aquatic Coleoptera of Oceania. [19] 18: 103–132. **Brindley, T. A.**—(See Anat., etc.). **Brown, W. J.**—Food plants and distribution of Calligrapha in Canada. [11] 77: 117–133 (*). **Fender, K. M.**—A n. sp. of Podabrus. [9] 41 : 12. **Fisher, W. S.**—Synopsis of the cerambycid beetles of genus Stenosphenus Hald. in America north of Mexico. [16] 36: 86–93 (*). **Islas, S. F.**—New genus and three new species of Mexican Aphodiinae. [4] 16: 451–457. **Landeiro, R.**—A broca da peroba (Stizocera plicicollis). [7] 1 : 123–126 (S). **Saylor, L. W.**—New genus and species in the Melolonthinae from Guatemala. [23] 48: 41. **Saylor, L. W.**—Revision of the scarab beetles of the genus Dichelonyx. [9] 40: 137–158 (k). **Saylor, L. W.**—A New West Indian Scarab. [9] 41 : 1–3. **Silvestri, F.**—New genus of termitophilous Scarab from Brazil. [8] 3: 344–353 (*). **Zimmerman, E. C.**—Two new Storeus from the Philippines (Coleoptera, Curculionidae). [19] 18: 139–144. **Zwaluwenburg, R. H. van.**—Notes on Samoan Elaterid beetles. [19] 18: 95–101 (*).

HYMENOPTERA—Gomes, J. G.—A new chalcid. (Minapis pseudonigra n. sp.) [7] 1 : 127–129 (S). **Pate, V. S. L.**—New Pemphilidine wasps. I Ectemnius. [18] 171: 1–14. **Pate, V. S. L.**—On two species of Oxybeles at Washington, D.C. [9] 40: 165. **Pate, V. S. L.**—Vernacular vs. Latin names in the Bees. [9] 41 : 13. **Pate, V. S. L.**—The species of the Gorytine Genus Trichogorytes. [9] 41: 15–17. **Rau, P.**—(See Anat., etc.). **Smith, M. R.**—(See Anat., etc.).

LIST OF JOURNALS CITED

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28.—Trans. Illinois Sta. Acad. Sci. 29.—Verhandl. d. Naturfors. Gesells. in Basel.

Review

INSECT DIETARY: AN ACCOUNT OF THE FOOD HABITS OF INSECTS. By Charles T. Brues. Harvard University Press, Cambridge, Mass., 1946. Pp. xxvi + 466. (Illustrated.) $5.00.

It is astonishing how great a portion of entomological science has necessarily been included in this book on food habits. Many phenomena are discussed dealing with the relations of insects to the animate and the inanimate world about them, with growth and development. The approach is very comprehensive and always from the point of view of the entire insect. Details of the chemistry of food use within the insect (metabolism) are not included.

The first chapter deals with the abundance and diversity of insects and cites individual records of actual numbers found in many insect populations. The second deals with food habits in a broad way and as related to growth, structure and surroundings. Then follow three chapters on "vegetarianism," including one on herbivorous insects and the very valuable chapters on gall insects and on fungi and microbes as food and symbioses with microorganisms. The remaining chapters treat of "carnivorism" and include accounts of predator insects, parasitism, blood-sucking and other external parasites, entomophagus insects, and insects as food. The last considers them as food for various forms of plant life from bacteria and fungi to the flowering plants and for animals from protozoa to man himself.

Much of the information given is not available elsewhere in a form that the average entomologist could find and enjoy reading. Yet it is of a sort that will interest all that have a predilection for insects whether they ordinarily pursue morphology, ecology, taxonomy or some other specialty. In the foreword, Dr. Brues states that " biology has failed to simply its problems" and pleads for a broadening of interest on the part of specialists. And indeed, in the writing of this book he has encouraged informative reading by avoiding the temptation to dazzle the reader with a plethora of confusing detail and by keeping the text very readable throughout. At the same time, he has given a selected bibliography at the end of each chapter that will serve as a key to the literature. These references together comprise 191 pages or over 40 percent of the volume. The book is written in an excellent style, clear and straightforward, and is enlivened here and there with humorous sallies.—R. G. SCHMIEDER.

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.

Lepidoptera—Am still collecting here and have only fine specimens for exchange. H. W. Eustis, Woodbine Rd., Augusta, Ga.

Wanted—Viennese Entomological Printing Press, for printing 3, 3½ and 4 type data labels. Kent H. Wilson, 430 Ridgewood Road, Fort Worth 7, Texas.

Wanted—Heteroptera from all parts of the world, all families except Miridae. Will buy, exchange or determine. S. and C. Amer. species esp. desired. John C. Lutz, 6623 Lansdowne Ave., Philadelphia 31, Pa.

Wanted—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

Arctic Lepidoptera on hand, including Erebia, Oeneis and Brenthis. R. J. Fitch, Lloydminster, Sask., Canada.

Odonata—Will buy or exchange North and Central American species, both imagos and nymphs. Also will exchange other orders for Odonata. Carl Cook, Crail Hope, Kentucky.

I want to collect Rothschildia farbesi, agapema, galfina and io moths for interested persons. E. Frizzell, Route 4, San Benito, Texas.

Wanted—Information as to the existence and present location of a copy of Solodonikov, S. V. Contribution à l'étude de la faune et de la biologie des larves des Libellules du Donetz et de certains de ces affluents. [In Ukrainian.] Trav. Soc. Nat. Charkow 52: 249–268. 1929. [Quoted from Zool. Rec. 1936, Ins. p. 147, No. 3114.] P. P. Calvert, P. O. Box 14, Cheyney, Penna.

Wanted—Crane-flies (Tripulidae) of New Guinea, New Caledonia and Neighboring Islands, for revisional purposes. Also, names and addresses of individuals or institutions possessing any of these flies. Correspondence solicited. Chas. P. Alexander, Fernald Hall, Amherst, Mass.

I want to collect Pennsylvania insects from York and Adams Co. E. W. Mange, 307 W. Walnut St., Hanover, Pa.

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ENTOMOLOGICAL NEWS

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Themira nigricornis Meigen in North America, With a Revised Key to the Nearctic Species of Themira (Diptera: Sepsidae)

By George Steyskal, Detroit, Michigan

Among material kindly submitted for determination by G. C. Crampton were three male specimens of a species of *Themira* different from any known to occur in North America. Consultation of the Duda monograph [1] showed that the specimens, captured in Cambridge, Mass., on April 24, May 16, and May 18 respectively, 1940, were *Themira nigricornis* Meigen, a species which belies its name in having antennae less black than its nearest relative, *T. putris*. Professor Crampton has graciously allowed the writer to retain the specimens in his collection.

In order to show the relationships of *T. nigricornis*, as well as those of two species described by Curran, the following key is offered. The genus is apparently restricted to the Holarctic region.

Key to the American Species of Themira

1. Sternopleura largely or wholly polished..................2
   Sternopleura entirely whitish pruinose...................5
2. Males; fourth sternite with lateral tufts of long hair; fore legs greatly deformed (male of *T. notmani* unknown)...3
   Females (female of *T. maculitarsis* unknown)...........4

[1] Duda, O., 1926, Monographie der Sepsiden, Ann. naturhist. Mus. Wien, 39: 1–153, 1 folding chart, pls. 1–7; 40: 1–110, pls. 1–9. Malloch (1928, Proc. Linn. Soc. New South Wales, 53: 611) has shown that although the first part of the Duda work (palaearctic and nearctic regions) bears the date December, 1925, it did not appear until January 16, 1926; the second part appeared on December 10, 1926.

3. Middle tarsi yellowish; fore basitarsus as long as the two following joints together, the second joint articulating at one-fourth from the tip of the basitarsus (Hudson Bay—1917, Wash. Agric. Expt. Sta. Bull. 143: 46)
♂ *T. malformans* Melander and Spuler

Middle tarsi with each joint whitish basally, black apically; fore basitarsus slightly longer than the second joint, which articulates at the middle of the basitarsus (Birtle, Manitoba—1929, Amer. Mus. Novitates No. 339:10)
♂ *T. maculitarsis* Curran

4. Legs mostly reddish; fore femora without bristles below (Grant Mt., Essex Co., N. Y., running with ants—1927, Amer. Mus. Novitates No. 275: 2) . . ♀ *T. notmani* Curran

Legs black; fore femora on under side with two approximate spines. . . . . ♀ *T. malformans* Melander and Spuler

5. Small species 2–3 mm. in length; anterior notopleural bristle not half as long as posterior. 6

Larger species 4–5 mm. in length; anterior notopleural bristle over half as long as posterior. 8

6. Fore coxae yellow; male fore femora nearly straight, only slightly sinuate on upper side; female fore femora with two or three small stout bristles on middle of under side (N. Y., Conn., Pa., Ill. [types]; Mich.—1917, Wash. Agric. Expt. Sta. Bull. 143: 46)
T. flavicoxa Melander and Spuler

Fore coxae dark brown to blackish; male fore femora strongly deformed, strongly sinuate on upper side, with a long bristle at base of under side; female fore femora without bristles near middle beneath, with but one, or with four or five. 7

7. Male middle tarsi with last three joints cordate, wider than long; female fore femora on under side without or with but one small bristle near middle (Wash., Ore., Mont., Vt., Pa., [types]; N. Y. (Leonard)—1917, Wash. Agric. Expt. Sta. Bull. 143: 45, fig. 23 [on pl. opp. p. 80])
T. latitarsata Melander and Spuler

Male middle tarsi with last three joints not broadened, longer than wide; female fore femora with four or five small, closely spaced bristles near middle beneath (Islands of Washington Sound, Wash.—1917, Wash. Agric. Expt. Sta. Bull. 143: 44) . . . *T. incisurata* Melander and Spuler

8. Antennae wholly black; cheeks white-pruinose; mesonotum with very thin brownish pruinosity, supra-alar bristle strong; ends of third and fourth veins almost parallel; MALE: long lateral hair tufts present on fourth sternite; fore femora with backwardly bent spine in emargination;

fore tibiae with conspicuous pale lappet at middle (Europe; widespread in northern nearctic region—1761, Fauna Suecica, 2d ed.: 456; 1917, Melander and Spuler, Wash. Agric. Expt. Sta. Bull. 143: 43, f. 25 [on pl. opp. p. 80]; 1926, Duda, Ann. naturhist. Mus. Wien 39: 92, pl. 3, f. 13) .... *T. putris* Linnaeus

Antennae reddish basally; cheeks brown, not pruinose; mesonotum with rather heavy brownish pruinosity, supra-alar bristle lacking; third and fourth veins strongly convergent; MALE: without tufts on fourth sternite; fore femora with distally inclined spine in emargination; fore tibiae without lappet (Europe; Cambridge, Mass.—1826, Syst. Beschr. 5: 291; 1926, Duda, Ann. naturhist. Mus. Wien 39: 94, pl. 3, f. 14) .... *T. nigricornis* Meigen

Themira minor is not included in the above key; lacking humeral bristles, it belongs in the genus *Enicomira* Duda, as shown in the writer's key to the American genera of Sepsidae (Pan-Pacific Ent., 19: 93, 1943). Duda has expressed the opinion that *T. incisurata* might equal *T. pusilla* Zett. and that *T. flavicoxa* might equal the poorly known *T. gracilis* Zett.

Some Fungus-Growing Ants Eat and Harvest Wild Fungi

By George N. Wolcott, Agricultural Experiment Station, University of Puerto Rico

The unique agricultural habits of the fungus-growing, leaf-cutting, or "parasol" ants of the neotropics are supposed normally to trend toward one-crop farming. The pieces of leaves of plants which the larger workers are seen carrying on their backs "like parasols" are comminuted inside the nest into a substratum on which is grown in pure culture a specific symbiotic fungus which is the only food of the ants. Thus, to have these ants eating wild and uncultivated fungi, and cutting up the wild fungus, as they normally would the leaves of trees, and carrying bits of it into the nest seems a deliberate and wanton contamination of the pure culture, besides being a reversion from an agricultural stage of culture to one much more primitive in which natural growths are eaten immediately, and the incidental surplus brought into the nest.

Some laborers of the Instituto Agronomico do Norte, at Belém, Pará, Brasil, engaged in clearing the land for planting rubber, had discarded an unbarked but trimmed pole beside the path in the forest leading to the clearing where their huts were located. On this prostrate pole, towards the end of the rainy season, an abundant growth of "oyster" fungi had appeared, and when observed on May 24, 1945, the part of it overgrown with fungi was serving as a path on which the fungus-growing ants were carrying pieces of cut-up leaves to their nest. Some of the ants, however, had been diverted from their task, and were intently feeding on the edges of the fresh white oyster mushrooms, while minims running about below were cleaning up all the chips. When the procession arrived at the butt end of the pole, it consisted of ants carrying only bits of green leaves, but when it left the pole for the nest, every third or fourth ant carried a white burden on its back: a bit of freshly-cut fungus.

Observed early the next morning, some fungi had been eaten down to their main stems, and the ants were beginning on others that may have developed during the night. Time and tide wait for no man, or ant, especially in a Brasilian forest, and numerous ghostly white beetle larvae were also feeding on the fungi, as was discovered when the fungus-infested part of the pole was brought into the guest house of the Instituto to dry. The beetle larvae cleaned out the stems of the fungi until only a hard, dry shell remained, and then aestivated until a fresh supply of polypore fungus was supplied them in Puerto Rico. This proving acceptable, they promptly continued growth and development, eventually becoming small, shining, oval, bright yellow beetles, identified by Mr. W. S. Fisher of the U. S. National Museum as a species of *Mycotretus* (Erotylidae), a genus of which eighty species have been recorded from Brasil.

The master carpenter of the Instituto identified the wood of the pole as being "cupiuba," of which he had additional lumber in his shop. Cupiuba is *Goupia glabra* Aubl. a reasonably common tree in the Amazon and Guiana forests, favorably known because of its resistance to the attack of dry-wood termites, and extensively used in construction.

The least-eaten oyster fungus available was dried in the herbarium-oven of Dr. W. Andrew Archer, and, via diplomatic pouch, submitted by Dr. H. M. Langford to Mr. John A. Stevenson, Senior Mycologist in charge, Division of Mycology and Disease Survey, Beltsville, Maryland. Of it he writes, under date of July 11, 1945, as follows:

"The mushroom which the ants were cutting up and carrying off to their nest is a species of *Pleurotus*. The common "oyster" mushroom is a member of this genus. What the Brazilian or other tropical species of this genus are, no one knows. I looked through Moller's classical work on the fungi grown by the leaf-cutting ants of Brazil, and the species involved, in his account at least, are distinctly not of the genus *Pleurotus*. Perhaps the ants were using this form for food direct, and not mixing it into their fungus plantations."

Specimens of the ants eating and carrying to the nest the *Pleurotus* were determined by Dr. Neal A. Weber of the University of North Dakota as being *Acromyrmex* (*A.*) *coronatus* Fabricius. To be sure, this is not the most specialized form of the Myrmicine tribe Attii, but is given by Wheeler as being next to the least primitive and the nearest to *Atta* s. str. It should therefore be among the least likely to exhibit such recessive traits as eating wild fungi and harvesting them into its nest.

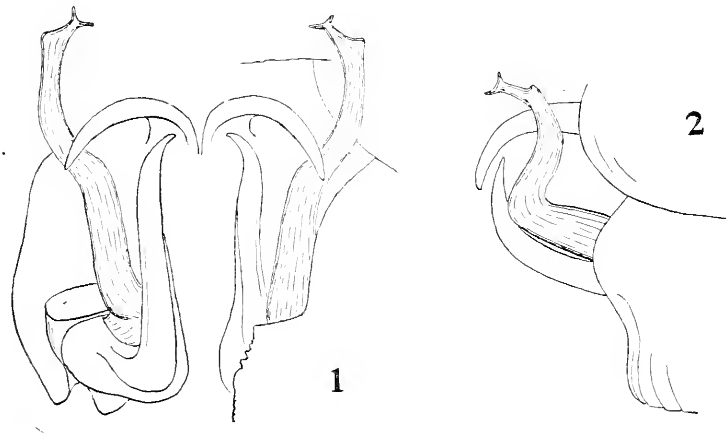
Texophon, a New Genus in the Diplopod Family Lysiopetalidae

By Ralph V. Chamberlin

In a small collection of millipeds and centipeds taken in Texas from nests of the wood rat *Neotoma micropus* Baird, by Maj. D. E. Hardy, were two males representing the interesting new species and genus here described. Taken at the same time from these nests were representatives of two other millipeds, *Aniulus prosoicus* Chamberlin and *Siphonophora texascolens* Chamberlin. The types of the new form are at present retained in the author's collection.

Genus **TEXOPHON**, new

Distinguished from *Spirostrephon* and *Delophon* in the structure of the gonopods. In these the principal blade is simple, not bent laterad into a subuncate process as exhibited by *Spirostrephon* and lacking the subapical trifurcate process in the latter; distally somewhat sigmoidally flexed and curving forward; from outer side of base of each a slender, less sclerotized, simple slender process curving about caudal side and then paralleling the gonopod proper, a pair of shorter pale processes arising cephalad of gonopods and distally curving caudo-ectad.



Texophon nessius, n. sp.

Fig. 1. Gonopods of male, ventral view, with exoskeleton removed on one side.
Fig. 2. Left gonopod in situ, ectal view.

Texophon nessius, new species

Body yellowish with a dark longitudinal dorsal band geminated by a narrow median yellow stripe. Head black between eyes and antennae, the vertex covered with a network of dark lines. Legs yellow. Antennae dusky. Antennae long, filiform; second and third articles longest, subequal, the fourth and fifth somewhat shorter, with the sixth next in length. Eye patch large, composed of 7 or 8 vertical series of ocelli; e.g., from behind forward, 8, 8, 7, 7, 6, 5, 4.

Collum with 20 crests across caudal border low, subequal in length.

First two pairs of legs in the male with a median ventral comb of hairs. The other anterior legs with ventral surface studded with numerous short setose points arising from nodular bases. Third legs in types with fungiform or pustular extrusions from coxae.

Gonopods as shown in figs. 1 and 2.

Number of segments in male holotype, 50.

Length, about 19 mm.; diameter, about 1.2 mm.

Locality:—TEXAS: Laguna Madre, 23 miles south-east of Harlingen. Two males taken in nest of *Neotoma micropus,* September 26, 1945, by D. E. Hardy.

Obituaries

Dr. Alfredo Borelli. We learn from a recent issue of the 'Annali' of the Civic Museum of Natural History of Genoa that Dr. Borelli died May 6, 1943, at Boves, near Cuneo, Piedmont, Italy, at the age of eighty-four. In addition to his numerous and important studies of the Dermaptera, which constitute the most outstanding series of contributions on the systematics of these insects to appear in the last thirty years, Dr. Borelli also published papers on reptiles, scorpions and the Solpugida. In 1893 and 1894, Dr. Borelli visited the Chaco of Argentina, Paraguay and Bolivia and there made important insect collections.

Dr. Carlo Menozzi. From the 'Annali' of the Genoa Museum we have also learned of the death of Dr. Menozzi, on March 4, 1943, at the age of fifty-one. Dr. Menozzi was also a student of the Dermaptera, and had published other contributions on ants.

Papilio Aristodemus Ponceana Schaus (Lepidoptera: Papilionidae) Notes

By W. F. Henderson, Chicago, Illinois

Since the publication of the articles on this species in the February and July (1945) issues of Entomological News, further communications have been received.

Mr. Franklin H. Chermock has kindly submitted data concerning the specimens in his possession. It is interesting to note that he has two specimens which are believed to have been captured by Schaus himself.

No. 34 ♂ Miami, Florida, May 1899; collected probably by Schaus. In F. H. Chermock collection.

No. 35 ♂ Same as No. 34.

No. 36 ♀ Matecumbe Key, Florida, May 7, 1943, Mrs. C. N. Grimshawe. F. H. Chermock collection.

No. 37 ♀ Same as No. 36, except collected on May 14, 1944.

No. 38 ♀ Same as Nos. 36, 37, except collected on June 2, 1944.

Nos. 39–44 Six ♂♂, all collected at the Matecumbe Key, May 3–22, 1945 by Mrs. C. N. Grimshawe. F. H. Chermock collection.

No. 45 ♀ Key Largo, Florida, June 14, 1941; collected and owned by Mr. Carl Cook, Crail Hope, Kentucky.

No. 46 ♂ Matecumbe Key, Florida, May 2, 1945; Mrs. C. N. Grimshawe. Carl Cook collection.

Mr. Cyril F. DosPassos of Mendham, New Jersey, reports the acquisition of 28 specimens (18 ♂♂ and 10 ♀♀) from Mrs. Grimshawe. The writer has also acquired four more specimens for his own collection, all from Mrs. Grimshawe.

It is now quite apparent that ponceana is coming to be better known than it was for many years and that this beautiful species will be represented in more collections as the years pass. The pioneer collector of this species continues to be Mrs. C. N. Grimshawe, who has been responsible for 66 of the 78 specimens referred to in this series of notes.

In conclusion, the writer again wishes to express his thanks to all of those who have cooperated with him in this survey.

A Mechanical Holder for Microscopical Examination of Pinned Insects

THEODORE A. OLSON, Lt. Colonel, Sn. C.*
Eighth Service Command Laboratory, Fort Sam Houston, Texas

Taxonomic work in entomology usually involves careful examination of insects from all angles; some of the positions are frequently difficult to attain with the ordinary cork blocks or other common devices used as holders for pinned specimens. In an attempt to overcome some of the difficulties and in an effort to expedite identifications, a mechanical holder which is an integral part of the microscope stage was developed at the Seventh Service Command Medical Laboratory, Fort Omaha, Nebraska, in early 1942. This device was produced with the assistance of Ordnance machinists at that post, and the first working model was used during the 1942 season. The success of this device, as measured by its popularity with technicians who had the opportunity to use the holder, indicated that it was a practical piece of equipment which could be given further trial. To date, 5 mechanical holders have been made; each has received a favorable comment by users. The first model has been in almost daily use for 3 years.

The device can be made by a professional machinist in 2½ to 3 hours time. Brass stock is used. Dimensions and assembly are indicated in figure 2. When completed the holder is mounted on the binocular dissecting microscope stage by drilling a hole (for the threaded center pin) through the stage at a point approximately 1¼ inches from the right side and 5¼ inches from the front edge of the platform when the microscope is in working position (figure 1). The exact position will vary somewhat with the type of microscope in use, but there is

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considerable leeway and this fitting may be done by anyone who has a fair amount of mechanical ability. Left-handed persons may wish to mount the device on the left side of the stage. The final position should be such that the insect-carrying head may be centered under the objectives when needed, while it may readily be swung back toward the center pillar of the microscope, and out of the way, when not in use.

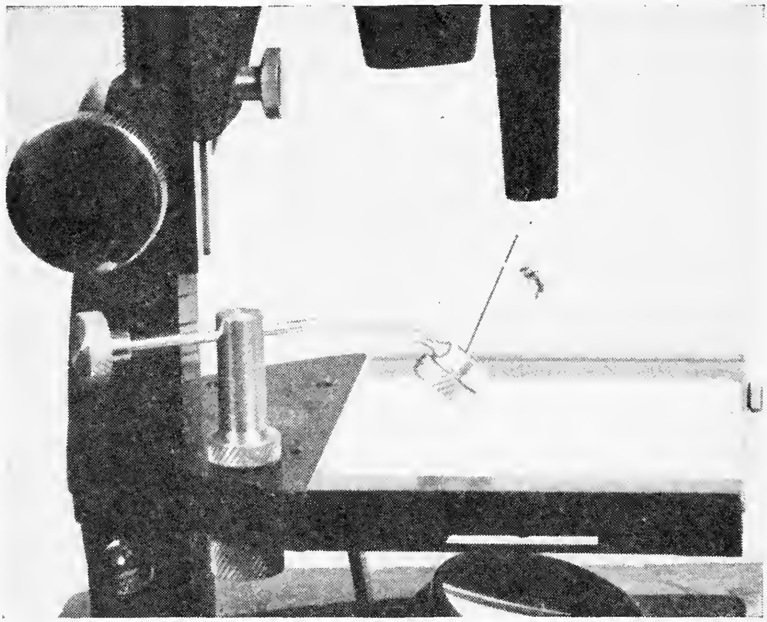

Figure 1

Some of the movements which may be accomplished by the holder are illustrated in figure 2. Briefly, there is a primary horizontal rotation about the main upright, a vertical rotation through the long horizontal rod, another rotation accomplished by the central sleeve of the head, and, finally, a long, back-and-forth, horizontal movement produced by sliding the rod through the upright. By placing a "point mounted" insect at an angle to center it over the mid-point of the head, the insect will stay in focus through practically all rotational movements. If bends

A and B have not been accurate, the centering may be imperfect, but this may easily be corrected by changing the angle of the head to a small degree. If, as is the custom with some workers, the microscope is used with the base removed, a very flat terminal nut must be substituted for the one shown. Because there is only a limited hollow space beneath the microscope platform, the tension spring and threaded center pin may also have to be reduced in length to permit proper mounting of the holder.

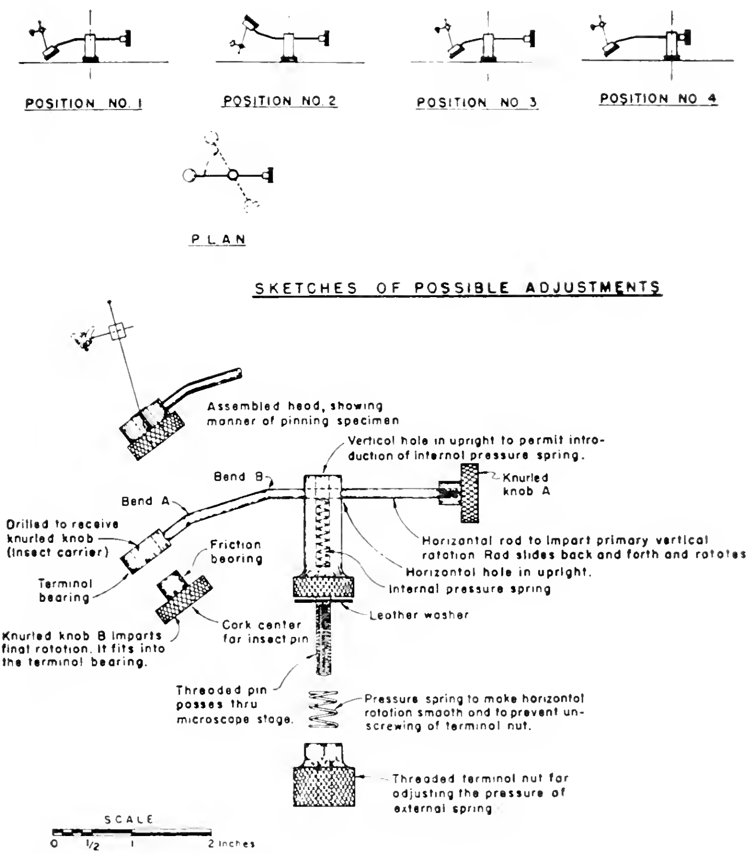

Figure 2. Mechanical holder for microscopical examination of insects.

Dragonflies (Odonata) Collected in Pennsylvania and New Jersey in 1945

By George H. Beatty, III, Merion, Pennsylvania

(*Continued from page 81*)

Tramea carolina Linne.

Pennsylvania: Holmes, Tinicum Marshes, and seen at Broomall, Central Square, State College and Crum Creek Farm, 22 May–8 Oct.

New Jersey: Upton Ponds, 1 ♂, 20 May; 2 ♂, 29 June; 1 ♂, 12 Aug.; Cape May Point, 1 ♂, 1 ♀, 22 Sept.; seen at Upton Ponds, 24 June, 8, 22 July; Whitesbog, 24, 29 June; Cape May City, 22 Sept.

Tenerals were taken on 21 September and 8 October.

Tramea lacerata Hagen.

New Jersey: Cape May Point, 4 ♂, 22 Sept.; seen at Whitesbog, 24 June.

This was the dominant dragonfly in the migrating hordes at Cape May which also included *A. junius*, *E. heros*, *L. pulchella*, *P. flavescens*, and *T. carolina*. No matter where one was, an upward look would reveal several *lacerata* and often other species too. At the beach, they could be seen flying out over the bay in a general southerly direction. Most of these dragonflies were teneral or young, suggesting that the urge to migrate seizes them immediately upon emergence.

Agrion apicale Burmeister.

New Jersey: Upton, 1 ♂, 22 July; Fisher's Dam, 2 ♂, 28 Aug.; Friendship Creek, 2 ♂, 1 ♀, 4 Sept.; Albertson Brook, 1 ♂, 5 Sept.; Clark's Brook, 4 ♂, 2 ♀, 7 Sept.

Only a few *apicale* were seen beside those captured.

Agrion maculatum Beauvois.

Pennsylvania: Broomall, Slab Cabin Run, Spring Creek, Echo Valley Farm, Darby Creek, Westtown Lake, and seen at Bear Meadows and Crum Creek Farm, 16 June–3 September.

New Jersey: Upton, Whitesbog, 5 May–12 August.

This species is largely replaced by *A. apicale* on the New Jersey cedar streams.

Hetaerina americana Fabricius.

PENNSYLVANIA: Darby Creek, 3 ♂, 2 ♀, 27 Aug.; 4 ♂, 7 ♀, 29 Aug.; Westtown Lake, 28 ♂, 28 ♀, 3 Sept.
NEW JERSEY: Albertson Brook, 8 ♂, 6 ♀, 5 Sept.; seen, Cecil, 5 Sept.

Lestes eurinus Say.

PENNSYLVANIA: State College, 1 ♂, 17 June.

Lestes congener Hagen.

NEW JERSEY: Pond near Fisher's Dam, 8 ♂, 5 ♀, 31 Aug.; 26 ♂, 21 ♀, 4 Sept.; 1 ♀, 7 Sept.

Congener was found in moderate numbers when this locality was visited, for the first time, on 31 August at 3:30 P.M. The pond was revisited at 11:00 A.M. on 4 September and not a single *congener* was seen, but at 3:00 P.M. on the same day this species was found in prodigious swarms, hundreds of coupled pairs being seen ovipositing on dried-up stems of Juncus sp. one to two feet above the water. At 5:00 P.M. on 7 September only two or three *congener* were found. On all four visits the temperature, humidity, etc., were about the same. The diurnal distribution of *congener* is evidently quite restricted at this locality at least. This is the first capture of this species in New Jersey.

Lestes unguiculatus Hagen.

PENNSYLVANIA: State College, 2 ♂, 4 ♀, 17, 19 June; Penn Valley, 9 ♂, 30 Aug.; 2 ♂, 2 Sept.; Holmes, 1 ♂, 21 Sept.
NEW JERSEY: Whitesbog, 1 ♂, 24 June.

Lestes forcipatus Rambur.

PENNSYLVANIA: Penn Valley, Broomall, State College, Holmes, 8 June–13 September.
NEW JERSEY: Pond near Fisher's Dam, Atsion Lake, Folsom, Erma, 31 August–22 September.

Lestes rectangularis Say.

PENNSYLVANIA: Central Square, State College, Echo Valley Farm, Holmes, 16 June–5 October.

Lestes dryas Kirby.[12]

PENNSYLVANIA: State College, 1 ♂, 4 ♀, 17 June.

[12] Formerly known as *L. uncatus* Kirby. See Cowley, Generic names of British Odonata (1935).

Lestes vigilax Hagen.

New Jersey: Upton Ponds, 3 ♂, 1 ♀, 24 June; 6 ♂, 1 ♀, 29 June; 7 ♂, 30 June; 4 ♂, 2 ♀, 8 July; 1 ♀, 22 July; 5 ♂, 3 ♀, 12 August; Whitesbog, 3 ♀, 24 June; 1 ♂, 29 June; Fisher's Dam, 7 ♂, 3 ♀, 21 Aug.; 4 ♂, 1 ♀, 28 Aug.; 3 ♀, 31 Aug.; 2 ♂, 1 ♀, 4 Sept.; Pond near Fisher's Dam, 3 ♂, 1 ♀, 4 Sept.; Batsto Pond, 6 ♂, 1 ♀, 5 Sept.

Though this is the most abundant *Lestes* in southern New Jersey, none was taken in Pennsylvania in 1945.

Argia apicalis Say.

Pennsylvania: Westtown Lake, 5 ♂, 2 ♀, 3 September.

Argia bipunctulata Hagen.

New Jersey: Whitesbog, 1 ♂, 24 June (J. Gillespie).

Argia tibialis Rambur.

New Jersey: Fisher's Dam, 1 ♂, 31 Aug.; Clark's Brook, 1 ♂, 7 Sept.

In both cases, *tibialis* was taken on a small cedar stream flying with *A. violacea* and *Enallagma weewa*.

Argia violacea Hagen.

Pennsylvania: Broomall, Crum Creek Farm, Darby Creek, Westtown Lake, 3 August–3 September.

New Jersey: Upton Ponds, Whitesbog, Fisher's Dam, Branch of Friendship Creek, Friendship Creek, Albertson Brook, Batsto Pond, Clark's Brook, Sleeper Brook; seen at Atsion Lake, 24 June–7 September.

At Fisher's Dam this species occurred in countless numbers and it was common along all of the cedar streams visited. Its abundance at the Pennsylvania points noted was neglegible by comparison with the swarms found in New Jersey.

Amphiagrion saucium Burmeister.

Pennsylvania: Bear Meadows, 4 ♂, 5 ♀, 16 June; State College, 33 ♂, 27 ♀, 19 June.

This species was not seen at all in eastern Pennsylvania or New Jersey.

Nehalennia gracilis Morse.

PENNSYLVANIA: Bear Meadows, 9 ♂, 20 ♀, 16 June.
NEW JERSEY: Whitesbog, 6 ♂, 3 ♀, 24 June; 2 ♂, 8 July; 2 ♂, 22 July; seen, Whitesbog, 29 June.

At Bear Meadows, *gracilis* occurred in swarms in the late afternoon, and a few sweeps with the net through the grass and sedges secured five to ten specimens.

Nehalennia integricollis Calvert.

NEW JERSEY: Upton Ponds, 1 ♂, 12 August. Cecil, 1 ♀, 5 September (J. Gillespie).

In both instances, this species was secured at the weedy edge of a pond rather than the bog areas which the genus *Nehalennia* is supposed to favor.

Nehalennia irene Hagen.

PENNSYLVANIA: Bear Meadows, 1 ♂, 3 ♀, 16 June; State College, 1 ♂, 3 ♀, 17, 19 June. Holmes, 1 ♂, 1 ♀, 6 Sept. (J. Gillespie).

Chromagrion conditum Hagen.

PENNSYLVANIA: Bear Meadows, 18 ♂, 2 ♀, 16 June; State College, 2 ♂, 17, 19 June.

Enallagma divagans Selys.

NEW JERSEY: Upton Ponds, 1 ♂, 24 June.

Enallagma hageni Walsh.

PENNSYLVANIA: Bear Meadows, 3 ♂, 2 ♀, 16 June; State College, 5 ♂, 17 June; 7 ♂, 19 June.

Like *Chromagrion conditum*, coupled pairs of this species did not appear on the stream at Bear Meadows until afternoon. Tenerals were seen early in the morning.

Enallagma cyathigerum Charpentier.

PENNSYLVANIA: State College, 1 ♂, 19 June.

Enallagma geminatum Kellicott.

NEW JERSEY: Fisher's Dam, 16 ♂, 6 ♀, 21 Aug.; 31 ♂, 2 ♀, 28 Aug.; 22 ♂, 1 ♀, 31 Aug.; 22 ♂, 4 Sept.; Pond near Fisher's Dam, 4 ♂, 31 Aug.; Batsto Pond, 1 ♂, 1 ♀, 7 Sept.; seen at Batsto Pond, 5 Sept.

Everywhere at Fisher's Dam, *geminatum* occurred in swarms, flying so close to the water that it appeared to be skating on the surface.

Enallagma recurvatum Davis.

New Jersey: Upton Ponds, 1 ♂, 24 June (J. Gillespie).

Enallagma signatum Hagen.

Pennsylvania: Central Square, 3 ♂, 2 ♀, 22 May; 2 ♂, 1 ♀, 29 May; 4 ♂, 9 ♀, 6 June; 2 ♂, 4 ♀, 8 Aug.; Westtown Lake, 4 ♂, 5 ♀, 3 Sept.

New Jersey: Fisher's Dam, 1 ♂, 4 Sept. (J. Gillespie); Cecil, 3 ♂, 1 ♀, 5 Sept.

Enallagma vesperum Calvert.

New Jersey: Cecil, 13 ♂, 1 ♀, 5 September.

Only on 5 September was any New Jersey pond visited late enough in the day for this crepuscular species to be on the wing.

Enallagma pictum Morse.

New Jersey: Upton Ponds, 4 ♂, 11 ♀, 24 June; 4 ♂, 8 ♀, 29 June; 5 ♂, 6 ♀, 30 June; 2 ♂, 1 ♀, 8 July; 1 ♂, 12 Aug.; Upton Ponds, seen, 22 July; Whitesbog, 2 ♂, 2 ♀, 24 June; 1 ♀, 29 June; Whitesbog, seen, 8 July, 12 Aug.; Fisher's Dam, 4 ♂, 2 ♀, 21 Aug.; 5 ♂, 6 ♀, 28 Aug.; 1 ♀, 4 Sept.; Fisher's Dam, seen, 31 Aug.; Cecil, 4 ♂, 2 ♀, 5 September.

Enallagma exsulans Hagen.

Pennsylvania: Westtown Lake, 2 ♂, 2 ♀, 3 September.

Enallagma weewa Byers.

New Jersey: Fisher's Dam, 7 ♂, 2 ♀, 31 Aug.; 4 ♂, 4 Sept.; Branch of Friendship Creek, 15 ♂, 31 Aug.; 27 ♂, 1 ♀, 4 Sept.; 7 ♂, 7 Sept.; Friendship Creek, 4 ♂, 4 Sept.; 6 ♂, 7 Sept.; Albertson Brook, 1 ♂, 5 Sept.; Clark's Brook, 20 ♂, 12 ♀, 7 Sept.; Sleeper Brook, 5 ♂, 3 ♀, 7 Sept.

This was decidedly the most abundant dragonfly along the New Jersey cedar streams in early September. Only *Argia violacea* approached it in numbers. All of the females were taken in cop. with males, no single females having been seen. Ovipositing pairs were extremely abundant on Clark's Brook where they were seen on the stems of Sparganium and Scirpus and on the leaves of Vallisneria and other plants floating on the surface of the water. Both sexes curved their abdomens in semicircular arcs and the female generally inserted the eggs just below the water's surface. There are three other recorded occurrences of this species in New Jersey [13] but its almost universal

[13] See Montgomery [Ent. News, XLIV: 40–44, 1933] and Gillespie [Ent. News, LII: 225–226, 1941].

distribution in the pine barrens has hitherto been unsuspected. Comparison with the available records from Florida, Georgia, South Carolina, and North Carolina [14] suggests that New Jersey may be the metropolis of *Enallagma weewa,* or that this species has been largely overlooked in the south.

Enallagma carunculatum Morse.

PENNSYLVANIA: State College, 1 ♂, 10 June (J. Gillespie).

Enallagma doubledayi Selys.

NEW JERSEY: Upton Ponds, 1 ♂, 24 June; 2 ♂, 29 June; 5 ♂, 1 ♀, 8 July; 1 ♂, 12 Aug.; Pond near Fisher's Dam, 1 ♂, 31 Aug.

This species was associated with *E. civile, E. aspersum,* and *Lestes vigilax* at the Upton Ponds. Females can be separated from those of *civile* only with great difficulty.

Enallagma civile Hagen.

PENNSYLVANIA: Central Square, State College, Crum Creek Farm, Holmes, 22 May–21 September.

NEW JERSEY: Upton Ponds, Cape May City, Lily Lake, Davis Lake, 24 June–22 September.

Enallagma aspersum Hagen.

PENNSYLVANIA: State College, 7 ♂, 1 ♀, 17, 19 June; Central Square, 1 ♂, 8 Aug.; Crum Creek Farm, 2 ♂, 8 Aug.; Holmes, 3 ♂, 13 Sept.; 3 ♂, 21 Sept.; 1 ♂, 5 Oct.

NEW JERSEY: Upton Ponds, 2 ♂, 29, 30 June; 7 ♂, 8 July; 11 ♂, 12 August; Pond near Fisher's Dam, 27♂, 3 ♀, 31 Aug.; 8 ♂, 2 ♀, 4 Sept.; Batsto Pond, 1 ♂, 5 Sept.; Batsto Pond, 7 Sept.

Enallagma traviatum Selys.

NEW JERSEY: Upton Ponds, 1 ♂, 24 June (J. Gillespie); 1 ♂, 29 June.

Ischnura ramburi Selys.

NEW JERSEY: Cecil, 4 ♂, 6 ♀, 5 Sept.; Lily Lake, 45 ♂, 18 ♀, 22 Sept.; Davis Lake, 15 ♂, 11 ♀, 22 Sept.

Heterochromatic females of this species outnumbered the homoeochromatic females in a proportion of about five to one.

[14] See Byers [Ann. Ent. Soc. Amer., XX: 385–392, 1927], Davis and Fluno [Ent. News, XLIX: 44–47, 1938], Westfall [Ent. News, LII: 15–18, 31–34, 1941], and Brimley, "The Insects of North Carolina" (1938).

Ischnura posita Hagen.

PENNSYLVANIA: Central Square, Penn Valley, State College, Crum Creek Farm, Holmes, etc., 6 June–21 September.

NEW JERSEY: Upton Ponds, Whitesbog, Fisher's Dam, Pond near Fisher's Dam, Branch of Friendship Creek, Albertson Brook, Batsto Pond, Folsom, Sleeper Brook, 20 May–7 September.

This species was found at the ponds and cedar streams nearly everywhere, but never in large numbers.

Ischnura verticalis Say.

PENNSYLVANIA: Central Square, Penn Valley, Bear Meadows, State College, Westtown Lake, Holmes, and seen at Spring Creek, Echo Valley Farm, Crum Creek Farm, 22 April–5 October.

NEW JERSEY: Whitesbog, Upton Ponds, Fisher's Dam, Pond near Fisher's Dam, Folsom, 20 May–5 September.

Anomalagrion hastatum Say.

PENNSYLVANIA: State College, 3 ♂, 17, 19 June; Central Square, 1 ♂, 8 August; Crum Creek Farm, 5 ♂, 4 ♀, 8 Aug.; Penn Valley, 1 ♂, 2 ♀, 30 Aug.; 1 ♂, 2 ♀, 2 Sept.; Holmes (seen), 13, 21 Sept., 5 Oct.

NEW JERSEY: Upton Ponds, 6 ♂, 7 ♀, 24 June; 3 ♂, 5 ♀, 29, 30 June; 3 ♂, 7 ♀, 8 July; 2 ♂, 1 ♀, 22 July; 14 ♂, 5 ♀, 12 Aug.; Whitesbog, 2 ♂, 24 June; 2 ♀, 29 June; Fisher's Dam, 5 ♂, 1 ♀, 28 Aug.; 1 ♀, 4 Sept.; Pond near Fisher's Dam, 1 ♀, 31 Aug.; 1 ♀, 4 Sept.; Atsion Lake, 22 ♂, 16 ♀, 5 Sept.; Folsom, 12 ♂, 14 ♀, 5 Sept.; Pond near Fisher's Dam, seen, 7 Sept.; Erma, seen, 22 Sept.; Lily Lake, 1 ♀, 22 Sept.

A. hastatum occurred in swarms at Holmes, Atsion Lake and Folsom, but only in relatively small numbers in the other localities.

The foregoing list represents about 70% of the combined odonate faunas of Pennsylvania and New Jersey as they are now known.[15] However, there is good cause to believe that a considerable number of additional species will be found in both states.

[15] The writer is compiling complete bibliographical catalogues of the dragonflies of Pennsylvania and New Jersey which will appear shortly. They will bring together all published records and many hitherto unpublished as well as data on distribution, seasonal range, and habitat.

Two genera are conspicuous in the 1945 collections by their poor representation. These are *Gomphus* and *Argia*, both chiefly restricted to fluviatile habitats. A glance at the list of collecting stations reveals few such habitats beside the cedar-stained streams of the New Jersey pine barrens which have a dragonfly fauna which is in many ways peculiar to them alone. Their sand bottoms and lack of turbulence, as well as the chemical nature of the water, make them a highly specialized environment.

The good representation of such genera as *Aeschna, Libellula, Lestes*, and *Enallagma*, is due to the writer's concentration upon lenitic habitats. In the preceding list, most of the dragonflies of unusual interest are lenitic forms.

Collecting was generally done on a survey basis, attempt being made to secure specimens of all forms occurring at a given place and time because of the writer's interest in dragonfly populations as such. Only in the case of species of unusual interest, such as *Aeschna constricta, Somatochlora filosa, Sympetrum obtrusum*, and *Enallagma weewa*, was rather intensive collecting of a single species resorted to.

The writer is indebted beyond hope of repayment to Dr. Philip P. Calvert who read the ms. of this article, making many valuable suggestions, and for his help, authoritative information, encouragment, and inspiration, freely given. To other odonatists who, in correspondence, aided materially in this work he is likewise grateful. Thanks are due to John Gillespie, without whose cheerful assistance many species would not have been collected, who was the author's companion on many field trips, and who willingly granted permission for the inclusion in this paper of any of his records desired. To all who assisted with field work the writer expresses his deep appreciation, especially to Alonzo Ellis, George Babb, Helen Gould, Dr. F. H. Forster, Virginia Orr, and my father, George H. Beatty, Jr. Alonzo Ellis deserves special credit, for he collected with rare discrimination and, with characteristic generosity, presented to the writer all of the dragonflies which he secured.

Personal

Dr. Henry K. Townes, Jr., was honored by the Washington Academy of Sciences on the 21st of March, 1946. The citation read: Henry K. Townes, Jr., Bureau of Entomology and Plant Quarantine, Beltsville, Maryland, in recognition of his distinguished service in the morphology and taxonomy of the insect superfamily Ichneumonoidea.

Dr. Townes' "A catalogue and reclassification of the Nearctic Ichneumonidae" was published last year as No. 11 of the Memoirs of the American Entomological Society, at Philadelphia. Much of the work on this memoir was done by Dr. Townes during his stay, as a National Research Fellow, at the Academy of Natural Sciences in Philadelphia.

Current Entomological Literature

COMPILED BY CHARLES HODGE IV, EDWIN T. MOUL, MAURICE E. PHILLIPS AND HENRY K. TOWNES JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in Entomological News are not listed.

GENERAL—Cockerell, T. D. A.—Looking Forward. [55] 22: 40. **du Dresnay, G.**—Procedure for keeping butterfly wings horizontal. [33] 9: 307–310. **Delamare-Deboutteville, Cl.**—Collection and preservation of minute insects. [12] 2: 66–69. **Faure, G. O.**—Identificaciones y datos adicionales de algunos insectos y aracnidos de Chile. [32] 48: 66–76, 1945. **Freeman, J. A.**—Studies in the distribution of insects by aerial currents. The insect population of the air from ground level to 300 feet. [15] 14: 128–154, 1945. **Frost, S. W.**—Additional Notes on Baptisia

Insects. [17] 54: 16. **Keen, F. P.**—Entomology in Western Pine Silviculture. [26] 22: 1–8. **Lhomme, L.**—A light trap which kills automatically. [33] 10: 121–122. **Miller, D.**—Apropos C. V. Riley. [26] 22: 28–30. **Monro, H. A. U.**—Low temperature fumigation. [9] 77: 192–196. **Strickland, E. H.**—Adult Odonata as Class-Room Material. [5] 39: 28–32. **Williams, C. B.**—Climate and insect life. [22] 156: 214–215, 1946. **Wright, M.**—Economic importance of dragonflies. [19] 21: 60–70.

ANATOMY, PHYSIOLOGY, MEDICAL—**Beirne, B. P.**—Notes on Biology of Some Hymenopterous Parasites of the Beech Weevil (Rhynchaenus fagil.). [30] 21: 7–11, ill. **Bodenstein, D.**—Corpora Allata of Mosquitoes. [4] 488: 396–405, ill. **Bourgogne, J.**—Genetics of Lepidoptera. [33] 10: 34–47, 49–63. **Cottier, W.**—Effects of rotenone bearing dusts on the diamond backed moth (Plutella maculipenis Curt.). [23] 27: 244–249, 1945. **d'Aguilar, J.**—Bionomics of Chloropidae (Dipt.). [12] 2: 3–6. **Deonier, C. C.**—Population Studies on Cochliomyia americana in Arizona. [16] 19: 26–29. **Ferreira Lima, A. D.**—Schistocerca paranensis (Brum.) in Rio Grande do Sul. [7] 1: 139–145. **Filho, J. O.**—Sobre a morfologia do penis em Lepidoptera. [8] 50: 1–79, ill., 1946. **Groth, K.**—Genetic studies on Lepidoptera. [33] 9: 323–334. **Jahn, T. L.**—The electroretinogram as a measure of wave-length sensitivity to light. [17] 54: 1–8. **Kalmus & Mitchison.**—Transplantation of larval ovaries in Drosophila from and to individuals susceptible to carbon dioxide. [22] 156: 230–231, 1946. **Leclerca, J.**—Effect of Atmospheric Humidity on eggs of a Phasmid, Carausius morosus. [30] 21: 3–5. **Le Marchand, S.**—Biology of Stigmella sericopeza Z. [33] 9: 351–357. **Le Marchand, S.**—Sexual organs of the families of Lepidoptera. [33] 10: 22–33. **Lindquist, A. W., Madden, A. H. and Schroeder, H. O.**—Effect of Temp., on Knock-down and Kill of Mosquitoes and Bedbugs Exposed to DDT. [16] 19: 13–15. **Melvin, R.**—A note on culturing of chiggers (Trombiculidae). [5] 39: 143–144. **Michener, C. D.**—Observ. on habits and life history of chigger mite, E. batatas. [5] 39: 101–118. **Muhsam, B. F. & H. V.**—Life tables for Musca vicina and Calliphora erythrocephala. [31] 115: 296–305. **Needham, A. E.**—Relative proportions in serially repeated structures. [31] 115: 335–370. **Owsley, W. B.**—Comparative morphology of internal structures of Asilidae

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EXCHANGES

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

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

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ENTOMOLOGICAL NEWS

Vol. LVII MAY, 1946 No. 5

Insects as Food in Japan

By Charles L. Remington, Cambridge, Massachusetts

The subject of insects as food has long aroused the curiosity of American naturalists, perhaps because eating insects is a custom both foreign and somewhat disgusting to them. An American's "natural" feeling of repugnance in this case is merely one of custom, and has little practical basis, since peoples have eaten insects in all parts of the world, apparently throughout the existence of *Homo sapiens*. Americans show no hesitation in eating crabs, lobsters, and shrimp, all rather closely related to insects as members of the phylum Arthropoda.

In some local areas of the world, where other animal foods are not available, insects have become a necessary food, supplying needed proteins to the diet of the inhabitants. The writer recently enjoyed hearing a first-hand account of insect eating in one of these areas from Professor Tetsuo Inukai, zoologist of the Hokkaido Imperial University of Sapporo, Japan. Professor Inukai's home province is Nagano Prefecture in north-central Honshu. Nagano is one of the few wholly inland provinces, segregated principally by mountains from ready contact with the sea. The people of the province are unable to get enough fish and meat to fill their protein needs, and they extensively tap the insect population.

The favorite insect for food in Nagano is the Yellow-jacket Wasp (subg. *Vespula*), whose larvae and pupae are highly prized. Pupae of all wasps are eaten when found, but *Polistes* seems to rank next to *Vespula* in frequency of occurrence on Japanese menus. In Sapporo the writer saw *Vespula* pupae preserved in cans and apparently sold in grocery stores. Professor Inukai told of various methods of raiding the ground-nesting *Vespula* colonies for the young forms. One is to place a small charge of gunpowder into the nest entrance with a *long* stick, light the fuse, and stand back. After the explosion the wasps are stunned and harmless. A more amusing (to us) method is for the food hunter to divest himself of every shred of clothing. If he moves quietly he may tear up the nest and take the young without being stung, since the vicious little wasps will not sting a nude person. Professor Inukai claimed that he had successfully used this method!

Other very popular insects are all species of Cicadidae (adults), *Oxya velox* (called "Inago" in Nagano Prefecture) and practically all other grasshoppers, all crickets (Gryllidae), and all praying mantes (Mantodea). These insects are killed in a hot pan and, like the wasp larvae and pupae, they are preferably cooked by frying.

Professor Inukai related that all pupae (other than wasps) taken in the soil are carefully avoided. Apparently some are very poisonous. On the other hand, all insects found in fresh water are edible and delicious. Larvae and aquatic adults of Coleoptera, Hemiptera, Ephemerida, Plecoptera, Trichoptera, Odonata, and others are eaten, unsorted. Aquatic insects are frequently gathered by nets and screens which are held in swift water while the stream bottom above them is agitated, stones moved, and trash stirred. Professor Inukai mentioned particularly *Dytiscus* adults and Belostomatidae among aquatic insects commonly eaten.

Larvae and pupae of Cerambycidae, Elateridae, and certain other wood-boring beetles, as well as larvae of Cossidae (wood-boring moths) are dug out of dead wood and are valued as food.

Lepidoptera pupae not found in the soil are said to be very tasty. One of the commonest and most easily gathered is the pupa of the Hag Moth (Eucleidae), a pest insect whose larvae bear stinging hairs. The pupa of the silkworm (*Bombyx mori*) is eaten, not only in Nagano Prefecture, but throughout Japan. When the silk is reeled from the cocoons the edible and nourishing pupae remain, and are not discarded. They are fried in fat and salted. While a dinner guest of several zoologists at the Hokkaido Imperial University, the writer was served *Bombyx* pupae prepared in this manner. Achieving the rather difficult viewpoint of unprejudiced interest, he found the pupae very delicious, enough so that he determined to investigate the taste of various American Saturniidae, such as *Platysamia cecropia*, *Actias luna*, and *Telea polyphemus*.

Eating insects may have possibilities beyond the food value. Certainly the Hag Moth population of Nagano Prefecture in Japan meets a challenge in the appetites of the insect eaters. Who can tell what crop increases might result from cultivation of a taste for grasshoppers among the inhabitants of the Great Plains region of the United States and Canada?

Three New Species and a New Genus of American Tingidae (Hemiptera)

By C. J. Drake and E. J. Hambleton

The present paper contains the description of a new genus, three new species and notes on seven species of American Tingidae. The specimens were collected by Edson J. Hambleton. The types are in the Drake collection.

Teleonemia prunellae, n. sp.

Head black, with very short testaceous spines, the hind pair adpressed and a little longer. Rostrum extending beyond mesosternum, brown, the apex dark. Bucculae areolate, closed in front. Orifice with prominent rim. Legs yellowish brown, the tarsi black. Hypocostal ridge uniseriate, the areolae moderately large. Antennae moderately long, densely clothed with rather long hairs, dark fuscous; segment I short, scarcely longer or thicker than II; III slightly more than two and one-half times as long as IV; IV short, scarcely thickened. Legs brown, the tips of femora and tibiae testaceous, the tarsi black.

Pronotum strongly convex, black, shiny, very coarsely pitted, tricarinate; carinae thin, whitish, indistinctly areolate; lateral carinae deeply, roundly constricted; collar moderately long, biseriate, almost truncate in front; paranota very narrow, thin, whitish; triangular process areolate, becoming whitish at apex. Elytra moderately constricted beyond middle, grayish, opaque, with numerous areolae dark brown to black-fuscous; costal area rather narrow, uniseriate; subcostal area wider, biseriate; discoidal area long, extending beyond middle, with outer boundary nearly straight, widest near middle, there four areolae deep.

Length, 3.40 mm.; width, 0.95 mm.

Type (male), *allotype* (female), and 16 paratypes, Guatemala City, GUATEMALA, May 15, 1945, found on *Prunella vulgaris*.

This species is most closely related to *T. schwarzi* Drake (1918) and *T. huachucae* Drake (1941) but differs from them by its larger size, smooth, and shiny black pronotum. The former feeds on *Beloperone californica*.

Teleonemia prolixa Stal

Numerous specimens, Finca Moca, Guat., July 7, 1945, taken on Cinchona blossoms.

Leptodictya tabida Herrick-Schaffer

Many specimens, breeds on sugar cane, Esquinta, Guat., June 27, 1945. It is also known to occur on bamboo.

Leptodictya bambusae Drake

Common on bamboo, Finca Naranjo, Guat., July 7, 1945. This species is sometimes found on sugar cane.

Leptopharsa lineata Champion

Numerous specimens, Esquintla, Guat., June 27, 1945.

Leptopharsa divisa Champion

Many specimens, Mazatenango, Guat., May 16, 1945, an undetermined species of Rubiaceae.

Corythucha setosa Champion

A long series of specimens, collected on an unidentified tree, Guatemala City, June 10, 1945, and Quetzaltenango, Guatemala, May 19, 1945.

Corythucha decens (Stal)

Several specimens, Guatemala City, Guat., May 15, 1945.

Corythucha gossypii (Fabricius)

Very common, Finca Naranjo, Guat., June 13, 1945, taken on *Canavalia ensiformis*.

PLIOBYRSA, n. gen.

Head short, exposed, with five spines. Antennae long, slender, longly pilose; segment I moderately long, stouter and distinctly longer than II, the latter short; III very long, slenderest; IV moderately long, slightly enlarged. Bucculae reticulate, meeting or nearly meeting in front. Rostral channel uninterrupted, the laminae low; rostrum moderately long. Orifice indistinct. Hypocostal ridge uniseriate. Pronotum moderately convex, finely pitted, tricarinate; hood small, tectiform, scarcely produced anteriorly; paranota usually widest opposite humeri, not produced anteriorly or posteriorly; hind triangular process short, rounded or triangular at apex. Elytra usually gradually widened posteriorly, the tips separated in repose, divided into usual areas; costal area wide; discoidal area short, not reaching middle of elytra; nervure separating subcostal and discoidal areas raised so as to form an inflated area. Margins of elytra finely hairy, serrate or nearly smooth, sometimes veinlets finely hairy.

Generotype, *Pliobyrsa inflata* Drake and Hambleton (= *Leptopharsa inflata* D. & H.).

Leptopharsa adversa Drake and Hambleton and *Leptobyrsa mollinediae* Drake and Hambleton, and perhaps *Leptobyrsa translucida* Champion are congeneric and are here transferred to the new genus *Pliobyrsa*. This genus is distinguished from *Plesiobyrsa* Drake and Poor by the distinctly narrower basal portion of elytra and the nonproduced anterior and posterior margins of paranota. *Planibyrsa* Drake and Poor has unicarinate pronotum and no hood.

Pliobyrsa lateris, n. sp.

Head black, the spines moderately long testaceous. Antennae slender, testaceous shortly pilose; segment I dark fuscous, thicker and slightly more than twice as long as II, the latter brown; III scarcely more than twice as long as IV, the latter a little thicker and pale brown. Rostrum not reaching middle of mesosternum. Bucculae short, nearly touching in front. Legs rather slender, testaceous.

Pronotum dark reddish brown, moderately convex, finely pitted, tricarinate; median carina testaceous, with dark spot in front, uniseriate, much higher than lateral; lateral carinae testaceous, parallel, low, uniseriate, testaceous; hood small, testaceous, slightly protruding in front; paranota rounded, moderately wide, biseriate in front, uniseriate behind, the outer margin serrate; triangular process triangular, membraneous, areolate. Elytra broad, testaceous, with transverse dark fuscous band near base, widened at base, the tips separated in repose, the areolae hyaline, the nervures in apical half fuscous; costal area wide, mostly triseriate; discoidal area very short, inflated.

Length, 2.80 mm.; width, 1.75 mm.

Type (male), *allotype* (female) and 8 paratypes, Mazatenango, GUATEMALA, May 16, 1945, E. J. Hambleton. The shorter antennal hairs, higher median carinae and more abruptly widened elytra at base separate it from other members of the genus.

Pleseobyrsa ablusa, n. sp.

Broad, testaceous, the pronotum brown. Head black, the frontal pair of spines short, brown, directed forward, the median very short, the hind pair greatly reduced. Rostrum yellowish brown, extending to base of mesosternum; laminae low, testaceous. Antennae moderately long, shortly pilose; segment I thicker and nearly three times as long as II, the latter short and brownish; III very slender, testaceous, two and one half times as long as IV; IV brownish, slightly thickened, with longer hairs. Bucculae testaceous, closed in front. Orifice present.

Pronotum moderately convex, coarsely pitted, tricarinate, the calli large, smooth and black; lateral carinae long, parallel, extending from calli to hind margin of triangular process, indistinctly areolate; median carina faintly higher, the areolae scarcely distinct; collar short, yellowish brown, slightly elevated at middle; paranota narrow, testaceous, uniseriate behind, bi-triseriate in front, the front margin roundly protruding anteriorly, scarcely reaching middle of eyes. Elytra broad, the areolae hyaline; costal area wide, mostly with five rows of areolae, a narrow transverse band (nervures only) just in front of middle and a transverse vein near base fuscous; subcostal area very wide, with six rows of areolae in widest part; discoidal area short, very broad, with outer boundary costate and sinnate, widest behind middle, there six areolae deep. Wings short, scarcely longer than abdomen. Abdomen beneath dark fuscous. Legs testaceous.

Length, 4.10 mm.; width, 2.85 mm.

Type, male, Changos, PERU, September, 1912.

This species differs from *P. peruviana* Drake by its narrower paranota, long lateral carinae and much wider subcostal area. The lateral carinae are not present on hind triangular process of pronotum in *peruviana*. Type in Drake Collection.

Notes on Cerambycidae of South Carolina (Coleoptera)

BY FRANKLIN SHERMAN,* Clemson College, Clemson, South Carolina

Since the writer began faunal survey work in South Carolina in 1925, he has given the family Cerambycidae some special attention. Adults have been collected from flowers, at lights, and on plants in all parts of the state, and a number have been recorded in association with their host-plants by rearing or otherwise.

Our records indicate May, June and July as the most productive months for collecting of adults in this state, particularly with

* Technical Contribution No. 132 from the South Carolina Experiment Station.

the flower-frequenting species. The flowers of Jersey tea and wild hydrangea, especially in our mountains, attract the greatest variety of species, with decidedly smaller numbers on flowers of dogwood, wild rose, spirea, elder, daisies, goldenrod, and others.

Identifications of many of the species have been made by ourselves, the more difficult ones by Mr. W. S. Fisher and Mr. J. N. Knull, to whom our thanks are due, also to Mr. A. Boving for identification of larvae in a few cases.

Our records show a total of 222 species and subspecies recorded from this state, one of which was obviously an accidental individual introduction.

The western tip of South Carolina with mountains attaining 3,600 ft. elevation, shows a strong infusion of northerly and westerly forms, while the eastern coastal area shows an infusion of southerly forms. The main central area of the state gives some mixture of these extremes, plus numerous species which are of wide general distribution in this part of the country. This same condition is exhibited by other faunal groups, i.e., amphibians, reptiles, birds and mammals.

In about 60 species our records represent an extension of the known range as indicated in Leng's Catalogue. A few new species or varieties (not yet described) have been taken.

Our 222 species are distributed among 95 genera, of which 66 genera have only 1 species each in our faunal list.

Among the northerly and westerly forms are:

Prionus laticollis (Drury)
Tessaropa tenuipes (Hald.)
Stromatium pubescens Hald.
Romaleum rufulum (Hald.)
Heterachthes 4-maculatus Fab.
Obrium rubidum Lec.
Hapalosalia aurata Horn
Hapalosalia ribex Newn.
Plectrodera scalator Lec. and many others

Of the more southerly forms there are:

Archodontes melanopus (L.)
Derobrachus brevicollis Serv.
Scaphinus muticus (Fab.)
Crioccphalus nubilis Lec.
Methia necydalea (Fab.) (others)
Callichroma suaveolens (L.) (a beautiful species!)
Phychodes trilineatus (L.) and others

Of rare or unusual species, or ones at least pleasing to secure, there are:

Derancistrus taslei Buq.
Eburia distincta Hald.
Centrodera decolorata (Harris)
Evodinus monticola (Rand.)
Gaurotes cyanipennis (Say)
Leptura emarginata L.
Bellamira scalaris (Say)
Euryptera lateralis Oliv.
Encyclops coerulea (Say)
Necydalis mellita Say
Physocnomum brevilineum Say
Arhopalus fulminans (Fab.)
Xylotrechus acerina Fisher
Xylotrechus nitidus Horn (very rare, fide Knull)
Anthoboscus ruricola (Oliv.)
Michthysoma heterodoxum Lec. (an "ant-like" species)
Purpuricenus humeralis (Fab.)
Cyrtinus pygmaeus (Hald.) (our smallest cerambycid)

For years we searched in vain for the "cloaked knotty-horn" elder borer *Desmocerus palliatus* Forst., but in June 1939 we found it quite common on elder in mountain valleys near our northern (the N. C.) border.

The most noteworthy recent addition to our list came last year (1945) when Mr. O. L. Cartwright took a series of the large and conspicuous *Plectrodera scalator* Lec., associated with quaking aspen trees in the "sandhills" section of South Carolina; it seems to be chiefly a Mississippi valley species.

Our "accidentally individually introduced" species is *Chlorophorus annularis* Fabr., from Japan. In August 1934 an adult was caught in the act of emerging from an imported Japanese bamboo fishing-rod in a hardware store in Walhalla, South Carolina, and it was given, still alive, into our possession—an illustration of how potentially serious pests may innocently be spread by commerce.

Personal

Dr. J. Linsley Gressitt has been separated from the Navy where he was an entomologist in the U. S. Naval Medical Reserve Unit No. 2, and is returning to the Lingnan Natural History Survey and Museum and to the Biology Department of Lingnan University, Canton, China.

The Dipterous family Tylidae (Micropezidae) in Colorado

By Maurice T. James,

Department of Entomology, Colorado Experiment Station, Colorado A. & M. College, Fort Collins, Colo.[1]

In his review of the Neriidae and Tylidae (Micropezidae) of America north of Mexico, Cresson [2] recorded seven species as occurring in Colorado. In working over the accumulated material in the collection of the Colorado A. & M. College, I was able to identify all seven of these species, but no others except for one that is apparently new to science. The present paper is offered for the purpose of describing that species and of adding to our knowledge of the geographical distribution of the others. No citations to the literature will be given, since these can easily be found by consulting Cresson's work. The terminology corresponds to that used by Cresson, except that I am accepting the Meigen 1800 names as valid and, consequently, adopting the generic name *Tylos* instead of *Micropeza*.

Tylos lineatus (Van Duzee)

This species is common throughout the eastern Colorado plains and into the foothills. At Roggen, it occurs in June. Most records are for elevations under 6,000 feet; however, I have taken it at Salida (7,050 feet), Aug. 3, 1938. The only record for western Colorado is from Maybell (5,903 feet) but it undoubtedly occurs widely at similar elevations, since it is widespread in Utah.

Tylos setaventris (Cresson)

Costilla County, July 19, 1932, 1 ♀.

[1] Colorado Agricultural Experiment Station Scientific Journal Series Number 207.

[2] Trans. Amer. Ent. Soc., LXIV, pp. 293–366, 1938.

Tylos turcanus (Townsend)

Common at Roggen, May 19 to June 16, where it occurs in general earlier than *T. lineatus*, though overlapping that species in seasonal distribution. The only other localities from which this species is recorded are in Arizona. This is only one of a number of southern species that extend into the sandhills area of the South Platte Valley.

Paracalobata univitta (Walker)

Cresson's record from "Marysville" should read "Maysville." I have several specimens from Fort Collins, June 14 to July 18.

Paracalobata pallipes (Say)

Widespread east of the Rockies and at lower elevations in the foothills; I have taken it, however, on La Veta Pass (9,378 feet) and at Pingree Park (9,300 feet).

Paracalobata mima (Hennig)

Apparently common in the mountains, mostly above 8,000 feet. The lowest locality from which I have a record is Steamboat Springs (6,680 feet). In his records of this species, Cresson erroneously stated that Pingree Park is in Pueblo County; actually, it is in Larimer County, north of Rocky Mountain National Park.

Paracalobata microfulcrum, n. sp.

♂, ♀. Head mainly black; frontale usually narrowly reddish-yellow immediately above base of antennae; parafrontal yellow anteriorly, gradually darkening to black on posterior half; face and bucca yellow; oral margin chiefly yellow but with some infuscation; proboscis brownish; palpus yellow; antenna yellow, the arista black, sparsely pubescent basally. Entire head covered with cinereous pollen, that of the velvety frontale sparse but evident in an oblique light; that of the median half of the posterior orbit likewise sparse. Some yellowish pile on face, occiput, and proboscis. Thorax wholly black; pronotum, humerus, pteropleuron, and lower and posterior parts of mesopleuron shining; mesonotum with a large subshining area covering most of the postsutural region except the broad margins and extending onto the posterior third of the presutural region, with sometimes extentions forward in the form of one or two indistinct vittae; thorax otherwise cinereous pollinose. Pile of thorax whitish to yellowish; bristles black. Halteres yellow. Wings yellowish hyaline; veins pale yellow. Legs chiefly yellow; middle and hind coxae black; each femur with an extensive black posterodorsal vitta, the middle and hind femora being sometimes largely blackish or brownish-black; hind tibiae usually brownish-black except at extremities; tarsi sometimes infuscated apically. Coxae cinereous-pollinose, legs otherwise subshining. Abdomen black except fulcrum and apical half of claspers, which are yellow; mostly shining, the first segment cinereous pollinose dorsally, the genital segments of male with sparse cinereous pollen; hairs scattered, short, whitish. Claspers (fig. 1) of male of ordinary size; terminal lobe oval, flattened, with a triangular lobe extending backward; fulcrum very small, weakly bilobed. Ovipositor cylindrical, somewhat flattened toward base, distinctly auriculated at base. Length, 5 to 6 mm.

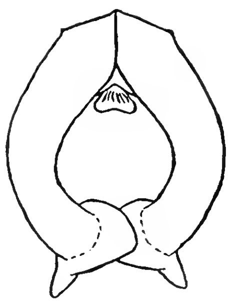

FIG. 1

Holotype, ♂, *allotype*, ♀, and *paratopotypes*, 1 ♂, 4 ♀, Divide, Colorado, July 19, 1937 (M. & H. James); paratypes, 1 ♂, Florissant, Colo., July 21, 1937 (M. & H. James), and 1 ♂, Webster, Colo., Aug. 1, 1938 (M. T. James, Urless Lanhan). Types in the Colorado A. & M. College collection.

In Cresson's key this species runs to *pallipes* and *mima*, but differs from both those species in the much more extensive darkening of the legs and the small size of the fulcrum. The ovipositor is auriculated basally, as in *pallipes*, but the lobes are less prominent.

Cnodacophora nasoni (Cresson)

Apparently a high altitude species, so far as habitats in Colorado are concerned. Cresson recorded it from Electra Lake; I have specimens from Salida, Pingree Park, and Kenosha Pass, all taken in August.

Additions to the Checklist of the Cicadellidae at Chatham, Virginia, with Eleven New Records for the State

By George Wene,[1] Virginia Agricultural Experiment Station Field Laboratory, Chatham, Virginia

During the summers of 1941 and 1942 leafhopper collections were continued at Chatham, Virginia. These collections were taken within a two mile radius of the Agricultural Experiment Station Field Laboratory. As in the original checklist by Wene & Dominick (1941),[2] the names are brought up to date according to DeLong & Caldwell (1937).[3]

Thirty-nine more species were collected in this area, eleven of which have not been recorded before in this state, and can be considered as new records. This makes a total of 104 species

[1] Now at the Dept. of Entomology, Cornell University, Ithaca, N. Y.

[2] Wene, George, and C. B. Dominick. A Checklist of the Cicadellidae at Chatham, Virginia, with Thirteen New Records for the State. Va. Jour. Sci., vol. 2; pp. 122–123. 1941.

[3] DeLong, D. M., and J. S. Caldwell. Check List of the Cicadellidae (Homoptera) of America, North of Mexico. Ohio State University; pp. i–iv and 1–93. 1937.

which were collected in this small area. A total of 24 new records were found here also. In the following list of additional species, the new records are marked with an asterisk.

Helochara communis Fh. 6–22–41.
Spangbergiella mexicana Bak. 7–8–41.
Osbornellus consors (Uhl.). 7–1–41.
Osbornellus scalaris (V. D.). 8–23–41.
Osbornellus unicolor (Osb.). 8–23–41.
Platymoideus acutus (Say). 6–14–40.
Nasutoideus vercundus (V. D.). 8–13–41.
Nasutoideus magdalenis (Prov.). 6–5–40.
Polyamia interruptus DeL. 7–12–41.
Unerus colonus (Uhl.). 6–22–41.
Ophiola striatula (Fall.). 5–29–41.
Amblysellus curtisii (Fh.). 7–12–41.
**Drylix parallelus* (V. D.). 6–7–41.
**Phlepsius attractus* Ball. 5–27–41.
Texananus majestus (Osb. & Ball). 8–15–41.
Graminella fitchii (V. D.). 7–26–41.
Chlorotettix spatulatus Osb. & Ball. 6–22–41.
Chlorotettix tunicatus Ball. 8–23–41.
Macrosteles wilburi Dorst. 6–26–41.
Forcipata loca Del. & Cald. 5–21–41.
Empoasca maligna Walsh. 7–25–41.
**Empoasca atrolabes* Gill. 6–7–41.
**Empoasca unica* Prov. 7–9–41.
**Empoasca adunca* DeL. 6–27–41.
Empoasca birdii Godg. 8–18–41.
Typhlocyba pomaria McA. 6–24–41.
**Typhlocyba aureotecta* (S. & DeL.). 5–27–41.
**Eupteryx melissae* Curt. 6–20–41.
**Hymetta distincta* Fair. 6–26–41.
Erythroneura vulnerata Fh. 5–21–41.
**Erythroneura lawsoniana* Bak. 7–1–41.
**Erythroneura noevus* Gill. 6–26–41.
Erythroneura obliqua (Say). 8–18–41.
Erythroneura morgani (DeL.). 8–23–41.
Erythroneura hartii (Gill.). 6–22–41.
Erythroneura comes (Say). 7–26–41.
Erythroneura tricincta Fh. 7–26–41.
Erythroneura vitis (Harr.). 6–30–41.
**Erythroneura omaska* Rob. 8–23–41.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Recent papers on the insect cuticle. It is well known to every entomologist that most insects are highly resistant to wetting by water, that is, their cuticle is hydrophobic. Following the work of Kühnelt (1928), Wigglesworth (1933) and Pryor (1940), this water-repellent property has been attributed to a waxy or at least fatty layer on the outer surface. Sometimes this waxy layer is considered to be the epicuticle, more commonly the hydrophobic layer is considered to be a waxy layer on the outer surface of the non-chitinous epicuticle. Being hydrophobic, this waxy layer is commonly thought to control to a large extent the permeability of the cuticle—both control evaporation leading to desiccation and control the entry of some contact insecticides. Undoubtedly it does play a very important role in this connection as is well illustrated by several recent papers from workers in England.

In 1935, Ramsey [1] reported that the cockroach is covered with a water-resistant grease which deters evaporation at ordinary temperatures, but that if the temperature is raised much above 30° C. (87° F.) the mobile grease layer undergoes a change of phase, its continuity is destroyed, and loss of water by evaporation (= transpiration) increases tremendously. This has been confirmed and greatly extended in a recent paper by Wigglesworth.[2] Briefly stated, Wigglesworth has studied the loss of water from numerous species of insects (with spiracles plugged to exclude evaporation via the tracheal system) by successive weighings after holding in a dry atmosphere for some hours at various temperatures. For some insects (e.g. larva of the fly *Bibio*) there is a straight line relationship between temperature and weight loss attributable to evaporation, i.e., at any higher temperature water is lost more rapidly just as it would

[1] Jour. Exp. Biol., 12: 373–383. 1935.

[2] Jour. Exp. Biol., 21: 97–114. 1945.

be from an open dish on heating. These are insects which *lack* a waxy coating and normally live perforce in a moist environment. In a dry environment they promptly dry up and die.

For many insects, however, evaporation is very slight until a certain "critical temperature" is reached (e.g., cockroach, wireworms, mealworms, bugs, etc.). As soon as these insects reach this "critical temperature" evaporation suddenly becomes very rapid and the insect dries up. These are insects which *possess* a waxy coating—they may normally live in either a moist or a dry environment. The "critical temperature" is not the same for all species; in some it is near 30° C. (87° F.), in some near 40° C. (105° F.), in some near 50° C. (123° F.), and in extreme cases over 60° C. (140° F.).

The simplest way of showing that the effect is not due to vital processes is to repeat the experiments with dead insects. The same results on rates of evaporation are obtained with dead as with living insects (and so for convenience after preliminary validating experiments dead insects were used). It is possible to detect physical changes in the waxy layer after passing the "critical temperature" but an even better method of showing that the waxy layer is the dominant factor in controlling evaporation through the cuticle is to scratch or abrade this layer at temperatures below that "critical" for the species being used. Once the waxy layer is extensively interrupted evaporation jumps. So it seems reasonable to conclude that when the waxy layer is interrupted in any manner an increased rate of evaporation will result. The layer can be interrupted by heating to the point of phase change or by abrasion or by removal with solvents. All give the same effect.

To elucidate the reason for different "critical temperatures" for different species, Beament [3] extracted the waxes from various species and examined their physical properties. They have different melting points and different phase-change points, and these are correlated with the "critical temperatures" of the species from which the waxes were extracted. Further, these

[3] Jour. Exp. Biol., 21: 115–131. 1945.

waxes placed on artificial membranes showed "critical temperature" properties similar to those of the cuticle of the insects from which the wax came. It is also interesting that the nature of the membrane on which the waxes are deposited is important, and that cuticle gives a better binding for insect waxes than for instance tanned gelatin or collodion.

An interesting ecological consideration arises from the work on abrasion. Numerous soil-inhabiting insects (e.g. wireworms) are endowed by nature with a highly water resistant waxy coat but they get this so badly scratched against soil particles that if they are removed from their moist environment they promptly dry up and die. Further, a satisfactory explanation of the lethal action of abrasive dusts, commonly used in insecticides, is obvious in similar terms.

Most recently, Beament [4] has shown a similar waxy layer on the insect egg shell but in this case the wax layer is on the *inside* of the shell, not on the outer surface. Being on the inside it is not in a position to be abraded by dusts and can be reached only by chemicals that can first traverse the *seven* protein layers of the shell. Likely we have here a partial answer to the question of why numerous good insecticides do not kill eggs.

Of course, only a fraction of the properties of the cuticle and only a part of the story of cuticle permeability depend on these waxy coats, but undoubtedly the waxy layer does play an extremely important role in those insects which possess such.—A. GLENN RICHARDS.

Present State of Some German Museums. Under the above title Francis J. Griffin, Registrar of the Royal Entomological Society of London, has contributed an informative summary in the May 11th issue of NATURE, his comments being based on an officially approved visit, made to determine definitely what the present condition of at least some of the German museums might be. As many German museums were depositories for great and important entomological collections, particularly rich in type material, any authentic information on their present con-

[4] Nature, 157: 370. 1946.

dition is of interest, and an abridged analysis of portions of Dr. Griffin's article is here given for American entomologists who might not have access to the original report.

Dr. Griffin summarizes the general condition in "one lasting impression," i.e. "the certainty that it will be many years before anything approaching normal conditions returns to German museums. The destruction of buildings must be seen to be believed, and one may be excused for thinking that there is a good case for abandoning such towns as Cologne, Frankfurt, Stuttgart and others and building new towns on alternative sites." He adds, however, that "by and large, scientific collections have emerged from the war with relatively little damage since for the most part they were evacuated in time. It has certainly been proved that such a policy was wise. Exhibition collections and teaching material, on the other hand, have usually suffered the fate of the museum or university building in which they were kept, while 'souvenir-hunting' has added to the losses."

The Museum at Darmstadt is said to be destroyed, but it was not possible to determine whether the contents had earlier been removed. The same is true of the Museum at Karlsruhe. The building of the Stuttgart Museum is burned out, and the collections suffered severely. The most valuable part of the Stuttgart entomological collection was evacuated to a salt mine at Kochendorf, where it still was in November, 1945, while other parts of the collection were deposited in various castles in the vicinity of Stuttgart. It is thought that none of the Stuttgart entomological types have been lost. Dr. E. Lindner and Dr. Götz, both entomologists, are still at the Museum.

The Niederrheinisches Museum at Duisburg is completely wrecked and its contents are nothing but debris. The Zoologisches Institut building at Bonn is completely destroyed, and the entire collections are said to be lost. These include the Winnertz collection of Diptera, part of the Nees von Esenbeck collection of Hymenoptera, both with type material, and the Bruch collection of Coleoptera, while a portion of the Reichensperger collection of myrmecophiles was also destroyed. The library of the Naturwissenschaftliches Institut at Göttingen was evacuated to a salt mine at Wolpriehausen and shared the mine with a munition dump. The latter blew up and a portion of the library is believed to be lost. The Institut building is a total loss, but the collection is undamaged.

The buildings of the famous Senckenberg Museum at Frankfurt on Main are very seriously damaged, having been burned out and also hit by high explosive bombs. The collections, aside from the exhibition series, were evacuated to more than forty different places, and all but one of these escaped damage, the one being completely destroyed. Apparently no entomological material was contained in the destroyed section. The library of the Senckenberg Museum was evacuated and is said to be safe.

The Deutsches Zoologisches Museum (formerly the Zoologisches Museum der Universität) at Berlin is very heavily damaged. The Russians appointed Drs. H. Bischoff (whose name will long be connected with the Nazi-enforced wanderings of the Wasmann collection of ants) and H. Pohle as directors, and entomologists on the now reduced staff are said to be Drs. M. Hering, W. Ramme, and H. Hedicke, and Messrs. N. J. Kardikoff and M. Eisentraut. The Museum was declared an independent institution, free from the University, by the Russians in September, 1945. The following entomologists, known for their association with the Berlin Museum, are said to have been alive November, 1945: Drs. Freise, and G. Enderlein, and Messrs. Bluthgen and Hans Wagner. Those said to be dead include Alfken, Max Muller, Engel, Draudt, Urbahn, Henning and Pappenheim. The collections are partially destroyed (estimated loss in entomology one-fifth), but the main part is safe. Much of the Hering collection of leaf-miners has been destroyed, but many of its bred specimens have been saved. The Staudinger collection, including the Microlepidoptera, is safe. The Museum Library was first evacuated to Altlitz-on-Oder, but, shortly before the Russian advance, was largely returned to Berlin, where it now is. Only six cases with their contents are lost, and these are known to have been burned. Working conditions at the Museum are said to be deplorable, as no glass for window replacements is available and weather damage is progressively destructive to collections and publications, to the preservation of which the small staff, working under many handicaps, is now largely devoting its energy.

The building of the Deutsches Entomologisches Institut in Gosslerstrasse (Berlin-Dahlem) is practically undamaged, but the contents were evacuated to Post Blucherhof, Mechlenburg, where they are believed to be intact. The present director Dr. H. Sachtleben is presumed to be at Post Blucherhof with the collection.

Wolcott Collection of Cleridae. Mr. Albert Burke Wolcott, of Downers Grove, Illinois, has presented his collection of 4,740 insects, including types, to the Chicago Natural History Museum, according to Clifford C. Gregg, director. Mr. Wolcott, a former member of the museum staff, did a great deal of work on the Cleridae and, according to Karl P. Schmidt, chief curator of zoology, this collection will make the museum's representation of those beetles more comprehensive than any other in the western hemisphere.

Correction

In T. D. A. Cockerell's review on The Adelid Moths of South Africa, the end of the quotation should come at the end of line 28 on page 63 (Vol. 57, no. 2), after the word "subgenera." After this line, insert the following: but having said this, he proceeds to treat them as genera.

Notice

Due to various circumstances, the titles of papers from current entomological literature that are ordinarily found in each issue of the NEWS are omitted but will appear in our next issue.

Review

The Mosquitoes of the Southern United States East of Oklahoma and Texas, by Stanley J. Carpenter, Woodrow W. Middlekauff and Roy W. Chamberlain. American Midland Naturalist. Monograph 3, 292 pp., University Press, Notre Dame, Ind., May 1946.

So overwhelming are the destructive results of war that it is a pleasure to consider such a constructive result as this new book. The 4th Service Command Laboratory at Fort McPherson, Georgia was the center of mosquito work in the southeastern states during the war period, and from the great amount of information gained from mosquito control work in this area, the authors have taken the opportunity to prodüce this excellent hand book. The very fine illustrative work at once catches the attention. Drawings of the larvae and male terminalia are given for all species. Other adült structures are included where they are of diagnostic value. Of the page space for each species about 40% is used for the illustrations, which will indicate the emphasis on this feature. The first 48 pages are devoted to bionomics, relation to disease, techniques of collecting, preparation and storage of material, and general morphology. The remainder of the work contains the treatment of 71 species or subspecies together with keys to the adults, the larvae, and the male terminalia. There is also a bibliography of 188 references and a full index.

Comparing the widely used reference of King, Bradley, and McNeel [1] on The Mosquitoes of the Southeastern States very great progress is evident in the completeness of data on bionomics, distribution, descriptions and keys. Relatively little, however, has been added in the way of new species and taxonomy. Considering the three new species or subspecies described since 1940: specimens of *Aedes fulvus pallens* had been confused with true *Aedes bimaculatus; Psorophora longipalpus* was likewise confused with *P. howardii;* and *Aedes mathesoni*

[1] W. V. King, G. H. Bradley, and T. E. McNeel, U. S. Dept. Agr., Miscl. Pub. 336, 90 pp., 1939.

may be a melanic development of *A. canadensis*, it is evident that few if any species remain to be added to the fauna other than the possible appearance of extralimital species. On the other hand interesting problems remain to be answered, as for example, the evolutionary status of the subspecies of *Anopheles crucians* or the two species of *Orthopodomyia*.

Some details of form may be questioned, such as, the alphabetical sequence of species under the subgenera rather than placing the most nearly related species adjacent to one another. It is fortunate that forms of *Anopheles crucians* are subspecies rather than species and *Culex pipiens* and *quinquefasciatus* are so named and thus placed together, but surely if one knows to which subgenus a species belongs he will have little trouble in locating the page without the use of the index. Considering the index we wonder why the page reference was omitted where the species is listed separately and not under the generic name. Generic names come and go and most people prefer to look up the species name directly. Presumably the drawings were made from selected specimens and therefore the value of such drawings would have been greatly increased if the geographic locality of the specimen had been given. It is not unlikely that some of the species may become subdivided into races or geographical subspecies, in which case the drawings may become indeterminate or misleading. For those not directly interested in mosquitoes this book may be a useful guide as to how other groups of insects might be treated. No publication is ever perfect or will please all people, but surely the authors and the many other persons who have contributed to this book should feel well pleased with the result.—H. R. ROBERTS.

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—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

Arctic Lepidoptera on hand, including Erebia, Oeneis and Brenthis. R. J. Fitch, Lloydminster, Sask., Canada.

Odonata—Will buy or exchange North and Central American species, both imagos and nymphs. Also will exchange other orders for Odonata. Carl Cook, Crail Hope, Kentucky.

I want to collect Rothschildia farbesi, agapema, galfina and io moths for interested persons. E. Frizzell, Route 4, San Benito, Texas.

Wanted—Information as to the existence and present location of a copy of Solodonikov, S. V. Contribution à l'étude de la faune et de la biologie des larves des Libellules du Donetz et de certains de ces affluents. [In Ukrainian.] Trav. Soc. Nat. Charkow 52: 249–268. 1929. [Quoted from Zool. Rec. 1936, Ins. p. 147, No. 3114.] P. P. Calvert, P. O. Box 14, Cheyney, Penna.

Wanted—Crane-flies (Tipulidae) of New Guinea, New Caledonia and Neighboring Islands, for revisional purposes. Also, names and addresses of individuals or institutions possessing any of these flies. Correspondence solicited. Chas. P. Alexander, Fernald Hall, Amherst, Mass.

I want to collect Pennsylvania insects from York and Adams Co. E. W. Mange, 307 W. Walnut St., Hanover, Pa.

Lepidoptera—Wanted, Hyloicus (Sphinx) and other Sphingidae in exchange for U. S. and Wisconsin Lepidoptera. Wm. E. Sieker, 119 Monona Ave., Madison 3, Wisconsin.

Hymenoptera-Aculeata (except ants and bees) and **Ichneumonidae** for exchange or purchase. Will collect any order in exchange. D. G. Shappirio, 4811 17th St., NW, Washington 11, D. C.

RECENT LITERATURE

FOR SALE BY

THE AMERICAN ENTOMOLOGICAL SOCIETY

1900 RACE STREET, PHILADELPHIA, PA.

DIPTERA

1119.—**Cresson** (E. T. Jr.)—Synopses of No. Amer. Ephydridae. Ia. Supplement of part I on the subfam. Psilopinae. II. The tribes Hydrelliini, Hydrinini and Ilytheini of the subfam. Notiphilinae, with descr. of n. sps. (70: 159–180, 1944) ... $ .40

1123.—A systematic annotated arrangement of the gen. and sps. of the Indoaustralian Ephydridrae. I. The subfam. Psilopinae. (71: 47–75, 1945) .... .60

1127.—A systematic annotated arrangement of the gen. and sps. of the Neotropical Ephydridae. I. The subfam. Psilopinae. (71: 129–163, 1946) .... .75

1126.—**Rapp** (W. F.)—Two new Nemocera Diptera. (Sciaridae and Cecidomyidae). (71: 125–128, figs., 1946) .... .20

THE BIOLOGY AND IDENTIFICATION OF TRYPETID LARVAE

By VENIA TARRIS PHILLIPS

Memoirs of the American Entomological Society, No. 12, 161 pp., 16 pls., 1946

This is a comprehensive work describing and figuring the important characteristics of the larvae of forty five species of American fruit flies (Diptera). An indispensible work for economic entomologists. It includes a glossary of the terms used in the descriptions; a list of 442 species of the family, with their known hosts; a list of their host plants; and an extensive bibliography. The plates contain 192 exquisitely executed figures.

Price $5.00 (postpaid, domestic delivery) U. S. Currency, remittance must accompany order.

HYMENOPTERA

1118.—**Bradley** (J. C.)—A preliminary revision of the Pompilinae of the Americas exclusive of the tribe Pompilini. (70: 23–157, 2 pls., 1944) 1.60

LEPIDOPTERA

1125.—**Jones** (F. M.)—Platoeceticus and a remarkable n. sp. of the genus (Psychidae). (71: 99–124, 6 pls., 1945) .... .75

ORTHOPTERA

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Nameability in Taxonomy

By Melville H. Hatch, University of Washington, Seattle

The modern problem of what to name and what not to name in plant and animal classification is a product of evolutionary biology. Previous to Darwin naturalists had sought simply for samples of originally created species. Darwin removed the absolutes of his predecessors. The notion that only individuals exist presented taxonomists with a sheer relativity, that since no two individuals are precisely the same, could end logically only with attaching a separate name to each specimen. The complex systems of varieties, color varieties, formae, abberations, etc., such as are found in portions of the lepidopterological and coleopterological literature are the result.

The problem of nameability cannot be resolved primarily by reference to the natural objects to be named. It can be solved only by erecting a set of assumptions as to what, in the light of biological phenomena being such as they are, it is useful and expedient to name. Different naming practices can be compared and criticized only by making explicit and contrasting the diverse assumptions on which they are more or less unconsciously based.

Linnaeus derived his practice from the assumption that the organic world has arisen as the result of a series of discrete creative events, and that all the individuals derived from a single such creative event should receive the same specific name. Biologists no longer accept the basic Linnaean assumption and consequently must seek another basis for their nomenclature.

Relativists like myself * and others who have espoused the

* Hatch, Jour. N. Y. Ent. Soc., XXXV, 1927, p. 341; XLVIII, 1940, pp. 235–244.

extensive naming of color forms and aberrations have assumed mere distinguishability as the basis of naming types of living things. I am now convinced that such a practice can end only in the *reductio ad absurdum* of naming each individual specimen.

The alternative to taxonomic "relativism" may be termed "populationalism." To avoid the pitfall of relativism, to account for the circumstance that while no two individuals are the same some resemble each other more than they do others, above all to account for the facts of ecology, taxonomists are led to interpret their individual specimens in terms of "populations." A "population" is a dynamic system. In its entirety (i.e., in respect to all of the members that constitute it) no population can ever be investigated, but a study of individual specimens (which are all we can ever investigate) does give valid information about the population or populations that they represent. In the light of these considerations, I propose that we explicitly assume that *only populations merit specific and infraspecific names*, not because other classes of specimens may not be recognizable but because in the present state of biological knowledge, the population is the first system above the level of the individual to possess biological efficacy.

There is nothing either new or startling about this position. It is the implied position of most modern taxonomists who have not believed in color-variety-naming. It has been the position in regard to species and subspecies of color-variety-namers like myself, who have merely desired to extend "populational" nomenclature to non-populational classes. I am now convinced, however, that such an extension is not desirable and that such classes should be handled by a nomenclature that is entirely independent of and not continuous with that used to designate populational units.

So delimited, the problems of populational taxonomy are extremely complex. Populations vary as do many other natural systems. Some are large; some are small. They may be spatially sharply delimited (species) or they may grade into one another geographically or ecologically (subspecies). Temporally they may intergrade likewise, and the paleontologist can never rid himself of the suspicion that, if he had enough data, all his "species" would grade together and his taxonomy would become one of working outward from points on a continuous series rather than one of working within limits of variation, as is now the case. Furthermore, populational taxonomy is rendered difficult by the varying amounts of data available on different populations. Some of these difficulties were treated by the author some years ago in a paper in the American Naturalist.*

Perhaps it may be no more than the over-enthusiasm of a recent convert, but I suggest that the policy advocated above, that only populations merit specific and infraspecific names, be implemented by resolution of biological and entomological societies, by the refusal of the editors of scientific journals to publish descriptions of undescribed non-populational categories to which Latin name are attached, and eventually by amending the International Code of Zoological Nomenclature.

I do not in the least suggest that studies in infra-populational variation be discouraged, but merely that they be accompanied by a nomenclature (using letters, numbers, formulae, non-Latin names, etc.) that is independent of populational nomenclature.

Finally, there is the mass of infra-populational names already present in the literature. I suggest that such names be continued as nomenclatorially on a par with other trivial names, but that every effort be made in accordance with the plan set forth above to reduce or eliminate the formation of such names in the future. Authors who are interested only in populational units will treat infra-populational names as absolute synonyms. Authors who are interested in infra-populational variation, will probably continue to use such names where they are already in existence, since it would usually seem to be unwise to drop already extant names in favor of designations of another sort, as by lettering or numbering. Where extant names are used in an infra-populational sense, they could be placed in quotation marks, e.g., var. "*albinus* J. Doe." A newly discovered albino variety, however, would not be given a Latin name but otherwise designated as var. A: albinistic.

* "The Logical Basis of the Species Concept," Amer. Nat. LXXV, 1941, pp. 193–212.

Migration in Ascia monuste phileta (Lepidoptera, Pieridae)

By Ralph L. Chermock

Ascia monuste phileta (Fabricius) [1] is found throughout the year in southern Florida. Its frequency is characterized by population waves (Term after Timofeeff-Ressovsky, 1939), the high peaks usually occurring in January–February and June–July. The population size decreases between these periods, in some years almost completely disappearing. Occasionally the peaks of high population concentration far exceed the normal range, and huge numbers of adult specimens occur. The author, in February of 1943, observed one of these *population swarms* in the Miami area. On a half acre of land covered with Spanish needle (*Bidens pilosa*, L.), a favorite food plant of the adults, over 500 freshly emerged specimens of *A.m.phileta* could be observed feeding at one time. During normal high peaks, 50 to 60 specimens are seen here. This situation was duplicated in other localities in Dade County. Within a few days, specimens of this subspecies in a normal ratio of males and females could be seen flying northward along the city streets and through the pine-palmetto country. They were undoubtedly in the process of migration.

In the summer of 1945, the author was collecting on Key Largo and again observed a population swarm. However, in the Miami area simultaneously, only the normal population peak existed. During the following week, numerous specimens of *A.m.phileta* were again seen heading north along the streets in Miami. Most of these specimens were slightly flown. This same situation was observed in the summer of 1943, when a relatively large migration of this subspecies followed the eastern coast line north from the keys, after a population swarm on Key Largo and Upper Matecumbe Key. Evidently, there was a correlation between the abnormally high peak of population concentration which the author is designating as a population swarm,

[1] This is the name applied to the Floridian subspecies of *Ascia monuste* (see Comstock, 1943).

and the incidence of migration of *A.m.phileta*. How can this correlation be explained?

First, we might attempt to find an explanation for a population swarm. The various *Cruciferae* which comprise the food plant of the larval stage of this butterfly are abundant and could support more than the normal larval population. If ecological conditions are satisfactory, it can readily be understood how an extreme increase beyond the normal population size can result in one generation.

Although the larval stage can be supported by the environment, a biological pressure is exerted on the increased number of adults. More specimens are found flying in a given area; and the limited number of flowers on which the adults feed in the area immediately surrounding the location of the larval food plant, is insufficient to support the adult population. As a result, they start moving to other areas in search for a suitable environment for their sustenance. Probably other biological factors exist which encourage this migration, but the need for food is unquestionably an important one.

Localities abounding in flowers used as food by the adult *A.m.phileta* are scattered and surprisingly scarce in south Florida. Population swarms of this species might also be present in these areas or at least the normal high peak of the population wave. Consequently, these localities in turn furnish a state of biological pressure on the migrants, which results in the continuation and possible supplementing of the migration. As the limits of the species range are reached by the migrants, the factors which initially started the migration are replaced by biological pressures exerted by a foreign environment. This could explain the continuation of the migration of this butterfly along the Atlantic seaboard, far out of the normal breeding limits of the species.

Ascia monuste cleomes (Boisduval & LeConte) was probably established as the result of one of these northern migrations, in which a few specimens were sufficiently adapted to the new environment to survive. Its geographic isolation from the parental stock, along with a new combination of environmental pressures, gave rise to characters sufficiently distinct to merit subspecific designation. However, in the small population existant, degenerative evolution has evidently taken place which has probably led to its extinction (Principle after Wright, 1939), as indicated by the lack of recent records. In another species of butterfly found in the south, *Papilio cresphontes cresphontes* (Cramer), a similar migrant form has become established in central Pennsylvania which probably has adapted itself through the interplay of natural selection and genic variation to its environment, and is increasing in numbers and distribution. It also has developed diagnostic characters sufficient to separate it from the parental stock and can be considered a subspecies, *Papilio cresphontes pennsylvanicus* (F. H. Chermock & R. L. Chermock, 1945).

Summary

A possible explanation for the migration of *Ascia monuste phileta* is based on an increase in numbers of adult specimens beyond the normal high peaks of the population waves, which condition may be designated as a "Population swarm." This results in biological pressure being exerted on the adults, one element of which is the limited supply of food, thereby giving rise to migration. This process is continuous throughout the extent of the migration, although the character of the biological pressure changes with the change of environment at and beyond the limits of the normal distribution of the species. These migrating forms can develop into distinct subspecies if they are able to become established far beyond their normal ranges, if genetically they can develop characters adapting themselves to the new environment through selection, and because of their isolation.

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The Post-Oak Locust (Dendrotettix quercus) at Mount Misery, New Jersey, in 1944 (Orthoptera, Acrididae)

By James A. G. Rehn, Academy of Natural Sciences of Philadelphia

In 1938 John W. H. Rehn and I [1] presented a series of observations on a serious outbreak of the Post-Oak Locust (*Dendrotettix quercus*) in the Mount Misery section of New Jersey, on the Ocean-Burlington County line. In the same paper we reviewed our knowledge of the occurrence of this potentially destructive species in the eastern United States, and also discussed its dimorphism in wing-length.

In a letter under date of July 6, 1944, Dr. Emlen P. Darlington, to whose interest and cooperation we owed the opportunity to study the 1936 outbreak, advised me that in company with Supervisor J. P. Allen, of the Lebanon State Forest, he had made a preliminary survey of a *Dendrotettix* infestation in that forest, and that he was mailing me some material then taken. He said the greatest infestation was in the neighborhood of that of 1936. On July 26 I visited the outbreak area with Dr. Darlington and Supervisor Allen, travelling approximately eight miles within the state forest boundaries.

The general area of infestation was found to be essentially the same as in 1936, both from our observations then and Supervisor Allen's more regular and critical check-ups in the course of his periodic inspections. The occurrences were spotty, apparently governed by a preference for chestnut oak and similar species, but avoiding scrub oaks. The injury already done was very great in a number of places, trees and some saplings being almost completely defoliated, and the ground conspicuously covered with droppings. The insects by that date, however, were not abundant, being locally common but in no degree as numerous as on August 1, 1936. Some were mating, very few climbing upwards as was so noticeable in 1936, and others, particularly females, were resting quietly on

[1] Trans. Amer. Entom. Soc., LXIV, pp. 79-95, pls. V-VI.

the bark of pines distributed through the oaks. All seen were brachypterous except for three macropterous individuals, two of which, a male and a female, found far apart, were captured.

There was no ocular evidence of oviposition, and none of the more than a score of females taken and eviscerated had as yet any very considerable number of fully formed eggs. Two maggots, presumably of *Sarcophaga atlanis* Aldrich,[2] were found in my cyanide bottles when the sixty or so collected specimens were dumped, and one female, when eviscerated, contained a single maggot.

Some weeks after my 1944 visit to the Mt. Misery area a letter from Dr. Darlington (dated August 19) advised me that chestnut oaks and other oaks "along the old Browns Mills-Pointville road at the Fort Dix boundary, about one mile north of Browns Mills" had had their foliage denuded. No locusts were found then, "but the work had all the evidence of *Dendrotettix quercus* infestation, comparable to that at the Lebanon State Forest." Further Dr. Darlington added, "the trees which were three-fourths or more denuded covered about an acre . . . with some scattered areas in the borders." This indicated an additional 1944 outbreak area approximately six miles northwest of those within the Lebanon State Forest from which our observations had chiefly been drawn.

Whether the periodic outbreaks of *Dendrotettix* in the New Jersey pine-barrens are regularly cyclic, which seems less probable, or are due to the relative absence of inhibiting control factors which we as yet do not understand, remains to be determined. Certainly parasitism plays a definite part in the picture, as past evidence shows. The injury this species inflicts in its mass outbreaks on the more desirable species of oaks in the pine-barrens is serious, even if over a limited area, as the defoliation is so severe it is often followed by the death of the trees involved.

I wish to thank Supervisor Allen and Dr. Darlington for their kindness in calling this outbreak to my attention, and also for their assistance at the time of my visit on July 26.

[2] See Rehn and Rehn, idem, p. 88.

On Some Millipeds of Georgia

By Ralph V. Chamberlin, University of Utah

In a small collection of millipeds made in Georgia by P. W. Fattig of Emory University are representatives of the three new species and the several previously known species listed below.

Scoterpes austrinus **nudus**, new variety

A number of specimens taken September 28, 1944, four miles south of Kingston in Saltpeter Cave.

Separated from *S. austrinus* Loomis, sensu str., as represented by the types from Manitou Cave, near Fort Payne, Alabama, in lacking terminal claws on the ninth legs of the male.

Spirostrephon lactarium (Say)

One female, presumably this species, also taken in Saltpeter Cave, on September 28, 1944.

Spirobolus marginatus (Say)

Two females referred to this species, one taken at Boston on April 14, 1939, and one on Stone Mountain on August 2, 1936.

Saiulus atlantus, new species

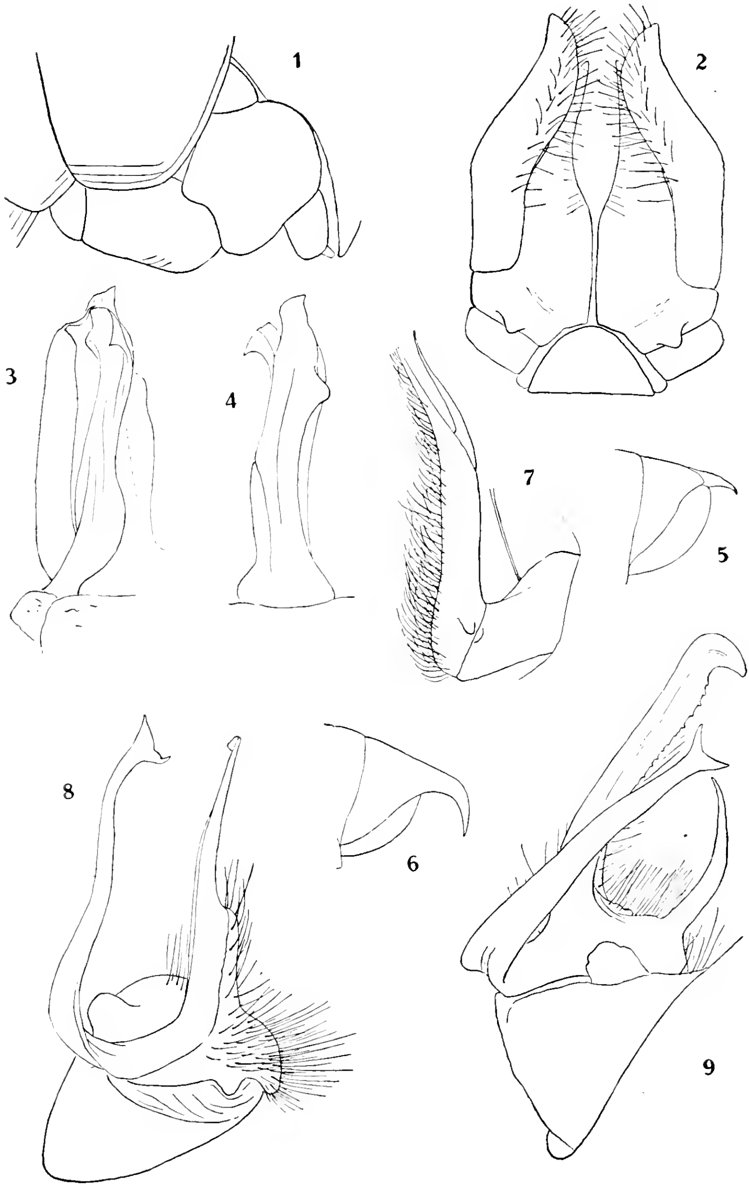
In general structure of the male gonopods, probably nearest to *S. fumans,* occurring in Tennessee, although these differ clearly in details, such as in the shorter inner division or coxa of the anterior pair, the form of the outer or second division, and the form of the posterior pair. See further figures 2, 3, and 4.

The form of the collum, stipes of the mandible, etc., of the male as shown in figure 1.

At once distinguished from *S. fumans* in the larger abruptly bent mucro of the last tergite. (See figures 5 and 6.) This is somewhat shorter in the female than in the male so far as the types show.

Number of segments in the male holotype, 53.

Diameter, 2.3 mm.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Dorsum of chestnut cast, with no median dark line, some lighter spots in transverse series on each side; the usual lateral series of black spots (repugnatorial glands); below the dark spots the sides are lighter, more or less yellowish in color; feet light yellow.

Locality: GEORGIA: Atlanta. A male and female taken December 1, and one female December 2, 1945.

Mimuloria georgiana (Bollman)

Two males and a female taken on Stone Mountain August 6, 1936.

Epeloria atlanta, new species

A much smaller form than the generotype, *E. talapoosa* Chamb., the only other known species of the genus, from which it also differs in the details of the gonopods of the male, such as in the more divergent apical prongs, as shown in the figure.

The dorsum in the male holotype is blackish from a network of lines which are across the posterior part of the metazonite and merge into a solid cross band, prozonite also with a dusky

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EXPLANATION OF FIGURES

Saiulus atlantus, new species

Fig. 1. Lateral view of lower end of collum, mandible, and first legs of male.
Fig. 2. Anterior gonopods (coleopods) of male, anterior view.
Fig. 3. Left posterior gonopod, submesal view.
Fig. 4. The same, subectal view.
Fig. 6. Posterior end of male, lateral view, showing form of cauda.

Saiulus fumans, Chamberlin

Fig. 5. Caudal end, lateral view.

Epeloria atlanta, new species

Fig. 7. Left gonopod of male, ectoventral view.

Pachydesmus denticulatus, new species

Fig. 8. Right gonopod of male, ventral aspect.
Fig. 9. Left gonopod of male, subanterior view.

network or band over light brown; keels orange or reddish, a narrow band of same color more or less evident across caudal border of metazonites. Legs yellowish. The female allotype is not in full color and does not show the dark coloration on dorsum.

Length, about 34 mm., width, 6.5 mm.

Locality: GEORGIA: Atlanta, December 1, 1945. A male (holotype) and female (allotype).

Pachydesmus denticulatus, new species

A large form in which the dorsum, in the preserved types, is dull brown with the outer part of keels yellow.

Agreeing most closely in general structure with *P. retrorsus* Chamberlin, but differing in the details of the male gonopods. In these the seminiferous blade is similar in general form but has the upper margin finely dentate as shown in the figure. The other branch is less divergent, running subparallel with the seminiferous blade, and is notably more slender and longer; similarly furcate distally, but the two prongs proportionately much shorter. See further figures 8 and 9.

The sternites are without spinous processes, but on the posterior segments present a low, median elevation somewhat compressed in the cepholocaudal direction and lying between the posterior legs.

First joint of legs not spined.

Length of male *holotype,* 47 mm.; width, 12.5 mm. A male *paratype* is somewhat wider, 13.2 mm.

Locality: GEORGIA: Atlanta. Male holotype, taken April 27, 1939, a male paratype November 4, 1941, another paratype, October 21, 1942, and the female allotype May 26, 1943. All were taken by P. W. Fattig.

Euryurus erythropygus (Brandt)

One female referred to this species was taken at Atlanta on April 4, 1939.

A New Sagebrush Aphid (Homoptera)

By George F. Knowlton,
Utah State Agricultural College, Logan

Artemisias or sages are important browse plants in Utah and over much of the western United States. Aphids frequently infest the sages, sometimes to a damaging extent. Among *Epameibaphis* aphid material examined recently was found an apparently undescribed species, here described as new. Distributional notes on a few additional *Artemisia*-infesting aphids also are included.

Key to Apterous Vivipara

1. Cornicles black .... *atricornis* G.–P.
   Cornicles pale or at most, dusky 2
2. Antennal III lacking sensoria .... *utahensis* K.–S.
   Antennal III of aptera possessing sensoria 3
3. Antennal III with 1 to 4 sensoria .... *frigidae* (Oest.)
   Antennal III with 5 or more sensoria .... *thornleyi* n. sp.

Epameibaphis thornleyi n. sp.

Apterous vivipara: Color pale; appendages pale, to dusky on distal portions; body 1.37 to 1.45 mm. long; width across abdomen .71 to .79; through eyes, .395 to .42 with ocular tubercles absent or weakly developed; vertex broadly rounded to flattened, with conspicuous hairs .075 to .079 mm. long and flattened at ends; antennal III, .28 to .3 mm. long with 5 to 6 sensoria; IV, .19 to .238; V, .182 to .205; VI, .11 to .125 plus .38 + (?) (broken); rostrum reaches abdomen; rostral IV + V, .189 to .2 mm. long and slenderly pointed; hind tibiae .79; hind tarsi .126, dusky; cornicles pale to somewhat dusky, .474 to .491, imbricated to knob-shaped apex; cauda .142 long, blunt at apex, pale, with 2 or 3 pairs of lateral hairs.

Taxonomy: This species runs to *Epameibaphis frigidae* (Oestlung) in Knowlton and Smith's key (Proc. Ent. Soc. Wash. 38: 89, 1936), from which it differs in being larger in size, possessing more sensoria on antennal III, and longer rostral IV + V.

Collection: This material was collected on *Artemisia tridentata* in Shoshone National Forest, Wyoming, September 11, 1941 (G. F. Knowlton), while on a field trip with Mr. F. H. Thornley, in whose honor the species is named. Type in the collection of the writer.

Epameibaphis atricornis G.–P. A specimen was found in a rockwren's stomach, collected at Dolomite, Utah, September 28, 1941 (Knowlton). Also collected on *Artemisia,* usually *tridentata,* at Leeds, Utah (Knowlton); Snowwater Lake, Nevada, August 20, 1943 (Knowlton); Lavina, Montana, June 2 and July 2, 1942 (H. F. Thornley); Big Horn in May, and Acton, July 1942, in Montana (Thornley); Helena, Montana, August 2, 1944 (Knowlton); Roundup, Montana, May 26, 1942 (Thornley).

E. frigidae (Oestlund) on *Artemisia tridentata* at Trout Creek, Utah, August 8, 1945 (Knowlton); Helena and Lake Helena, Montana, August 3, 1944 (Knowlton); on *Artemisia* at Flagstaff, Arizona, September 23, 1944 (Knowlton); White Valley, Millard County, Utah, May 19, 1940 (R. W. Fautin).

E. utahensis K.–S. Collected on *Artemisia* at Zion National Park, Utah, September 7, 1943 (Knowlton).

Aphis artemisicola Williams on *Artemisia tridentata* at Vernal and Weber Canyon, Utah; North Powder, Oregon, June 17, 1939; Carson City, June 30, Battle Mountain, Carson City and Wells, Nevada, July 1, 1939; Gibson and Ryegate, Montana, August 14, 1942 (H. F. Thornley).

A. canae Williams on *Artemisia tridentata* at Preston, Idaho, June, 1933; Gallatin, Montana, July 15, 1936.

A. oregonensis Wilson on *Artemisia tridentata* at Gallatin, Montana and Yellowstone National Park, Wyoming, July 15, 1936.

Macrosiphum artemisophilus K.–A. on *Artemisia* at Roundup, Montana, June 15, 1942 (H. F. Thornley).

M. coweni (Hunter) on *Artemisia tridentata* at Snowwater Lake, Nevada, August 20, 1943; foothills of Raft River Mountains, Utah, May 24, 1930; Boise, Idaho, June 16, 1939; Flagstaff, Arizona, September 23, 1944; Grand Canyon of the Snake River, Wyoming, September 11, 1941.

M. filifoliae G.–P. on *Artemisia filifoliae* at Mt. Nebo, July 12, and Beaver Mountain, July 10, 1942, in Utah; Judith Gap, June 18, and Roundup, May 26, 1942, in Montana (H. F. Thornley).

M. frigidae Oestlund, on *Artemisia frigidae*, Teton Pass, Wyoming, September 13, 1941.

M. frigidicola (G.–P.) on *Artemisia* at Acton, Montana, July 1, 1942 (H. F. Thornley).

M. jonesi G.–P. on *Artemisia* at Steamboat Springs, Colorado, August 18, 1935; Yellowstone Park, Wyoming, September 11, 1941; Beaver Mountain, Utah, July 10, 1942; Allen Canyon, Utah, August 25, 1938.

M. ludovicinae (Oestlund) on *Artemisia vulgaris* at Hubbard Ranch, Nevada, August 20, 1943; Craig, Montana, August 5, 1944; on *Artemisia tridentata* in Shoshone National Forest, Wyoming, September 11, 1941; on *A. ludovicianae,* Colfax, Washington, August 7, 1944.

Drosophila mallochi, nom. nov.

By O. Frota-Pessoa, Santa Teresa, Rio de Janeiro

During a bibliographic revision, I saw that *Drosophila lativittata* Malloch, 1924, is a preoccupied name and wrote to Professor J. R. Malloch about it. He kindly asked me to propose a new name, which is what I am doing in this note.

Drosophila mallochi nom. nov.

Drosophila lativittata Malloch, 1924 in Malloch & McAtee, 1924 Proc. Biol. Soc. Wash. 37: 36–37.

nec *Drosophila lativittata* Malloch, 1923 Proc. Linn. Soc. N. S. W. 48: 618.

D. mallochi is a North-American species, while *D. lativittata* Malloch, 1923, is an Australian one.

A Note on Hellgrammites in Eastern Tennessee

By Mike Wright, Tusculum College, Greeneville, Tennessee

Hellgrammites or larvae of the large and spectacular dobson fly (*Corydalis cornutus*) are found fairly frequently in the cool, fast flowing streams of eastern Tennessee, particularly in the mountainous section. They are locally known as "grampies" and are highly valued as bass or trout bait.

This observer has frequently found specimens while searching for dragonfly nymphs in such streams, usually under larger rocks. According to Comstock's *An Introduction to Entomology* (p. 287), these insects spend about three years in their larval stage, leaving the water to pupate under a stone or some other object on or near the bank of the stream. In view of this we wish to report the following interesting observation on the terrestrial wandering of these larvae.

On May 11 and 12, 1946, the writer with a party of students stayed at Kinzel Springs, about 25 miles northwest of Gatlinburg, Tennessee. This resort is located on Little River just outside the Smoky Mountain Reserve. At about 10:30 P.M. several students brought in a large hellgrammite from the roadway just outside the cottage. Further investigation produced two additional larvae, all walking along the same roadbed. The roadbed was some 200 to 300 feet from the river and raised about 15 to 20 feet above the water level of the river. In many places the river bank was gently sloped and contained abundant rocks and other debris suitable for pupation of hellgrammites. Little River was high, due to recent rains, and carried considerable silt from upstream cultivated fields, but suitable pupating areas were abundant.

We are unable to offer an explanation for this wandering, but note that no hellgrammites were found on land the next morning, although several were taken in the stream. In addition, one large larva was found inside a cottage located on the edge of the stream, but some 15 feet above the water level. The hellgrammite had crawled up the side of the cottage and through some opening into the bedroom, where it was found wandering about over the floor.

As larval measurements are not given in our available literature, the following dimensions of the two largest larvae are given herein: total length of body (a) 74 mm., (b) 71 mm.; width of head (a) 10.5 mm., (b) 9 mm.

Aedes tortilis (Theobald), a Mosquito New to the United States

By Arthur E. Staebler, S. A. Sanitarian (R) and William F. Buren, Asst. Sanitarian (R), Foreign Quarantine Division, U. S. Public Health Service

Aedes tortilis (Theobald) occurs in the Bahamas, Virgin Islands, and the Greater Antilles. So far as we are aware the species has never been taken in the United States, even on the Florida Keys. On August 28, 1945, a female specimen was captured in a light trap operated by Mr. J. H. Hause, Malaria Control in War Areas at Key West, Florida. As Key West is a port of entry for aircraft, this trap was set up with the cooperation of Mr. Hause by the writers for the purpose of checking on the possible implantation of exotic insects of Public Health interest.

Aedes tortilis has also been taken in the routine insect inspection of aircraft arriving at Miami, Florida, from quarantinable areas. A total of five dead females has been recovered as follows: September 27, 1944, on a plane from San Juan, Puerto Rico, via Guantanamo, Cuba (2 specimens); October 7, 1944, on a plane from Panama Canal Zone via Jamaica (1 specimen); August 20, 1945, on a plane from San Juan, Puerto Rico via Camaguey, Cuba (1 specimen); November 24, 1945, on a plane from Barranquilla, Colombia via Camaguey, Cuba (1 specimen).

There is a possibility that *Aedes tortilis* may have been recently introduced at Key West by aircraft.

The identification of the specimens has been confirmed by Dr. Alan Stone of the U. S. National Museum.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

The Adams Collection of Odonata. Dr. Charles C. Adams, lately retired as Director of the New York State Museum, Albany, N. Y., has presented his collection of Odonata to the Academy of Natural Sciences of Philadelphia. The insects, about 3900 in number, representing at least 337 species, are mostly in paper envelopes. The localities of origin include Illinois (Dr. Adams' native State, in which he did much collecting around Bloomington); the upper waters of the Cumberland and Tennessee Rivers (gathered in the course of his investigations of the mollusk Io); Gotha, Florida (collected by Adolph Hempel); Phoenix, Arizona (from R. E. Kunze); Intervale, New Hampshire (collected by G. M. Allen); Orono, Maine (by F. L. Harvey); the Nilgiris, India (by a native collector); and many localities of the Old World as received in exchange from the well-known French student of the Odonata, René Martin (1846–1925). Many examples from Dr. Adams' collection are recorded in the Odonate section of the Biologia Centrali-Americana. Dr. Adams writes: "The collection was given to the Academy in recognition of Dr. Philip P. Calvert's outstanding contribution to our knowledge of Odonata and on account of his generous and friendly relations with all students of these insects." Dr. Calvert has been a Research Fellow in Entomology at the Academy for many years.

Personal

Dr. Donald T. Ries, formerly Park Naturalist at Starved Rock State Park, Utica, Illinois, has recently returned from active duty with the Sanitary Corps, U. S. Army. He has been appointed Assistant Professor of Biology at Illinois State Normal University, Normal, Illinois, beginning in September 1946.

Current Entomological Literature

COMPILED BY CHARLES HODGE IV, EDWIN T. MOUL, MAURICE E. PHILLIPS AND HENRY K. TOWNES JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in ENTOMOLOGICAL NEWS are not listed.

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stein, D.—Investigation of the locus of action of DDT in flies (Drosophila). [9] 90: 148–157, ill., 1946. **Carlson, J. G.**—Protoplasmic viscosity changes in different regions of the grasshopper neuroblast during mitosis. [9] 90: 109–121, ill., 1946. **Cockayne, E. A.**—Peroneural Defect in Abraxas grossulariata, L. [21] 58: 45–46, ill. **Ilse, Dora.**—The color vision of insects. [34] 65: 68–82. **Lindberg, H.**—Morphological variations of stylopized cicadas. [28] 23: 144–156. **Marcus, H.**—Comparative study of mandibular articulation of ants and termites. [1] 2: 259–284. **Marcus, H.**—Respiration of ants. [1] 2: 307–320. **Marcus, H.**—Olfactory organs of ants. [1] 2: 441–445. **Palmer, E. D.**—Intestinal canthariasis due to Tenebrio molitor. [25] 32: 54–55. **Richards & Cutkomp.**—Correlation between the possession of a chitinous cuticle and sensitivity to DDT. [9] 90: 97–108, 1946. **Roeder & Weiant.**—The sight of action of DDT in the cockroach. [38] 103: 304–306. **Suomalainen, Eske.**—Beiträge zur zytologie der parthenogenetischen insekten. I Coleoptera. [5] Ser. A. 54: no. 7, 1–76, ill. **Waterhouse, D. F.**—Studies of the Physiology and Toxicology of blowflies. [7] Bul. 191: 1–39. **Wheeler, L. R.**—Hairs on the Bodies and Upper Wing Surfaces of Butterflies: A Probable Protection Against Cold. [20] 79: 80–87. **Williams, R. W. and H. W. Brown.**—Transmission of Litomosoides carinii, by tropical rat mite, Liponyssus bacoti. [38] 103: 224.

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British Butterflies

The British Islands have a biota which is of extraordinary interest whether regarded from the aesthetic or purely scientific point of view. The flowers, the birds, the butterflies and moths, the snails, are extremely beautiful, and give much pleasure to those able to appreciate them. But at the same time there is perhaps no part of the world which illustrates so well the migrations and variations of species, the events taking place since the glacial period or periods, when most of the country was covered with ice. It was a happy thought to found a new series of books, under the title of The New Naturalist, to set forth the essence of all this, including the observed facts, and modern theories of genetics; to present the best results of scientific work in such a way that any intelligent person could understand. At the same time, the sense and enjoyment of beauty is well satisfied by exquisite colored plates.

With this ambitious purpose the problem naturally arose, how could men be found to write the books? They must not be mere compilers, they must know nature out-of-doors, and yet they must have understanding of theoretical matters sufficient to interpret the observations made in the field. At the same time they must be good writers. Whether these conditions can be met in the case of the numerous other volumes proposed, remains to be seen, but certainly the first author, Dr. E. B. Ford of the University of Oxford abundantly satisfies all these requirements. The book is so interesting and stimulating that one would like to discuss it at great length, but some idea of its contents can be got from the chapter headings. The History of British Butterfly Collecting. The Structure and Developments of Butterflies. The Senses and Colours of Butterflies. The Principles of Classification. Habits and Protective Devices. Relations with Other Insects. Distribution. Dispersal. Theoretical Genetics. Practical Genetics and Breeding. Genetic Interactions. Evolution. The Races and Subspecies of British Butterflies. The Origin of the British Butterfly Fauna. There are numerous maps showing distribution.

Long ago, I was called upon to assist Alfred Russel Wallace in the preparation of a new edition of his ISLAND LIFE. Wallace considered that there ought to be a number of races of British animals evolving in Pleistocene or Pliocene times. At that time there was a very strong prejudice against such an idea and as we now think of it, it seems extraordinary that we were so blind as to the actual facts, whether relating to mammals, birds or insects. Among the butterflies, striking abberations were prized by collectors, and given names, but the relatively inconspicuous differences between subspecies were overlooked. Thus the English race of the swallow-tail, *Papilio machaon,* is said by Ford to constitute a distinct subspecies which cannot be confused with any other. It is beautifully illustrated in the book, and at the same time the French race for comparison. But this British insect was named subsp. *britannicus* by Seitz, in a German work in quite modern times.

The price of the book is only 16 shillings, though it has 368 pages and very many illustrations. It is published by Collins, 14 St. James' Place, London.—T. D. A. COCKERELL.

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—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

Arctic Lepidoptera on hand, including Erebia, Oeneis and Brenthis. R. J. Fitch, Lloydminster, Sask., Canada.

Odonata—Will buy or exchange North and Central American species, both imagos and nymphs. Also will exchange other orders for Odonata. Carl Cook, Crail Hope, Kentucky.

I want to collect Rothschildia farbesi, agapema, galfina and io moths for interested persons. E. Frizzell, Route 4, San Benito, Texas.

Wanted—Information as to the existence and present location of a copy of Solodonikov, S. V. Contribution à l'étude de la faune et de la biologie des larves des Libellules du Donetz et de certains de ces affluents. [In Ukrainian.] Trav. Soc. Nat. Charkow 52: 249–268. 1929. [Quoted from Zool. Rec. 1936, Ins. p. 147, No. 3114.] P. P. Calvert, P. O. Box 14, Cheyney, Penna.

Wanted—Crane-flies (Tipulidae) of New Guinea, New Caledonia and Neighboring Islands, for revisional purposes. Also, names and addresses of individuals or institutions possessing any of these flies. Correspondence solicited. Chas. P. Alexander, Fernald Hall, Amherst, Mass.

Lepidoptera—Wanted, Hyloicus (Sphinx) and other Sphingidae in exchange for U. S. and Wisconsin Lepidoptera. Wm. E. Sieker, 119 Monona Ave., Madison 3, Wisconsin.

Hymenoptera-Aculeata (except ants and bees) and **Ichneumonidae** for exchange or purchase. Will collect any order in exchange. D. G. Shappirio, 4811 17th St., NW, Washington 11, D. C.

Wanted—Oriental Cerambycidae and Chrysomelidae for determination and research purposes: China, India, Philippines, Pacific. Will purchase from China, Assam, Burma, Siam, Formosa. Will exchange identified Chinese insects. J. Linsley Gressitt, Lingnan University, Canton, China.

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ENTOMOLOGICAL NEWS

JULY 1946

Vol. LVII **No. 7**

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ROSWELL CARTER WILLIAMS, JR.

ENTOMOLOGICAL NEWS

Vol. LVII JULY, 1946 No. 7

Roswell Carter Williams, Jr.

Mr. Williams was born in Brooklyn, New York, on August 21st, 1869 and died in Philadelphia, Pennsylvania, on March 7th, 1946. He was in his seventy-seventh year. He attended the Adelphi Academy in Brooklyn, graduating with a B.S. degree, and then entered Cornell University from which he graduated in 1892 with an M.E. degree. He was associated with Charles P. Steinmetz in the development of the "Three Phase Power Transmission" experimental work. He removed to Philadelphia and about 1896 entered the electric engineering and contracting firm of J. F. Buchanan & Company as a partner, and remained a member of that firm until his retirement from business in 1918.

In World War I, Mr. Williams volunteered for war service and received the appointment of Captain in the Ordnance Department. He was appointed by Congress on the Board of Adjustment to represent the Government at Nitro, West Virginia and served throughout the war.

Mr. Williams was long very much interested in natural history, especially in the study of Lepidoptera, and for many years up until the time of his death was actively associated with the Academy of Natural Sciences of Philadelphia and with the American Entomological Society. He was elected an annual member of the Academy on November 26th, 1901, became an Associate Sustaining Member on February 21st, 1928, and a Sustaining Member on January 16th, 1929. He served as a member of the Scientific Council of the Academy from December, 1920, until his death. He was Chairman of the Committee on Accounts of the Academy from December, 1922, to

October, 1924, when through a reorganization of the operations of the Academy the Committee was discontinued. In 1922 he was elected by the Council of the Academy to the post of Research Associate in the Department of Entomology which he held to the time of his death.

Mr. Williams was elected a member of the American Entomological Society on March 25th, 1915 and served three periods as its Recording Secretary, i.e. 1916–1918, 1920, and 1922–1924. He was President of the Society the years 1926 to 1935 and as ex-President was a member of its Council up to the time of his death. At various times he served as a member of the Society's Finance Committee and of its Publication Committee.

In his studies of Lepidoptera, Mr. Williams was principally interested in the family of butterflies known as the Hesperiidae, and about these published numerous papers and described for the first time many species new to science. He was particularly interested in these butterflies from the tropical regions of America, but also did considerable work with those of the North American fauna. He had many correspondents in Central and South America who sent him specimens from various countries. His earliest publication known to the writer was in Entomological News, xxv, 1914, in which he described a new form of hesperid.

For several years up to the time of Dr. Henry Skinner's death in 1926, Mr. Williams worked intimately with him and collaborated with him in writing a comprehensive work on the male genitalia of the North American Hesperiidae, illustrated by drawings from nearly all the then known species occurring north of the Mexican border, and with the description of a new species. Under the title of "On the Male Genitalia of the Hesperiidae of North America" their work was published as a series of papers in the Transactions of the American Entomological Society, XLVIII, 1922–1923, XLIX, 1923, and L, 1924. These are the first and only publications of this kind dealing entirely with the North American species of Hesperiidae. The illustrations and much other data provide great assistance to students of these butterflies.

Mr. Williams was keenly interested in the study of the male genitalia of Hesperiidae as a means of certain identification of species and most of his works are well illustrated with drawings of these structures. He published his "Studies in the Neotropical Hesperiidae" in the Transactions of the American Entomological Society in two parts, LII, 1926 and LIII, 1927, the first part dealing with the genus *Eudamus* and the second part with several other genera. These papers contain descriptions of several new species and one new genus and a great deal of data on various other species and include drawings and two plates in each part of very exact and beautiful figures in natural color of the insects themselves. He also published in the Transactions, LVII, 1931, a paper entitled "Two New Hesperids from Ecuador" illustrated with drawings and colored figures of the two species. He also published another paper entitled "A New Hesperid from Mexico" in the Transactions, LIX, 1933, with a plate of black and white figures.

In 1929 a small group of collectors, in which Mr. Williams participated, sent Mr. Orazio Querci to Cuba to collect Lepidoptera, and on the Hesperiidae taken on this expedition Mr. Williams published a paper in the Transactions of the American Entomological Society, LVII, 1931, entitled "Cuban Hesperiidae." This paper is illustrated with drawings, a chart showing species and dates of capture and one plate of fifteen figures of butterflies in their natural color.

Mr. Williams joined with Dr. A. W. Lindsey and the writer in compiling a revised edition of "The Hesperioidea of North America," which was published in the Denison University Bulletin, Journal of the Scientific Laboratories, XXVI, 1931.

Mr. Williams and the writer worked together on many problems concerning the American Hesperiidae and jointly published several papers which appeared in the Transactions of the American Entomological Society. These papers are "Short Studies in American Hesperiidae," LVI, 1930; "Studies in the American Hesperioidea," in four parts, LIX, 1933, LX, January, May and September, 1934; "New Species of Pellicia with Remarks on the Genus," LXV, 1939; "New Neotropical Hesperiidae and Notes on Others," LXVI, 1940, all of which are illustrated with drawings.

In 1926 Mr. Williams participated in organizing an expedition to the Guianas to collect insects, and early in 1927 Dr. W. T. M. Forbes of Cornell University and his associate Dr. P. P. Babiy were sent to Dutch and British Guiana with short stops in some of the West Indies. They spent several months collecting and on the Hesperiidae taken by them a joint paper was published by Mr. Williams and the writer entitled "Hesperiidae of the Forbes Expedition to Dutch and British Guiana." This paper appeared in the Transactions of the American Entomological Society, LVII, 1931, and in it several new species are described and it is illustrated with many drawings and one plate of colored figures.

Mr. Williams and Mr. Kenneth J. Hayward, of Tucuman, Argentina, jointly compiled the "Hesperiidarum Rei Publicae Aequatoris Catalogus" published at Tucuman in De Acta Zoologica Lilloana del Instituto Miguel Lillo, II, 1944. In this work they presented a catalogue of all the known species of Hesperiidae occurring in Ecuador, with a long bibliography and details of the localities from which the insects came. To the writer's knowledge, Mr. Williams spent a great deal of time over several years in research and in compiling the information for this catalogue from the large amount of Ecuadorean material in the collection of the Academy of Natural Sciences.

Two weeks before his death Mr. Williams completed assembling specimens of butterflies for a map showing their distribution in the United States, which has been published in the July issue of the "Holiday" magazine and this, his last contribution to the Science of Entomology, is a tribute to his many years of interest in it.

The writer's own intimate friendship with Mr. Williams began nearly twenty-five years ago while he was working with Dr. Skinner on their papers, and over this long period of years it was always of the greatest pleasure to work with him on problems of mutual interest, much of it done by correspondence, but many very happy hours were spent with him and his family at their home and with him at the Academy of Natural Sciences. He was a cheerful, courteous, unassuming man, a loving husband, a devoted father, a loyal friend, a patriotic, upstanding citizen of his Country; he was "Roz" to his host of friends and by them his memory will be cherished so long as they live.

Surviving him are his wife, Carrie Hamsher Williams, and four sons: Roswell Carter III, Hamilton, Arthur P., Lieutenant Charles M., U.S.N.

ERNEST L. BELL

Notes on an Amphibious Cockroach from the Republic of Panama

By H. H. CROWELL, Assistant Entomologist, Oregon Agricultural Experiment Station, Corvallis

While dipping for mosquito larvae in a lagoon of the Rio Chilibre near the Panama Canal Zone boundary in January, 1944, the writer found the nymph of a medium-sized roach. The insect was, at first glance, thought to be an hemipterous water bug, since it was swimming rapidly around in the dipper beneath floating scraps of vegetation. It was transferred to a jar of water and taken alive to the writer's home in Ancon, Canal Zone. A battery jar aquarium was fitted out with the floating aquatic plants *Piaropus crassipes* (water-hyacinth) and *Jussiaea natans*, which were the predominant plants in the lagoon. Food, in the form of "Pablum"* (baby food—known to be eaten readily by certain household roaches), was offered to the nymph by floating it on sections of cork. Both the "Pablum" and the small round leaves of the *Jussiaea* were fed upon, but not while the roach was under observation.

About two weeks after its capture, the roach molted into an adult, winged female. The nymphal skin was not found, so it was assumed that it had been eaten—a common procedure for roaches. During the time the roach was under observation in the aquarium, it was induced several time to submerge, voluntarily, by passing the shadow of one's hand over it or by touching it lightly with the end of a pencil. When disturbed, the roach (both in the nymphal and in the adult stages) dived into the water from the floating vegetation and swam around the jar rapidly for a minute or two well below the surface of the water. If not disturbed further, the roach clung to the dangling roots of the aquatic plants and remained quiescent for as long as fifteen minutes, on two occasions, before climbing to the surface and thrusting forth its antennae and head. In this position it often remained quiescent for five or more minutes before emerging completely. When the roach was quiet under the water, a large bubble of air could be seen trapped beneath the pronotal shield.

The adult specimen was sent to the National Museum and was identified by Dr. H. K. Townes as *Epilampra abdomen-nigrum* (DeG.). Subsequent mosquito collecting trips to the Chilibre lagoon revealed no additional specimens of this species in the aquatic vegetation. One specimen of an unknown species was dipped on one trip, but it escaped before it could be transferred to a suitable container.

Since returning to the United States the writer has received some very interesting information concerning the amphibious habits of roaches from correspondence with Mr. James A. G. Rehn, Curator of Insects at the Academy of Natural Sciences of Philadelphia, and Dr. Ashley B. Gurney, Entomologist with the Division of Insect Identification in Washington. Dr. Rehn was very familiar with this species, having had considerable to do with clearing up its much involved synonymy and working out its distribution. *Epilampra abdomen-nigrum* occurs from southern Mexico to Amazonia and through the Lesser Antilles, Jamaica and Puerto Rico. Although this species has been collected on the mainland more abundantly, probably, than any other species of the genus, the amphibious life habits have not been specifically noted for it or for any other related form from Panama. Aquatic habits have been noted, however, for other species of *Epilampra* and relatives of the genus since 1900, when Annandale recorded observations on adults of a Malayan species of *Epilampra*. Since then there have been a number of recorded observations of amphibious habits in blattids from both the Eastern and American tropics, largely in genera of the family Epilamprinae.

Undescribed Species of Crane-Flies from the Western United States and Canada (Dipt.: Tipulidae). Part VI

By Charles P. Alexander, Massachusetts State College, Amherst, Massachusetts

The preceding part under this title was published in Entomological News, 57: 65–71, 1946. At this time I am characterizing three further species from California and Idaho, all belonging to the major genus *Tipula*. Acknowledgement for these specimens is given under the individual species.

Tipula (Oreomyza) inyoensis new species

Belongs to the *borealis* (*unca*) group; mesonotal praescutum yellow, with four more reddish brown stripes, the intermediate pair approximated or confluent in front; posterior sclerites of notum chiefly yellow; pleura and pleurotergite entirely yellow; femora yellow, the tips narrowly and weakly darkened; wings with a strong brownish tinge, more yellowed on basal third, without clearly defined pattern; basal abdominal segments chiefly yellow, the outer ones more darkened; ninth tergite with the median portion produced, its margin gently emarginate, on either side beneath with a slender blackened rod; inner dististyle with the beak unusually slender, blackened, extended straight backward into the dorsal crest; lateral appendage very reduced, somewhat as in *madera*, without a pendulous lower process or a claw-like middle one; upper process a conspicuous blackened clavate lobe; gonapaphysis appearing as a flattened blade.

♂. Length about 15 mm.; wing 13 mm.; antenna about 5.2 mm.

♀. Length about 15 mm.; wing 12.2 mm.

Frontal prolongation of head obscure yellow, paler beneath; nasus very long, tufted with long black setae; palpi obscure testaceous yellow, the terminal segment more infuscated. Antennae (male) long; scape, pedicel and extreme base of first flagellar segment obscure yellow, remainder of flagellum black, the extreme bases of the more proximal segments paler; flagellar segments elongate, gently incised, longer than any of the verticils. Head above brownish gray, clearer gray in front, more yellowed behind; posterior vertex more infuscated, with a vague darker median vitta.

Pronotum infuscated medially above, obscure yellow on sides. Mesonotal praescutum with the ground color yellow, with four more reddish brown stripes, the intermediate pair approximated or confluent in front, obliterating the central pale vitta; outer borders of both intermediate and lateral stripes vaguely bordered by darker; scutum yellow medially, the lobes extensively grayish brown; posterior sclerites of notum chiefly yellow, the scutellum with a capillary brown median vitta, this less evident on the scutum; mediotergite more reddened on sides of posterior third. Pleura and pleurotergite yellow, unpatterned. Halteres with stem yellowish brown, the extreme base yellow, knob infuscated. Legs with the coxae and trochanters yellow; femora yellow, the tips narrowly and weakly darkened, most evidently so on the outer face; tibiae obscure brownish yellow, the tips narrowly darkened; tarsi black, basitarsi restrictedly paler on proximal portions; claws hairy, simple. Wings with a strong brownish tinge, more yellowed on basal third, without clearly defined pattern, the prearcular and costal fields most evidently so; stigma brownish yellow, vaguely bordered by darker; a scarcely evident pattern in the basal cells, particularly *M* and *Cu*; obliterative areas restricted; veins brown, paler in the more brightened fields. Venation: *Rs* long, about three-fourths longer than *m-cu*; R_{1+2} entire; *m* about twice the petiole of cell M_1.

Abdomen chiefly yellow on basal segments, the outer ones more suffused, on the subterminal segments the sublateral portions more darkened; hypopygium chiefly yellowish brown on tergite and styli, the eighth sternite pale. Male hypopygium with the median portion of the ninth tergite slightly produced, its caudal margin gently emarginate; from the lower surface on either side arises a slender blackened rod. Outer dististyle flattened, its apex truncate. Inner dististyle with the beak unusually slender, blackened, extended straight backward into the dorsal crest; lower beak very deep, its upper outer angle more blackened and produced into a short point; dorsal crest with numerous setae, on the outer face more emarginate and produced into a conspicuous lobe that is tufted with a few long setae. Lateral appendage very reduced, somewhat as in *madera*, without a pendulous lower process or a claw-like middle one; upper process a conspicuously blackened clavate lobe, its tip obtuse; lower angle merely triangular, not at all produced, entirely pale. Gonapophysis appearing as a flattened blade, the tip narrowed abruptly into a small obtuse lobule. Eighth sternite very shallowly incised to form three low lobes that are only sparsely hairy, the central one especially so.

Habitat.—CALIFORNIA. *Holotype:* ♂, Camp Manzanar, Inyo County, altitude about 3700 feet, July 1–6, 1945 (Joe M. Mayeda); through Dr. John A. Comstock. *Allotopotype:* ♀; *paratopotype*, 1 ♂.

The present fly is one of the interesting species collected by Mr. Mayeda in the vicinity of Camp Manzanar and kindly presented to me by Dr. Comstock. This is a very distinct species in an unusually difficult group, in its almost unpatterned wings somewhat resembling *Tipula* (*Oreomyza*) *appendiculata* Loew (*derelicta* Dietz, *stalactoides* Doane), differing very evidently in the structure of the male hypopygium, particularly the reduced lateral appendage. In this last respect it most resembles *T.* (*O.*) *madera* Doane, which is one of the largest species in the group, with the wing pattern especially heavy and distinct.

Tipula (Lunatipula) alcestis new species

Belongs to the *barbata* group; allied to *accurata*; wings with a brownish tinge, the obliterative area before cord extensive, virtually crossing the wing; remaining cells not conspicuously streaked with whitish; male hypopygium with the lobes of the ninth tergite obliquely truncated; beak of inner dististyle stout, outer basal lobe broad; gonapophysis dark-colored, terminating in an acute spine; eighth sternite with the median plate small, compressed-flattened.

♂. Length about 11–11.5 mm.; wing 13–13.5 mm.; antenna about 3.5 mm.

♀. Length about 14–15 mm.; wing 13 mm.

Described from alcoholic specimens.

Frontal prolongation of head brown, darker above; nasus elongate; palpi dark brown, terminal segment somewhat paler. Antennae with scape and pedicel yellow, the former a little darker at proximal end; basal two flagellar segments weakly bicolored, the remainder uniformly brownish black; flagellar segments only feebly incised, longer than the verticils. Head brown.

Thorax brown, variegated with darker brown, including broad praescutal stripes and a single major darkening on either scutal lobe; postnotum chiefly darkened; scutum and scutellum with a darkened capillary median vitta. Pleura with the mesepisternum dark brown, the mesepimeron and metapleura paler, variegated with brown. It is probable that in dry specimens the surface is more or less pruinose. Halteres with stem yellow, knob brown, its apex paler. Legs with the coxae brown; trochanters yellow; femora brownish yellow, the tips narrowly blackened; tibiae yellow, still more narrowly darkened at tip; tarsi obscure yellow, passing into black. Wings with a brownish tinge, the prearcular and costal fields a trifle more yellowed; stigma darker brown; cells beyond cord more strongly infuscated, especially in the outer radial field; small brown spots at origin of *Rs* and over the anterior cord; obliterative area before cord extensive and conspicuous, virtually crossing the wing along vein M_4, slightly broken at end of *Rs*; poststigmal pale area likewise conspicuous, including parts of cells Sc_2, R_2 and R_3; pale streaks along veins virtually lacking, most evident as vague lines in cells *Cu* and *1st A*; veins brown. Venation: *Rs* relatively long, from about one and one-half to nearly two times *m-cu*, longer than in *accurata*. In this latter species, the wings are more conspicuously variegated by paler, involving virtually the entire wing and appearing chiefly as broad streaks along the veins, excepting in the outer radial field.

Abdomen with the segments chiefly yellow, the tergites trivittate with brown, the lateral pair more broken; on the fourth and succeeding segments the color more uniformly dark brown: hypopygium chiefly yellow. Male hypopygium having the ninth tergite with broad lobes, obliquely truncated and less pointed than in *accurata;* median notch a trifle wider. Appendage of ninth sternite smaller, oval, with long dark-colored setae. Outer dististyle long and slender. Inner dististyle with the beak much stouter than in *accurata,* sloping upward to the dorsal crest; outer basal lobe broader than in *accurata.* Gonapophysis dark-colored, relatively long, produced into a slender spine on side near apex. Eighth sternite with the median plate small, compressed-flattened, not rectangular, as in *accurata.*

Habitat.—IDAHO. *Holotype:* ♂, alcoholic, Humphrey, Centennial Mts., Clark Co., along Route 91, altitude 6,500 feet, August 20, 1941 (Stanley B. Mulaik). *Allotopotype:* alcoholic ♀. *Paratopotypes:* 1 ♂, 1 ♀, alcoholic.

I am greatly indebted to Mr. Stanley B. Mulaik for the present material and other interesting Tipulidae from Colorado, Idaho and Utah. The most similar described species is *Tipula (Lunatipula) accurata* Alexander, which differs conspicuously in the wing pattern and in several important details of structure of the male hypopygium, including the tergite, inner dististyle, gonapophyses and eighth sternite.

Tipula (Lunatipula) zelotypa new species

Size relatively small (wing, male, 12 mm.); mesonotal praescutum gray, with four entire brown stripes; antennae with scape and pedicel yellow, basal flagellar segments weakly bicolored; femora obscure yellow, the tips narrowly and weakly infuscated; claws (male) simple; wings with a weak brown tinge, sparsely spotted with darker brown; a virtually complete obliterative band at and before cord; no trichia on squama or in wing cells; male hypopygium with the ninth tergite having a broad shallow V-shaped notch, the low lobes heavily blackened; basistyle produced caudad into a very thin scooplike blade; dististyle compact, beak obtuse; two spinelike points on style, one behind the beak, the other in the region of the posterior crest; outer basal lobe a strong curved arm, unequally bifid at tip; eighth sternite with its caudal border very slightly produced, provided with numerous pale setae that are directed caudad, not arranged in brushes or pencils.

♂. Length about 12 mm.; wing 12 mm.; antenna about 4 mm.

Frontal prolongation of head brownish yellow, the dorsal surface sparsely dusted; nasus elongate; palpi with basal three segments brownish yellow, terminal one blackened. Antennae with the scape and pedicel yellow; first flagellar segment obscure brownish yellow; succeeding segments weakly bicolored, the small basal swellings brown, the apices paler, the outer segments more uniformly dark brown. Head above light gray, more yellowed on the occipital region; a short brown median vitta on the posterior vertex; vertical tubercle low, entire.

Pronotum brownish gray. Mesonotal praescutum gray, with four narrow entire brown stripes, the intermediate pair separated by a ground vitta of more than one-half their width; lateral stripes slightly broader; humeral region narrowly bordered by dark brown; posterior sclerites of notum testaceous brown, the scutal lobes and median region of scutellum patterned with somewhat darker brown; pleurotergite pruinose. Pleura pruinose behind, the anterior portion somewhat more variegated with darker, especially on the anepisternum and ventral sternopleurite; dorsopleural membrane yellow. Halteres yellow, knob weakly darkened. Legs with the coxae yellow, sparsely pruinose, the fore pair a little darker; trochanters yellow; femora and tibiae obscure yellow, the tips narrowly and weakly infuscated, the latter more narrowly so; tarsi light brown, passing into black outwardly; claws (male) simple. Wings with a weak brownish tinge, heavier along the veins beyond cord; stigma small, pale brown, inconspicuous; obliterative band before cord large, extending from before stigma to the posterior border along vein M_4, involving less than the proximal half of cell *1st* M_2; veins brown. No squamal setae; no trichia in wing cells, including the stigma; veins beyond cord with relatively abundant long trichia. Venation: *Rs* a little less than twice *m–cu*; R_{1+2} entire; *m* oblique, longer than the petiole of cell M_1; M_{3+4} little more than one-half the basal section of M_{1+2}; cell *2nd A* broad.

Abdominal tergites obscure yellow, trivittate with brown, the median stripe broad and distinct, narrowly interrupted at the posterior borders of the segments; lateral areas much broken, becoming more distinct on the outer segments; basal sternites yellow, the outer segments darker but this apparently caused by discoloration; hypopygium chiefly pale. Male hypopygium with the tergite having a very broad and shallow V-shaped emargination, the low lobes heavily blackened; median region with a microscopic lobule; outer apical portion of lobe with an indistinct blackened point or carina. Appendage of ninth sternite a small lobe provided with numerous short pale setae. Basistyle produced caudad into a flattened, very thin, scooplike blade. Dististyle with the beak very stout and obtuse, the lower beak lacking; dorsal crest scarcely elevated; region of posterior crest produced into a short spinelike lobe; on face of style behind the beak with an even smaller reddish spine; what appears to be the outer basal lobe is a curved arm, unequally bilobed at tip, the axial spine larger, the subapical one evidently variable in size; apical portion of arm with numerous setae. Aedeagus stout but simple; gonapophyses reduced. Eighth sternite transverse, the central area of the posterior border very slightly produced, provided with numerous long pale setae that are not arranged in brushes or pencils.

Habitat.—California. *Holotype:* ♂, Brawley, Imperial County, altitude 109 feet below sea-level, April 5, 1935 (A. L. Melander); Alexander Collection, through kindness of Dr. Melander.

The present isolated fly shows some points of resemblance to *Tipula atrisumma* Doane, which I have referred to the subgenus *Lunatipula* Edwards. In all other respects, the hypopygium and general appearance of the two flies is quite distinct. It may be found that *zelotypa* is more properly to be considered as being a *Trichotipula* but, if so, it deviates in many respects from the hitherto accepted characters of the subgenus.

Relative Toxicity of DDT Aerosols to Mosquitoes and Musca Domestica. Insect Balance [1]

By Frank Brescia, College of the City of New York, Victor K. LaMer, Irwin B. Wilson, John C. Rowell, Kenneth C. Hodges, Columbia University, New York City

Resolution of the well founded fear of an unbalanced insect world that may result from the use of DDT over large tracts of land (1, 2, 3, 4) requires information on the relative susceptibility of the various insects to DDT. Such a quantitative laboratory study will indicate what other insects will be effectively controlled during control operations for any given insect.

Control of the natural population of salt marsh mosquitoes up to 5000 feet downwind in open country under favorable meteorological conditions was obtained (5) with an output of 15 gallons of emulsion (50 per cent water–50 per cent oil by volume; DDT content being 10 per cent of the weight of the oil) per 1000 feet of front covered with the Insecticidal Aerosol Generator developed at Columbia University. This dosage is equivalent to 5 pounds of DDT per 1000 feet of front. It was also found that an area cleared of anopheline adult mosquitoes remained relatively free of such adults for several days. This protective period cannot be attributed to the deposited DDT but very probably to a low rate of infiltration.

Several insects of medical and economic importance were also subsequently used as test insects. The results obtained emphasize that the dosage recommended (above) for mosquito control operations is not equally effective against other insects and that *with this comparatively small and controlled dosage*, the possibility of appreciable disturbance of the natural insect balance, resulting from general insect destruction, appears to be remote.

[1] This paper is based on work done for the Office of Scientific Research and Development under O.S.R.D. contract OEMsr 1388 with Columbia University.

Field experiments in which *Musca domestica*, suspected to be an important factor in the transmission of infantile paralysis, were exposed to several dosages using the aerosol generator are presently reported. The results indicate that the adult fly is 4 to 6 times more resistant than the adult (salt marsh) mosquito.

Fly technic. Pupae, obtained from the Entomological Testing Laboratory, New York City, were placed in each of several cages (brass netting) with a cotton wad wetted with a sugar solution. Emergence was produced by keeping the cages at about 85° F. under conditions of high humidity.

Shortly before the field experiment, fresh cotton wads with sugar solution were introduced into the cages and the cages placed in large screw cap bottles which contained a wad of cotton saturated with water.

When not being exposed to the aerosol or to the wind in the case of some checks, the fly cages were kept in the jars.

At the time of the test, the flies varied in age from 3 to 30 hours, most of them being at least 24 hours old.

Experimental procedure. Cages of flies were exposed to the aerosol in open country for different intervals of time at 3 different distances, 100, 500, and 1000 feet, downwind.

The generator was stationary but the equivalent dosage (gals. per 1000 feet) of a moving test was calculated from the generator output (gals./min.), exposure time (from 2 to 20 minutes depending on distance) and spread (feet) of the aerosol at each distance. The mass particle diameter was 16 microns; the wind velocity 9 miles per hour.

Four check cages were placed upwind of the generator. Three cages were exposed to the wind for various periods; the fourth was kept within the jar. Two additional check cages were kept in the laboratory.

Results and discussion. Within 2 hours after exposure to the aerosol, all flies were knocked down and a few were dead, except in one cage which had been exposed to an equivalent dosage of 4.7 gallons of emulsion per 1000 feet of front at a distance of 1000 feet downwind. In this cage only one fly was down while 15 were active. All flies were down in another cage at the same distance and exposure. The check cages showed a 10 per cent knockdown. Mortality data for the 1000 foot distance are given in Table 1.

TABLE 1. Mortality Data for Several Dosages of DDT Aerosol at 1000 Feet Downwind and for Controls. May 5, 1945

Equivalent Dosage in Gallons of Emulsion per 1000 Feet of Front	Number of Flies	% Dead
4.7	16	12
4.7	11	9
6.1	13	55 (1)
14	19	95 (1)
14	23	91 (1)
24	27	100
24	26	100
Check Cages Exposed to Wind. Minutes	**Number of Flies**	**% Dead (2)**
50	17	6
50	27	22
120	9	11
0	17	16
0	12	0

(1) Living flies were on their backs.
(2) Those flies which were living but were on their backs were counted as dead.

The data show that an output of about 15 gallons of the emulsion per 1000 feet of front will be required to effect adult housefly control to 1000 feet downwind. Comparing this data with the mosquito data (given in the introduction), it can be concluded that an adult housefly is 4 to 6 times more resistant than an adult salt marsh mosquito. To obtain a more accurate comparison, quantitative laboratory studies are required. It can, however, be definitely stated that the same extent of control against mosquitoes and flies will not be effected for a given DDT output. This will be also true, of course, of other insects and other forms of life more resistant to DDT than the mosquito. It appears very probable, therefore, that the projection of controlled and regulated quantities of DDT used to control mosquitoes may not lead to any serious disturbance in insect balance. The *danger will be present* when quantities greater than the recommended 5 pounds of DDT per 1000 feet of front (5) are used to obtain control over large areas by residue effects.

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Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Kuala Lumpur. From a letter recently received from N. C. E. Miller, who before the war wrote extensively on Orthoptera and Rhynchota, and was a member of the staff of the Department of Agriculture at Kuala Lumpur, Federated Malay States, we learn that following his release from internment by the Japanese for more than three years in Sumatra, he visited Kuala Lumpur and found his insect collections and library largely intact, but that the very well known and active Museum of the Federated Malay States, also at Kuala Lumpur, was no more, having been levelled in bombing. He also informed us that H. M. Pendlebury, of the Museum, and a capable entomologist, one of the authors of "The Butterflies of the Malay Peninsula," who also took a major part in the most recent zoological exploration of Mt. Kina Balu, in Borneo, had been released from internment only to die in India from the effects of malnutrition and starvation.

The Hoffman Collection. The American Museum of Natural History has recently received, through the generosity of Mr. Frank M. Johnson, the Carlos C. Hoffmann collection, consisting primarily of Mexican Lepidoptera and scorpions. Dr. Hoffmann lived in Mexico for many years and the collection, which is in magnificent condition, is the result of over thirty years of work. It contains nearly 15,000 spread Lepidoptera, mostly identified, and about as many specimens in papers. It is particularly rich in Saturniidae, Sphingidae, and butterflies of the southern two-thirds of Mexico, but includes also large numbers of small moths. The northern part of the country is rather poorly represented in comparison with the southern portion. The scorpion collection is from the entire country, and contains seven hundred specimens.

Dr. Hoffmann was much interested in medical entomology, whence his interest in scorpions probably arose. He published several papers on Mexican scorpions, including a revision of the species occurring in that country. On Lepidoptera he published numerous papers, describing many species the types of most of which (in addition to the scorpion types) were received with the collection. His papers on Lepidoptera culminated in a series of catalogues of Mexican species of the various families.

The collection will be of great value as it is from a region where most North American collections are poor. For this reason it will make possible studies of distribution and geographical variation heretofore impossible.

Cornell University. The Department of Entomology announces the inauguration of a five year research program to study the amino acids of insects. This work is made possible by a grant from the Lalor Foundation of Wilmington, Delaware, and is being carried out in the laboratories of Insect Physiology of the Department of Entomology. The project supports two research fellows and appointments have been made for Mr. H. L. House who is on a leave of absence from the Dominion Parasite Laboratory at Belleville, Ontario, and Mr. J. J. Pratt, Jr., who has recently been discharged from the U.S.P.H.S. Initial studies will include the identification of the amino acids in insects, and the amino acid nutritional requirements of insects.

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—Mosquitoes for determination, or exchange for S. E. specimens. Particularly desire larvae. H. R. Dodge, Box 1095, Macon, Ga.

Arctic Lepidoptera on hand, including Erebia, Oeneis and Brenthis. R. J. Fitch, Lloydminster, Sask., Canada.

Odonata—Will buy or exchange North and Central American species, both imagos and nymphs. Also will exchange other orders for Odonata. Carl Cook, Crail Hope, Kentucky.

I want to collect Rothschildia farbesi, agapema, galfina and io moths for interested persons. E. Frizzell, Route 4, San Benito, Texas.

Wanted—Information as to the existence and present location of a copy of Solodonikov, S. V. Contribution à l'étude de la faune et de la biologie des larves des Libellules du Donetz et de certains de ces affluents. [In Ukrainian.] Trav. Soc. Nat. Charkow 52: 249-268. 1929. [Quoted from Zool. Rec. 1936, Ins. p. 147, No. 3114.] P. P. Calvert, P. O. Box 14, Cheyney, Penna.

Wanted—Crane-flies (Tipulidae) of New Guinea, New Caledonia and Neighboring Islands, for revisional purposes. Also, names and addresses of individuals or institutions possessing any of these flies. Correspondence solicited. Chas. P. Alexander, Fernald Hall, Amherst, Mass.

Lepidoptera—Wanted, Hyloicus (Sphinx) and other Sphingidae in exchange for U. S. and Wisconsin Lepidoptera. Wm. E. Sieker, 119 Monona Ave., Madison 3, Wisconsin.

Hymenoptera-Aculeata (except ants and bees) and **Ichneumonidae** for exchange or purchase. Will collect any order in exchange. D. G. Shappirio, 4811 17th St., NW, Washington 11, D. C.

Wanted—Oriental Cerambycidae and Chrysomelidae for determination and research purposes: China, India, Philippines, Pacific. Will purchase from China, Assam, Burma, Siam, Formosa. Will exchange identified Chinese insects. J. Linsley Gressitt, Lingnan University, Canton, China.

Wanted—Papers on Cicindelidae of any part of the world, especially South America and Pacific. R. G. Dahl, 3225 Grand Ave., Apt. 13, Oakland 10, Cal.

Subscriptions for 1947 are payable now

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ENTOMOLOGICAL NEWS

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Two New Species of Skippers from North and Central America (Lepidoptera: Hesperiidae)

By H. A. Freeman, Pharr, Texas

Celaenorrhinus stallingsi new species (Fig. 1)

This species appears to be nearer *fritzgaertneri* (Bailey) than any of the other species in the genus; however there are several specific differences that can easily be noticed. In *stallingsi* the coloration is darker brown, and the small white spot found in interspace 1, toward the base, in *fritzgaertneri,* is absent and in its place is a black dot. On the under surface of the primaries the oblique discal band of six white hyaline spots reappears and below the sixth spot there is a white area that extends to the outer margin of the wing. This area is not present in *fritzgaertneri.* The fringe is concolorous with the wings and not feebly checkered as in *fritzgaertneri.* The genitalia differs from the Godman and Salvin figure (Biologia, Pl. 85, Fig. 4) in the shape of the uncas and the scaphium, the saccus is shorter and the vinculum is not recurved, there is a curved spur at the caudal end of the aedeagus and the terminal arm of the clasper is longer and more pointed than in *fritzgaertneri.*

Expanse.—♂, 42 mm.; ♀, 43 mm.

Described from 2 specimens, 1 ♂, V–28–41, Monterrey, N. L., Mexico, collected by Don B. Stallings; and 1 ♀, XI–8–44, Pharr Texas, collected by the author.

This species is named in honor of Mr. Don B. Stallings, who is one of our outstanding lepidopterists.

Holotype.—♂, V–28–41, Monterrey, Mexico, is in the Stallings and Turner collection and *allotype* ♀, XI–8–44, Pharr, Texas, is in the collection of the author.

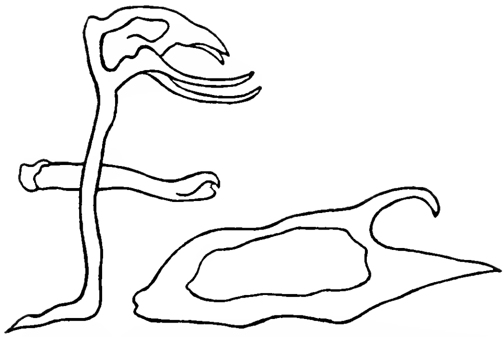

Figure 1. Genitalia of *Celaenorrhinus stallingsi* new species, ♂ holotype, Monterrey, N. L., Mexico, V–28–41.

Calpodes evansi new species (Fig. 2)

♂.—Upper surface.—Primaries, dark brown, becoming lighter toward the base due to the presence of light brown scales and hairs. There are two tan subapical spots and four larger semi-hyaline spots arranged as follows: a narrow one at the end of the cell, and three larger ones in the lower half of the wing between the cell and the outer margin. These are all tan in coloration.

Secondaries, dark brown ground color, well suffused toward the base with lighter brown scales and hairs. There is an indistinct light band running from the coastal margin toward the anal angle.

Under surface.—Primaries, light brown becoming much darker toward the base. All of the spots reappear and the bottom one is suffused with sordid white scales.

Secondaries, brown, with a bluish-violet sheen over all but the anal angle, which is dark brown. There is an indistinct white band running from the costal margin nearly to the anal angle.

Fringe of both wings light brown. Body, dark brown above, light beneath, nearly white.

Expanse.—45–47 mm.

♀.—Similar to the ♂, except the hyaline spots on the upper surface of the primaries are lighter in coloration, the white band on the lower surface of the secondaries is not easily discernible and the bluish-violet sheen on that surface of the wing is a little more pronounced.

Expanse.—49 mm.

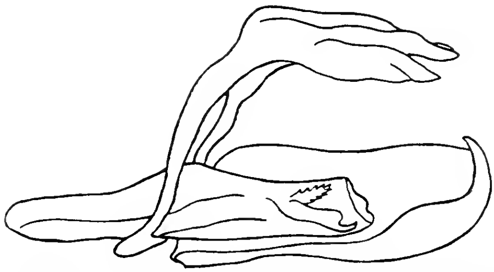

Figure 2. Genitalia of *Calpodes evansi* new species, ♂ paratype, Limon, Costa Rica, X–5–15.

Described from 4 specimens, 3 ♂♂ and 1 ♀. The data on these specimens are as follows: 1 ♂, Limon, COSTA RICA, X–5–15, collector not known; 1 ♂, Belzie, BRITISH HONDURAS, VII–06, collector not known; 1 ♂, Pharr, TEXAS, X–21–44, and 1 ♀, Pharr, TEXAS, X–8–44, both collected by the author. The two Central American specimens were loaned to the writer by the American Museum of Natural History.

This species is named in honor of Brig. W. H. Evans of the British Museum, who first recognized this species as being undescribed.

Holotype.—♂, X–21–44, Pharr, Texas, and *allotype* ♀, X–8–44, Pharr, Texas, are in the collection of the author. The two Central American *paratypes* are in the collection of the American Museum of Natural History.

Calpodes evansi resembles *sylvicola* H.-S., in the maculation of the primaries, both above and beneath. The white band on the under surface of the secondaries is much broader and more conspicuous in *evansi* than in *sylvicola*. The main difference is easily discernible in the greater size of *evansi* being nearly twice as large as *sylvicola*.

Report of Mosquitoes Collected at Fitzsimons General Hospital, Denver, Colorado, During the Seasons of 1944–1945 *

By William R. Lasky, Sgt., U. S. Army, Fitzsimons General Hospital, Denver, Colorado

There has never been a systematic survey of the mosquitoes of the State of Colorado. In 1918 Dr. T. D. A. Cockerell, of the University of Colorado, published a list (Journal Econ. Ent. XI: 195–200, 1918) on the order of a preliminary survey. In 1924, Dr. Harrison G. Dyar, of the U. S. National Museum, republished Dr. Cockerell's list as a supplement to his observations and studies made at Grand Lake, Colorado, at an elevation of 7,000 feet. He was mainly concerned with the Canadian fauna occurring at that high altitude and, in compiling his list, he compares his findings with those of Dr. Cockerell.

The writer acknowledges the assistance of others whose encouragement and help with difficult identifications have made this work possible. He is particularly indebted to Colonel Hugh W. Mahon, M. C., Chief of Laboratory Services, Fitzsimons General Hospital, whose constant encouragement and interest have been most helpful. He is further indebted to Colonel J. Vincent Falisi, M. C., Chief of Laboratory Services and to 1st Lt. Hugh L. Keegan, Sn. C., Entomologist, Seventh Service Command, Omaha, Nebraska, for their careful confirmations of identifications and for their assistance and advice. The author wishes to express his thanks to Dr. Maurice T. James of Colorado A. & M. College for his help in determining the validity of the first record of *Culex pipiens* Linn. in Colorado.

* In 1942 the Seventh Service Command Laboratory at Omaha, Nebraska, organized a Mosquito Collecting program for the Army installations in the Service Command. In 1944, Fitzsimons General Hospital was included in this program. The findings of the Service Command Laboratory were published by Theodore A. Olson and Hugh L. Keegan, jointly, in the Journal of Economic Entomology, 1944, Vol. 37, pp. 780–785 and p. 847. Since these findings deal with the nine state area of this command and are concerned mainly with the mosquitoes related to disease transmission, it is felt that the present report, which is more specific in nature, is warranted.

This report deals with the eighteen species of mosquitoes, four of them new to the State, collected on the post area and within the environs of Fitzsimons General Hospital, located in Adams County, thirteen miles east of Denver, Colorado, at an altitude of 5,280 feet.

Methods of Collection and Results Obtained

During the two-season survey, adult mosquitoes were collected nightly in a single New Jersey-type light trap. This trap was set up at various points on the post and these stations were rotated weekly. In 1944, 14,459 mosquitoes were collected in the five months, May through September, during which time the trap was set up 92 nights out of a possible 143 nights. Of the remaining nights, in which no trapping was done, 40 occurred on weekends, and 11 were inclement. In 1945, the survey was conducted from May through October and 5,285 mosquitoes were trapped. The trap was set up 100 nights out of a possible 184. The season being a very wet one, 36 nights were unfit for trapping because of rain or snow and 48 occurred on the weekend. A total of 19,744 mosquitoes was collected by means of a single trap during the two seasons. During both seasons, the greatest numbers were collected during the last two weeks of August and the first week of September. The species yielding the greatest number of individuals were: In 1944, *Culex tarsalis*, *Aedes vexans*, *Culiseta inornata*, *Aedes dorsalis* and *Culex pipiens*, in the order named. In 1945, *Culex pipiens* led, followed by *Aedes vexans*, *Culex tarsalis*, *Culiseta inornata* and *Aedes dorsalis*. (See Table 1.)

Adult mosquitoes were also collected by hand, while both resting and biting. These collections were made weekly. Resting collections were made under bridges, road culverts, in buildings and under duck nesting shelters at the game refuge. Biting collections were made both in the daytime and evenings. In the 1944 season 152 mosquitoes of six species were collected in this manner. In 1945, 1,475 mosquitoes of 15 species were taken.

Collections of larvae were made weekly and yielded a total of 2,020 specimens during the two seasons. *Aedes dorsalis* led as the most numerous species of larva collected; then came *Aedes vexans*, *Culex tarsalis*, *Culiseta inornata* and *Culex pipiens*. (See Table 1.) Eighteen distinct breeding sites were found, of which 5 may be called permanent while the remainder depend on rainfall, irrigation and snow to become suitable for breeding. Larvae were taken in animal hoof prints filled with rain water, in alkaline, grassy rain water pools, in an irrigation pond marsh, in road ditches, in irrigation ditches throughout the post area and in the irrigation inlets and catch basins of this system. Larvae were taken in an ornamental fish pond, at the grassy sides of a natural creek, in waste disposal cans partially filled with rain water and even in an old rain-water-filled bedpan on the post dump.

The following table summarizes the results of the collections during the two seasons of the survey. A total of eighteen species was found, belonging to four genera. Of the 29,391 specimens taken, over half were of *Culex tarsalis*.

Table 1. Mosquito Collections at Fitzsimons General Hospital During 1944 and 1945 Seasons

Species	Trap	Hand	Larvae	Total
Aedes dorsalis	388	37	5,853	6,278
Aedes fitchii	2	1	—	3
Aedes increpitus	15	110	—	125
Aedes nigromaculis	51	49	9	109
Aedes sticticus	2	2	—	4
Aedes triseriatus	15	9	—	24
Aedes trivittatus	58	3	20	81
Aedes vexans	1,789	47	838	2,674
Culex apicalis	—	3	—	3
Culex pipiens	2,691	165	73	2,929
Culex restuans	10	—	—	10
Culex salinarius	2	—	2	4
Culex tarsalis	14,103	901	666	15,670
Culiseta incidens	9	36	55	100
Culiseta inornata	590	262	499	1,351
Culiseta melanura	7	—	2	9
Culiseta morsitans	—	1	—	1
Psorophora signipennis	12	1	3	16
	19,744	1,627	8,020	29,391

New records for the State of Colorado

Aedes sticticus Meigen. Four adult ♀♀. In trap: Aug. 10 and 15. Biting: Aug. 8 and 13, 1945.

Aedes triseriatus Say. Twenty-four adults, all in 1945. In trap: ♂♂, Aug. 16, 26, 30, Sept. 6; ♀♀, July 30, Aug. 16, 21, 23 (2 specimens), Sept. 6 (2 spmns.), Sept. 7 (4 spmns.). Biting: July 26 (3 spmns.), Sept. 4. Resting: ♂♂, July 9, 16, Aug. 13; ♀♀, July 23, 30.

Culex pipiens Linn. Two thousand and nine hundred and twenty-nine adults and larvae were collected. The following records include both sexes. In trap: Sept. 4 to Oct. 1, 1944, 92. Aug. 7 to Oct. 31, 1945, 2,599. Resting: Sept. 30, 1944, 42. Aug. 8 to Oct. 31, 1945, 123. *Larvae:* Sept. 15 to 29, 1944, 37. Aug. 2 to Sept. 25, 1945, 36 specimens.

Culex restuans Theobald. Ten adults were collected, all in 1944. ♂, Aug. 16. ♀♀, Aug. 16, 17, 19, 20, 24, 26 (2 spmns.), Sept. 3, 4.

NOTES

Aedes dorsalis Meigen

Aedes dorsalis is the second most abundant mosquito in our area. It breeds in tremendous numbers in grassy pastureland that has many cattle footprints and shallow depressions which periodically fill with snow and rain-water forming shallow, alkaline pools. The larvae develop very fast in these pools, which soon become black with their countless numbers. The end of April is the earliest breeding date recorded and by May 4th literally thousands of *Aedes dorsalis* were observed emerging. Breeding continues throughout the season as late as the first of September and larvae are to be found any time during this period provided the area has not dried up. This area does dry up three or four times during the season but frequent summer showers make it suitable for breeding again. Associated with *Aedes dorsalis* may be found small numbers of *Aedes nigromaculis*, *Aedes trivittatus*, *Aedes vexans* and *Culex tarsalis*. *Aedes dorsalis* were also found breeding in several other temporary rain-water-filled prairie pastureland depressions, in both shaded situations and in sunlight. They were found in fairly large numbers in a road-ditch filled with slowly running irrigation water together with *Culiseta inornata*. In very small numbers, it occurred in an artificial, stagnant fish pond on the hospital grounds with *Culiseta inornata*, *Culiseta incidens* and *Culex tarsalis*. Finally, it was found breeding in animal hoof prints at the side of, but never in, a small, natural creek, Tollgate Creek. It was never found in permanent locales such as the irrigation marshes north of the hospital or in the post irrigation system's catch-basins.

Aedes dorsalis is a very important pest in this area. On the golf course it rests in fairly large numbers and when disturbed by golfers passing by it does not hesitate to attack legs and arms. Though these insects were particularly vicious after sundown, if disturbed, they bite throughout the day.

Aedes fitchii Felt and Young

Only three specimens of this mosquito were taken, all in 1945, so it may be assumed that this species is rare in our area. Two of the specimens were trap-collected, on July 4 and July 20, in the middle of the hospital area near an ornamental fish pond. The third was found July 6 resting under the ties of the bridge that spans Tollgate Creek.

Aedes increpitus Dyar

This species was not found in our area until the 1945 season when it was taken in moderate numbers resting under Tollgate Creek bridge. The first specimens were taken May 16 and the last were taken the end of July. Through these months a few specimens were taken biting on the post area. Fifteen individuals were found in the trap from May 15th to the first of July.

Aedes nigromaculis Ludlow

This mosquito was taken in largest numbers in the light-trap, 51 individuals being taken thus. It was also collected in moderate numbers by hand, while resting and biting, and many were observed emerging from pupae that were living with *Aedes dorsalis* and *Psorophora signipennis* in the rain-water-filled, grassy depressions and hoof-prints adjacent to Tollgate Creek on July 26, 1945. Larvae were collected in this same breeding area from June 7th to August 13th, 1945, in small numbers and together with *Aedes dorsalis*, *Aedes trivittatus* and *Aedes vexans*. They were not found breeding elsewhere about the post and it is thought that they prefer the above alkaline, grassy marshes to other types of breeding areas. In the trap, *Aedes nigromaculis* was collected from June 18th to the middle of September. This mosquito was much more frequently taken in the trap in the 1945 season than in the 1944 season.

Aedes nigromaculis was found to bite very savagely late in the afternoon and during the day if disturbed from its resting place in the high grasses near its breeding locale. It is too uncommon to constitute an important pest.

Aedes sticticus Meigen

Specimens of *Aedes sticticus* were collected only by trap and while biting in the daytime. The four specimens taken are the first published records of this mosquito from Colorado.

Aedes triseriatus Say

Twenty-four specimens, both male and female, of this species were collected during 1945 at Fitzsimons. These are the first published records for this state. Although extensive investigation was made to ascertain the breeding locales, none was found. There are no really suitable tree-holes in the area surrounding the post as most of the trees, cottonwoods and willows, have such porous bark that the rain water does not remain in their crevasses longer than 48 hours, even after heavy rains. Presumably this mosquito is breeding elsewhere and further work is necessary to discover its breeding place. Adults occurred in small numbers throughout the post, especially in the vicinity of the duck pond refuge where it was found active and biting throughout the day. Both trap and hand collections were made throughout July, August and as late as September 7th, 1945. However, nowhere was it observed in any numbers.

Further work will be necessary to determine its local importance. It is a vicious daytime biter and of some annoyance to golfers.

(To be continued)

A New Centiped of the Genus Guambius from Mississippi

By Ralph V. Chamberlin

The new lithobiid centiped here described is represented by a male and female forming part of a small collection made at Pass Christian, Mississippi, in February, 1946, and submitted to me for study by Wm. F. Rapp, Jr. Other chilopod species represented are the following: *Theatops posticus* (Say), *Cryptops hyalinus* (Say), *Otocryptops sexspinosus* (Say), *Scolopendra viridis* Wood, *Neolithobius mordax* (Koch), *Geophilus mordax* Meinert. The types of the new species are retained in the author's collection at the University of Utah.

Guambius (Sibibius) christianus, new species

Dorsum uniform light brown, the head but little darker. Antennae dark brown, paler at tip. Legs with middle joints brown, the proximal ones paler and the tarsus yellow or somewhat rufous except at base.

Antennae short, composed of 26 articles. Ocelli in three series, 1+3,3,2; the single ocellus largest, the most caudal of the top series also large, the ocelli of the bottom series small.

Prosternal teeth 2+2, the outer tooth on each side slightly larger than the mesal one; median incision V-shaped, the angle acute. Ectal spine setiform. Coxal pores round 4(5),4,4,4.

Ventral spines of first legs 0,0,0,0,1; dorsal also 0,0,0,0,1. Ventral spines of penult legs 0,1,2,3,2; dorsal 0,0,3,2,2(1); claws 3. Ventral spines of anal legs, 0,1,3,3,1; dorsal, 0,0,2,1,0; claws 2. None of the coxae armed.

The claw of the female genital forceps large and strictly entire. Basal spines 2+2, these all conically acute from base to apex, the messal one on each side much smaller than the ectal one.

Length of female holotype, 12.5 mm.

Locality.—Mississsippi: Pass Christian. An adult female and a not fully mature male were taken on February 15, 1946 by J. and W. Rapp.

The male is 9.2 mm. long. In the spining of the legs it differs in having the ventral spines of the penult 0,1,2,2,2, and of the anal legs on one side 0,1,2,2,1. The penult legs not as yet modified. The fourth article of the anal legs with a longitudinal dorsal sulcus mesad of which is a longitudinal ridge bearing a series of setae. The ocelli are 1+3,2,1.

The species is apparently nearest to *G. oedipes* (Bollman) of Arkansas, but it is a smaller form with claws of anal legs 2 instead of 3, etc. There is no indication in the not fully developed male of *christianus* of such exceptionally strong modification of the anal and penult legs as characterize *oedipes*.

Notes on a Few Dipterous and Hymenopterous Parasites of Mud-wasps (Dipt., Hymenoptera)

By Phil Rau, Kirkwood, Missouri

Hymenoptera

Mesostenus discoidalis Cr. [H. K. Townes].* A bamboo stem (*Arundiaria tecta*) from Reelfoot Lake, Tennesee, contained two cocoons of an unknown Trypoxylon wasp. From these emerged two ichneumonid parasites, *M. discoidalis* Cr. The insects left the cocoons nearly a month apart, one on May 6, and the other on June 4, 1941. Some years earlier, a parasite of this species (determined by R. A. Cushman) emerged from a nest of *Sceliphron caementarium* on May 15. Some of the cells in this nest were reused by the wasp *Pseudagenia millipes*, so I do not know which of the two wasps was host to the parasite. There are three species of the genus *Mesostenus* listed in "Insects of New York" (1928), but hosts are not given for any of them.

* The names of the specialists who named the insects appear in brackets.

Chrysis parvula Fab. [H. K. Townes]. Several dead specimens of this parasite were found in the sealed cells of *Sceliphron caementarium* in a nest taken at Steeleville, Missouri, in 1942. In one of the cocoons in the same nest, made by *Chalybion cyaneum,* another *C. parvula* was found. The latter observation shows, of course, that the host lived long enough to make its cocoon after parasitization.

Sphaerophthalma pennsylvanica scavea Blake [H. K. Townes]. A dead male of this parasite was found within the cocoon of *S. caementarium* in a mud nest taken in St. Louis county, Missouri, and two additional males emerged from similar nests brought from Huzzah, Mo. and Ellsworth, Kansas. The former emerged on June 10, 1942, and the latter on Aug. 30, 1942. Here too, the hosts did not die until after they had produced the cocoons.

Diptera

Anthrax daphne O. S. [R. H. Painter]. Several of these parasites emerged from the cells of *Sceliphron caementarium* Aug. 4 to 6, 1942. The mud nest was taken near Scott City, Kansas.

Anthrax albofasciatum Macq. [R. H. Painter]. Two cocoons of *Trypoxylon clavatum* taken from an old nest of *S. caementarium* were parasitized by this fly. The nest was taken near Eminence, Missouri, and the adults emerged July 23, 1942.

Anthrax pauper O. S. [R. H. Painter]. A nest of *S. caementarium* sent by a friend from somewhere in Oklahoma gave forth parasites of this species on June 12, 1942, and nests collected from Scott City, Kansas, gave several adults in August, 1942.

Anthrax slossonae Johns. [R. H. Painter]. Six adults of this parasite emerged from the cocoons of *Trypoxylon politum,* the pipeorgan builder. The nests were taken at Reelfoot Lake, Tennessee, and the flies emerged June 7 to 16, 1941.

Toxophora amphitea Walk. [H. R. Painter]. Several cells in an old *Polistes* nest had been reused and sealed with mud by the wasp *Odynerus foraminatus* Sauss. From two of these cells, a male and a female *T. amphitae* emerged on May 26, 1942. The nest was taken at Gray Summit, Missouri.

Note on Pseudcscorpions

By Janet L. C. Rapp, University of Illinois, Urbana, Illinois

Twenty-one specimens of pseudoscorpions were collected coincidentally with the author's field work on a problem for a thesis entitled "Insect Hibernation Studies in Champaign County, Illinois, During the Winter of 1944–45," so far unpublished. Most of the insects and the pseudoscorpions were taken with the use of a Jacot apparatus,[1] a modification of that originally proposed by Berlese. Essentially this consisted of a large funnel of sheet steel or copper with a sieve at the bottom and a 300 watt bulb suspended within an inch of the sample of litter taken from the field. The dry heat of this light drove the specimens downward through the sieve and into a beaker of 70 percent alcohol placed beneath the funnel. Surprisingly, in more than 90 such samples, pseudoscorpions were found only three times and then all from the same locality, Urbana, February 18, 1945. This area, lying east of town, was fairly wooded and not far from the west branch of the Salt Fork River. Several chestnut trees, evidently victims of the chestnut blight, had fallen and were starting to rot. Some of these were pried up and the material underneath was found to be free of frost. Debris from the tree plus some of the underlying soil yielded the following specimens:

Microbisium brunneum Hagen (1)
Pselaphochernes parvus Hoff (20)

The pseudoscorpions were kindly determined by Dr. C. Clayton Hoff of Quincy College.

Personal

We have learned by letter from Buenos Aires that **Dr. Augustin Riggi** has been appointed Director of the Museo Argentino de Ciencias Naturales, "Bernardino Rivadavia," as of July 10, 1946.

[1] Jacot, A. P. 1936. Soil structure and soil biology. Ecology, 17: 359–379.

Current Entomological Literature

COMPILED BY CHARLES HODGE IV, RAYMOND Q. BLISS, EDWIN T. MOUL, MAURICE E. PHILLIPS AND HENRY K. TOWNES JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Anon.—F. W. Nunenmacher. (Obituary). [28] 22: 70. **Allenspach, V.**—Preparation of small beetles. [26] 19: 343–347. **Blackwelder, R. E.**—Fabrician Genotype Designations. [9] 41: 72–78. **Collart, A.**—Regards sur le monde des Dipteres. [8] 82: 18–44. **Edney, E. B.**—An Apparatus for Handling Small Living Insects. [10] 37: 83–87 ill. **Gadd, C. H.**—Macrocentrus homonae—a polyembryonic parasite of tea tortrix (Homona coffgearia). [12] 23: 67–80. **Gemignani, E. V. and Rodriguez, R.**—Damage to wood by Hylotrupes bajulus (L.) (Coleopt.: Ceramb.). [34] 10: 370–378. **Gibson, A.**—Obituary of Theodore Henry Frison. [11] 78: 23–24. **Grensted, L. W.**—Pleuron, Pleura and Pleurite: A Postscript. [15] 82: 146–147. **Knowlton, G. F.**—Grasshoppers eaten by Utah birds. [20] 19: 71–72. **Van Hearden, H. P.**—Some histological methods of interest to entomologists. [19] 8: 157–161. **Weiss, H. B.**—Fred M. Schott, 1887–1946. Obituary. [21] 54: 170–171.

ANATOMY, PHYSIOLOGY, MEDICAL—Allard, H. A.—Synchronous Singing of 17-year Cicadas. [29] 48: 93–95. **Cassab, A.**—Le régime alimentaire de la Courtilière (Orthoptera: Gryllotalpidae). [6] 1943: 83–86. **Donisthorpe, H.**—Fifty Gynandromorphous Ants taken in a single Colony of M. sabuleti Meinert in Ireland. [14] 79: 121–131.

ill. **Fenjves, P.**—Bionomics of the aphid, Myzus persicae Sulz. of the potato. [26] 19: 489–611. **Fox-Wilson, G.**—Factors Affecting Populations of Social Wasps, Vespula Sp., in England. [31] 21: 17–27, ill. **Habib, A.**—Biology and bionomics of Asterolecanium pustulans Ckll. (Hemiptera: Coccidea). [6] 1943: 87–112. **Hayward, Kenneth J.**—Food plants of Argentine Hesperiidae. [34] 11: 31–36. **Hean, A. F.**—Notes on maternal care in thrips. [19] 6: 81–83. **Henson, H.**—On the Malpighian tubules of F. auricularia (Dermap.). [31] 21: 29–39, ill. **Hudson, G. H.**—The tentorium in Orthoptera. [19] 8: 71–90. **Joerg, M. E.**—Ensayo de cultivo de células ectodermicas de un insecto. [33] 1: 65–68. **Krause, J. B.**—The Structure of the Gonads of Wood-Eating Beetle, P. cornutus Fabr. [3] 39: 193–206, ill. **Leclerq, J.**—Insects which drink water. [8] 82: 71–75. **Linck, E.**—Copulation in Carausius morosus Br. (Orthopt.: Phasm.). [26] 19: 202–203. **Martin, C. H. and Finney, G. L.**—Control of sex-ratio in Macrocentrus ancylivorus Rowher. [18] 39: 296–299. **Nadig, A.**—Copulation in chionea (Diptera). [26] 19: 308–316. **Riedel, F. A.**—Connective Tissue in the Ventriculus of Certain Lubber Grasshoppers (Orth. Acridi.). [3] 39: 289–303, ill. **Rosedale, J. L.**—On the composition of insect chitin. [19] 8: 21–. **Shay, D. E**—Observations on the Cellular Enclosures of the Mid-Gut Epithelium of Periplaneta americana. [3] 39: 165–169, ill. **Theron, P. P. A.**—Terminating diapause in codling moth larvae. [19] 6: 114–123. **Ullyett, G. C.**—On the function of the caudal appendage in primary larvae of parasitic Hymenoptera. [19] 7: 30–37. **Ullyett, G. C.**—Oviposition by Ephestia kühniella Zell. [19] 8: 53–59. **Ullyett, G. C.**—Some aspects of parasitism in field populations of Plutella maculipennis Curt. [19] 6: 65–80. **Van der Merwe, J. S.**—Biology and ecology of Mormoniella vitripennis Walk. (Pteromalidae, Hymenoptera). [19] 6: 48–64. **Zolotarev, E. K.**—Influence of chloroform on gaseous exchange of chrysalids of Antherea pernyi Guer. [7] 49: 20–23.

ARACHNIDA AND MYRIOPODA—Bequaert, J. C.—The Ticks, or Ixodoidea, of N.E.U.S. and E. Canada. [13] 25: 185–232 (k). **Bouvier G. and Gaschen, H.**—Mites parasitic on Diptera. [26] 19: 191–197. **Chamberlin, R. V.**—On the Chilopods of Alaska. [3] 39: 177–189 (k*), ill. **Chamberlin, R. V.**—A New Schendyloid Chilopod from Cal.

[28] 22: 69–70. **Cooreman, J.**—Tyroglyphopsis frennetti n. sp. [8] 81: 241–244. **Günthart, E.**—Spinning mites (red spiders) and their natural enemies. [26] 19: 279–308. **Nesbitt, H. H. J.**—Three New Mites from Nova Scotian Apple Trees. [11] 78: 15–22, ill.

SMALLER ORDERS—Berner, L.—N. Spp. of Florida Mayflies (Ephe.). [17] 28: 60–82, ill. **Carriker, M. A., Jr.**—Neotropical Mallophaga Miscellany No. 1. [4] 4: 165–189 (*), ill. **Henson, H.**—See under Anat. **Jameson, E. W., Jr.**—A new sp. of Epitedia Jordan (Siphonaptera). [20] 19: 62–65. **Kennedy, C. H.**—Archaeopodagrion bilobata, n. sp., from Central Ecquador. [3] 39: 171–176, ill. **Moulton, D.**—N. sp. of Thrips from Haiti and Turkestan. [28] 22: 56–58. **Moulton, D.**—Two n. sp. of Thrips from N. A. [28] 22: 59–60. **Ross, H. H.**—A Review of the Nearctic Lepidostomatidae (Trich.). [3] 39: 265–291 (k*), ill. **Snyder, T. E.**—A Small, Dark-Colored New Kalotermes from Guatemala. [29] 48: 158–160. **Williner, G. J.**—Ascalafidos Argentinos. [34] 12: 425–437 (*). **Wray, D. L.**—New Collembola from North Carolina. [9] 41: 79–85, ill.

ORTHOPTERA—Daguerre, J. B.—Biological observations on Dichroplus arrogans (Stal). [34] 10: 341–346. **Liebermann, J.**—The genus Adimantus Stal in Argentina. [34] 12: 416–424. **Liebermann, J.**—Antiphon gallus Stal, new for Argentina. [34] 10: 363–367. **Liebermann, J.**—Geographical distribution of some genera of Argentine acridines. [34] 1: 103-106. **Rehn, J. A. G.**—One Genus and Six n. sp. of C. American and Columbian Pseudophyllinae (Ortho., Tettig.). [38] 72: 1–26 (k), ill. **Shay, D. E.**—See under Anat., etc.

HEMIPTERA—Allard, H. A.—(See under Anat., etc.) **Ball, E. D. and Parker, F. H.**—Some New N. A. Idiocerus (Homo., Cica.). [20] 19: 73–82. **Beamer, R. H.**—A N. Sp. of Delphacine Fulgorid w/notes on Four Other Spp. [20] 19: 82–87, ill. **Bodenheimer, F. S.**—Additions to the Coccoidea of Iraq, with 2 new spp. [6] 1944: 85–100. **Calkins, L. A.**—Notes on the juniper mealy bug, Pseudococcus juniperi Ehr. [20] 19: 66–68. **DeCarlo, J. A.**—New spp. of Limnocoris Stal. [34] 11: 37–41. **DeCarlo, J. A.**—New spp. of Cryphocricus Sign. and Heleocoris Stal. [34] 10: 426–433. **DeCarlo, J. A.**—Aquatic and semi-aquatic Hemiptera. [33] 1: 1–4 (*). **DeCarlo, J. A.**—Los Ranatridae de

Sud America. [1] 42: 1–38. Pl. I–VII (k*). **DeLong, D. M. and Hershberger, R .V.**—The Genus Sanctarus in N. A. Including the Mexican species. [3] 39: 207–224 (k*), ill. **Habib, A.**—(See Anat., etc.) **Hepner, L. W.**—A New Subgenus and Several N. Spp. of Scaphylopius. [20] 19: 87–109. **Hungerford, H. B.**—A new genus and species of Notonectidae. [20] 19: 59–61. **Jensen, D. D.**—A New Euphalerus and Notes on Other Spp. of Psyllidae from Idaho (Homo. Psyll.). [3] 39: 242–245, ill. **Knowlton, G. F.**—Minute Pirate Bug Notes. [9] 41: 103. **Knowlton, G. F.**—Deraeocoris brevis Feeding Observations. [9] 41: 100–101. **Knowlton, G. F.**—Some Aphid Host Records. [28] 22: 75–76. **Knull, D. J.**—The Genus Bandara Ball (Homo., Cica.). [3] 39: 259–264 (k*), ill. **McKenzie, H. L.**—A New Sp. of Lepidosaphes Attacking Vendsobium Orchids in Hawaii and Calif. [30] 12: 611–613, ill. **Rubin, G. J.**—Three new spp. of Neohaematopinus. [29] 48: 119–124. **Ruckes, H.**—Mecidea minor, a N. Sp. of Pentatomid from New Mexico. [9] 41: 86–88, ill. **Schott, F. M.**—17-Year Cicada Notes for 1945. [21] 54: 167–169. **Torre-Bueno, J. R. de la**—On Heperotirgis Antennata Drake. [9] 41: 94–95. **Usinger, R. L.**—Notes on the Synonymy and Classification of the Ericocephalidae. [3] 39: 170. **Usinger, R. L.**—Notes and Descriptions of Ceratocombus. [30] 12: 633–636 (S*).

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Review

PRACTICAL MALARIOLOGY. By Paul F. Russell, Luther S. West and Reginald D. Manwell. xix + 684 pp. W. B. Saunders Company, Philadelphia, London, 1946. $8.00.

Practical Malariology was prepared under the auspices of the Division of Medical Sciences of the National Research Council and is designed to give field, laboratory and clinical information about malaria. It was originally started as a military medical manual but has been changed to conform with civilian needs. The volume presents in an interesting narrative form an up-to-the-minute account of malariology that should prove to be of great value to all who are interested in this subject. The method of presentation is such that the book is not only interesting reading but useful as a source of general information and reference. Particularly valuable are the excellent digest of important recent literature and the carefully selected bibliographies. Aside from a relatively short historical introduction it contains sections on the parasite, mosquitoes, man, the community, prophylaxis and control, and therapeutic malaria, and an appendix with keys to the Anophelini of the world.

The section on the parasite not only discusses the human Plasmodia but also summarizes what is known concerning the various animal forms, both those used in experimental projects and others but newly discovered or poorly known. In this section one finds ". . . Physiologic peculiarities of a species may be just as real, and perhaps just as stable, but do not seem to be sufficient grounds for establishing new species." While "physiologic" species do not ease the lot of the investigator, is it feasible arbitrarily to deny them recognition? Particularly in entomology, the noting of physiologic differences and at times the naming of such forms has stimulated more critical morphological surveys. In many cases these have revealed substantiating characters. Perhaps refinements in technics and further investigations will reveal more readily recognized differences in the Plasmodia, but even if these fail should not the findings be the guide, not the ease of applying a measure? In this section the chapter on laboratory technics summarizes the many important new methods available for research and diagnosis.

In addition to the usual morphology, taxonomy and biology, the section on mosquitoes includes interesting chapters on bionomics and distribution. In the latter are tables, by zoogeographic regions and subregions, of the important vectors showing areas where they are of importance, general range and larval habitat. Again there is a useful section on laboratory and field technics and a selected bibliography.

The pathology and clinical aspects are reviewed in the section on man and the various available treatments are discussed. The chapter on immunity, latency and relapse while giving an analysis of the available information clearly shows one of the many lacunae in our knowledge of malaria. The epidemiology of malaria, a discussion of the types of epidemics and the influence of climatological factors as well as methods of making surveys are interestingly covered in the section dealing with the community. The section on therapeutic malaria presents a summation of available knowledge.

Effective utilization of information discussed in the earlier sections and a discussion of various methods of prophylaxis and control are fully covered. The concise presentation of recent advances and the selected bibliography are valuable contributions.

Revised keys to the Anophelini of the world, which, while following previous keys, have some important changes, form an appendix. As new forms have been added and the status of several has been changed it is regretted that a selected bibliography has not been included.

Practical Malariology will undoubtedly prove to be one of the valuable contributions to the subject in recent times.

J. W. H. Rehn

EXCHANGES

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

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

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Some Dragonfly Observations in Alkaline Areas in Nevada

By IRA LA RIVERS, Nevada Academy of Natural Sciences, Reno, Nevada

Ophiogomphus morrisoni Selys 1879

This Pacific coast species enters the western Great Basin along streamways which head in the Sierra Nevada mountains and end in desert basins in Nevada. In 1914, Kennedy (1917) found it prominent on the Truckee River system from Lake Tahoe (6225 feet elevation) down to the valleys and alkali plains of central western Nevada at elevations as low as 3800 feet. The difference in elevation does not seem marked, at first glance, but climatic conditions are radically altered from the one situation to the other. Lake Tahoe lies in the High Sierras surrounded by dense coniferous forests. As zonations go, this vicinity can be accredited to the Transition, and possesses an average rainfall of 20 inches. On the flats of adjacent central Nevada, Upper Sonoran elements constitute the zonational picture and over most of this vast region, *Atriplex* and *Sarcobatus* (shadscale and greasewood) replace the sagebrush (*Artemisia tridentata*) so popularly and erroneously thought to characterize most of the Upper Sonoran zone in Nevada. Annual rainfall decreases to less than 4 inches in portions of this region within the immediate range of *O. morrisoni*.

This diversification of the floral picture is somewhat misleading, however, in any consideration of dragonfly ecology, for aquatic insects do not generally reflect such extreme changes in external temperatures since water is more stable in this respect than ground or air, and humidity is no longer a factor. So while certain dragonflies may be definitely restricted to high cold mountain streams, and others to the warmer waters of lowlands, many occur indiscriminately in the two areas, generally requiring only certain types of stream bottoms on which to pass the naiadal stage.

This is the case with *O. morrisoni;* not only does it occupy both types of habitats, but occurs in waters varying widely in percentage of total solids, from fresh to brackish. The Truckee River in its upper reaches is one of the purest of mountain streams—in its extreme lower stretches where it meanders through alkaline desert ground, it becomes increasingly brackish. Pyramid Lake, a tectonic basin of considerable proportions into which the Truckee River naturally empties, is quite brackish.

Only one requirement seems consistently needed for the species—that of a gravelly or sandy bottom for the naiad stage. Kennedy (1917) records it frequenting gravel bars and beaches from the High Sierras to the Humboldt River system east of Pyramid Lake. In the vicinity of Pyramid Lake, I have found it more commonly, and in many cases, exclusively, on sand beaches and bars, but there can be little intrinsic difference here between the two habitats, intergrading as they do.

The subspecies *O. morrisoni nevadensis* Kennedy 1917 was based on specimens from the western Great Basin, typical *morrisoni* being delimited to higher montane areas to the adjacent west. There is little actual difference between the two varieties, but *nevadensis* seems good on the basis of ecological considerations. The exact inter-relationships of the group of *Ophiogomphi* containing the species *occidentis, severus* and *morrisoni* have yet to be worked out. Very probably intergrading forms will be found, when material from the concerned Western areas can be compared. All are somewhat unstable, exhibiting considerable individual variation, both in coloration and genitalia.

O. morrisoni has been recorded from both the Truckee and Humboldt River systems in Nevada (Kennedy 1917, La-Rivers 1940, 1941), where it is quite common. Dr. Kennedy's Pyramid Lake specimens were taken in August of 1914 and, from his notes (1917), seem to have come from the Truckee River a few miles from its delta at the southeast edge of the lake. Under the description of *O. m. nevadensis*, he lists the allotype from "Pyramid Lake, Nevada," but in a list of captures at Pyramid Lake, no *O. m. nevadensis* is mentioned. In any event, his collecting locality at the Lake seems to have been in the neighborhood of a mile east of the river mouth. Here the lake waters are comparatively fresh as against the salinity concentrations achieved farther north.

For many years I have known of an almost phenomenal abundance of the species in the brackish middle waters of the lake as evidenced by the cast skins of emergent naiads left conspicuously on lime-whitened tufa domes just above water level in the vicinity of the Pyramid, a massive rock-island close to the eastern shores of the lake. However, I was never able to collect the spot at optimum emergence time, and naiads never seemed abundant. During June 19–20, 1946, the species was found emerging in large numbers about rocks surrounded by sandy shore in the vicinity of the Pyramid, and was the only immature form to be taken from the water, although adult *Sympetrum corruptum* were regular inhabitants. While most emergences apparently took place during the night or early morning hours, many naiads crawled up on the rough tufa on shaded sides, or hid under slabs of tufa and went through the process of emergence during all hours of the day. Cast skins were everywhere, but imagines were only rarely seen, a fact attesting the nervous activity and wide-ranging propensity of adults.

The process of emergence occupied only some 30 minutes, at the end of which the very pale tenerals had expanded their wings sufficiently to flutter to a more protected spot on the rocks. Specimens hardened in paper sacks required some 24 hours to attain a good color, and were not then entirely hardened. Air temperature at 3 P.M. was 90°F, and lake water along the shallow, sanded beach varied from 64°F to 73°F, depending on whether it lay in the shade or exposed to the hot desert sun. Naiads came up in about equal numbers from both shaded and unshaded water. Water temperatures were obtained from six inches of depth—temperatures dropped sharply in several feet of water some distance from the shore.

The ability of *O. morrisoni* to tolerate wide variations in brackishness can be demonstrated by the fact that Pyramid Lake has undergone marked changes in volume in the 100 years since its discovery by the white man, and is now at the lowest and most brackish level in its recorded history. When discovered by Fremont in the winter of 1844, the lake has been reliably estimated to have stood at an elevation of 3860 feet (Hardman and Venstrom 1941), which was considered low under normal conditions. It rose to a maximum of 3879 feet in 1868, remained above 3860 feet until 1917, since which time it has steadily dropped until it stood at 3818 feet in 1939. At the present writing (1946) it stands at 3814 feet (Dukes 1946) and seems to have established a quasi-equilibrium with the greatly curtailed Truckee River inflow. It will doubtless retreat farther in the ensuing years, but the period of accelerated recession such as occurred between 1917 and 1939 when the lake level dropped nearly 50 feet in 22 years seems to be over. From 1939 to 1946, the level receded at an average rate of 7 inches per year as compared with 27 inches per year during the 1917–1939 interval.

Tree-ring studies of the Truckee River system watershed (Hardman and Reil 1936) indicated that drought conditions prevailed in the area for many years prior to 1860, at which time increased precipitation raised the lake level considerably. This continued until about 1917, when drought again became dominant; this, coupled with the tapping of the lower Truckee River by the Fallon agricultural district's Derby Canal in 1908, was sufficient to initiate extreme desiccation of the Pyramid Lake area. During Dr. Kennedy's collecting visit to the south end of Pyramid Lake, the water level stood between 3865 and 3861 feet, some 50 feet higher than it is today, although he erroneously listed it at 3880 feet. Its companion lake, Winnemucca, then with approximately 70 feet of water in its deepest portions, is now (1946) absolutely dry, and has been so for nearly ten years, being now a large alkaline flat or playa, containing water only during the winter and spring rains.

During Jones' (1925) 1914 analyses of Pyramid Lake at a level of about 3863 feet, the water showed a content of approximately 0.270% NaCl, or about one-tenth that of seawater. Hutchinson's (1937) 1933 investigations gave him a figure approximating 0.320% for an elevation of about 3826 feet, or something like an eighth that of seawater. Analyses by Miller (1946) for 1943 indicate a salinity of approximately 0.334% at a lake level of 3815.5 feet. His analyses for 1944 were quite similar, showing a salinity remaining at approximately that of the 1943 level. During the summer of 1946, I took a water sample at Fremont Point, on the mid-eastern shore of Pyramid Lake at the focus of *Ophiogomphus morrisoni* emergence previously mentioned, which Mr. Miller was kind enough to run. The sample was obtained in about a foot of constantly-moving water along the sandy beach, care being taken to eliminate the obvious, macroscopic sediments in suspension. The resulting analysis showed a total salinity of 0.350%; lake elevation was 3814 feet. The increase over the 1943 figure is possibly attributable to the proximity of the shoreline, which is demonstrably contributing material to the lake with each rain, and also to the leaching action of the waves.

It is thus apparent that concentration of electrolytes is proceeding systematically in the lowering lake, and it is quite obvious that a point will be reached eventually at which such concentration will progressively eliminate much of the animal life now occupying the basin, leaving only a few halobiotes. Hutchinson (1937) mentions the finding of "a very large number of dead dry fish" on a low terrace in Winnemucca Lake, shallow companion of Pyramid Lake, "three meters above the water level" (of 1933), which were determined as *Leucidius pectinifer* Snyder 1917, a lake chub now (1946) swarming in Pyramid Lake, and once as common in Winnemucca Lake. A strict lake breeder, this species was perhaps the last to go, although no specific data are available for several other species once common to the lake. These were presumably killed by electrolytic concentration which had reached a lethal point, and probably died during 1930, when the lake stood approximately three meters above the level of 1933. The NaCl concentration during Hutchinson's investigations of Winnemucca Lake stood at approximately 5.0% and a slightly lower value undoubtedly prevailed when the lake was ten feet higher. However, in such speculations, there are other electrolytes than sodium and chlorine to be considered; calcium, magnesium, potassium, phosphorus, sulfates, carbonates and bicarbonates are all present, are all concentrating at the present time, and must all be accorded a part in the picture—how much of a part is not apparent at present. Some idea of their prevalence may be gained by comparing total solids in Pyramid Lake with total salt content. For example, total solids during Jones' analyses amounted to approximately 0.35% for the lake as against 0.27% of salt; the 0.08% representing ions other than sodium and chlorine. Miller's 1943 analyses give total solids approximating 0.47%, an increase of 0.12% over Jones' figures. No such data are available on lethal concentrations for insects, which flourished in Winnemucca as they do in Pyramid today, but it is certain the latter will have to recede tremendously from what it is today before such concentrations become effective. Pyramid Lake now has slightly more than 300 feet of water in its deepest portions, although small decreases in water level will leave large areas at the shallow north and south ends exposed. If and when the lake becomes too saline to support non-halophiles, such species will undoubtedly move to the freshwater sloughs about the mouth of the river and to the river itself.

Dr. Kennedy gives a specific gravity of 1.0034 for Pyramid Lake in 1914. My data indicate a slightly smaller figure. By 1943, when the lake level had receded nearly 48 feet from its 1914 elevation, the specific gravity stood at a fraction in excess of 1.004. It would seem, from Osborn's data (1906), that a critical point may be approaching for odonates, but at present, a large population of several species flourishes in the lake, as well as other non-halophiles upon which the naiads prey, and at the slowly accumulative rate of salinity concentration now prevailing, it would seem that no sudden extinction awaits the naiadal population, but rather a gradual lessening of its numbers.

The damselfly *Enallagma clausum* Morse 1895 was quite abundant about the sanded shore margins of the lake in the vicinity of the Pyramid, but naiads were only rarely found, and these where many tufa fragments lay in the water and provided cover. Adults, however, were common perching on dried tumbleweed or Russian thistle (*Salsola kali tenuifolia*) lying partially imbedded along the shore.

SPRING, SOUTH SMOKE CREEK DESERT

While field collecting during June of 1946, I found a local focus of dragonflies at the south end of the Smoke Creek desert, 55 miles due north of Reno, Nevada (Washoe County), and some 70 miles by road. This desert, a massive alkali flat 35 miles long and 8 miles wide, is the southernmost of a chain of such sinks stretching from the north end of Pyramid Lake for over a hundred miles northeasterly across northwestern Nevada, and all are remnants of Pleistocene Lake Lahontan. Water is excessively scarce in these waste areas and we came without warning upon the highly mineralized springs in the *Sarcobatetum vermiculati* (Billings 1945) about a mile south of the south end of the Smoke Creek desert. Such areas as this are of interest to the odonatist in the Great Basin since the dragonfly population is generally discontinuous and concentrated about such spots. The many miles intervening are devoid of all but a few wanderers.

South of the springs sanded hills rose to a moderately-sized ridge—between the springs and the desert the soil became decreasingly sandy and increasingly alkaline. Greasewood (*Sarcobatus vermiculatus*) prevailed and grew large and sturdy. No trees grew about the springs, but some 300 yards of shallow, narrow ponds lay on the alkali hardpan, fed by two springs, and bearing extensive growths of sedges and grasses. Over these pools dragonflies of many species swarmed. Some swept persistently over the water, others were found only among the greasewood about the ponds. Seining produced very few naiads, chiefly those of *Plathemis lydia subornata,* which was by far the commonest species over the pond.

The following species were taken: (21/VII/46, el. 4000 ft., LaR. & Christensen).

Anax junius (Drury) 1773. Occasional individuals beat over the pools on wider circuits which carried them some distances out in the *Sarcobatetum.* Uncommon.

Aeshna multicolor Hagen 1861. These were common, and, while met occasionally beating over the surrounding greasewood, were most in evidence working carefully through the mediumly-dense thickets of sedges at an average height midway between the water and the tops of the plants—they were quite adept and persistent in this type of hunting, and seemed more stealthy than usual. They invariably pursued any *Anax junius* which appeared.

Libellula saturata Uhler 1857. Only one individual was seen over the greasewood some distance from the ponds.

Libellula pulchella Drury 1773. Somewhat less common than *Aeshna multicolor,* and, like it, found over pond and greasewood.

Libellula composita Hagen 1873. Only a few individuals of this white-faced, distinctly blue-bodied species were seen. All were found in the *Sarcobatetum* about the ponds, and were difficult to catch in the brisk breeze then prevailing.

Plathemis lydia subornata Hagen 1861. This form, only weakly differentiated from typical *lydia,* was by far the commonest dragonfly, and was seemingly restricted to the pond areas, where it beat over the water in regular circuits, *Libellula saturata*-fashion. The only female seen was perpetually molested by the numerous males as she sought to oviposit in marginal waters (June 21). With *Erythemis simplicicollis* and *Sympetrum corruptum,* this is generally the only species found in the smaller springs of this area of the desert, springs which are often only muddy seeps, generally near the base of a hill, and few and far between.

Sympetrum corruptum Hagen 1861. This was not common, only a few individuals being seen, with males and females about equally represented.

Pachydiplax longipennis Burmeister 1839. One specimen was taken in the brush some distance from water.

Erythemis simplicicollis Say 1839. Several individuals were seen, and one taken, both in the *Sarcobatetum* and about the pond margins.

Strangely enough, no *Pantala* or *Trapezostigma* were seen.

Lestes congener Hagen 1861. This large damselfly was not common about the ponds, but was usually found resting in the greasewood about the water, wings half-spread in characteristic fashion.

Ischnura denticollis Burmeister 1839. Common, and one of the smallest species present; confined apparently to the pond margins.

Ischnura cervula Selys 1876. One specimen was taken at the pond margin.

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Obituary

Morgan Hebard, one of our leading students of the Orthoptera and Dermaptera, died suddenly on December 28, 1946, at his home in suburban Philadelphia. A biographical sketch of his life will appear in an early number of ENTOMOLOGICAL NEWS.

Urocerus gigas Fabricius in Brazil (Hym.: Siricidae)

By Donald T. Ries, Illinois State Normal University, Normal, Illinois

Several years ago while checking some sawflies in the collection of the Academy of Natural Sciences in Philadelphia, I found seven specimens of Siricidae which, according to the labels, were collected at "Itunana River, Matto Crosse, Brazil, 1880." This is without doubt Matta Grosso, the large dense forest province of inland Brazil. No previous record of the occurrence of Siricidae in South America has been found in literature.

I identified the specimens (all females) as *Urocerus gigas* Fabricius, a common palearctic species. This identification was corroborated by Mr. Robert B. Benson of the British Museum (Natural History) who kindly compared one of the specimens with material in that institution.

Although it is common through Europe and Asia, no records of this species have heretofore been reported from the western hemisphere. The most logical explanation for its occurrence in South America is that lumber containing the larval stages was shipped in from some European country.

A similar instance of the importation of nearctic species of Siricidae to England in lumber has been recently recorded by Benson (Ent. Monthly Mag., lxxxi, 67–68, 1945).

Personal

Dr. H. Radclyffe Roberts, Assistant Curator in the Department of Insects, member of the Board of Trustees and of the Scientific Council of the Academy of Natural Sciences, has been appointed Managing Director of that Academy as of January 1, 1947. Dr. Roberts is known among entomologists for his original work on Orthoptera and as joint author of the two parts of the "Mosquito Atlas."

The Generic Names of the Sapygidae and their Type Species (Hymenoptera: Aculeata)

By V. S. L. Pate, Ithaca, N. Y.

The Sapygidae are a small family of approximately eighty described species, distributed among nine genera. Representatives of the family occur in all the major zoogeographic regions of the world with the exception of the Australian Realm.

In the past, the Sapygidae have been regarded as a wholly parasitic group and their exact taxonomic position has long been a matter of conjecture. But *Fedtschenkia*, hitherto generally considered to be a somewhat aberrant Mutillid, is indubitably a Sapygid and is the type of a separate and distinct subfamily. The structure of the legs indicates that the members of this Holarctic genus are without question fossorial forms. Indeed, the general habitus of *Fedtschenkia* is so very similar to that of the present day Anthoboscines, there can be little question that the Sapygidae arose from the ancestral stock of those forms.

A list of the generic and subgeneric names proposed for Sapygidae, with the type species of each, is presented below. The form of citation used is the same as that introduced in my catalogues [1] of the generic names of the Sphecoid wasps and of the Psammocharidae.

Aclastocera Förster, 1855. Verh. naturhist. Ver. preuss. Rheinl. u. Westphal., XII, p. 247.

Type: *Aclastocera Frivaldskii* Förster, 1855 [= *Polochrum repandum* Spinola, 1805]. (Monobasic.)

Isogenotypic with *Polochrum* Spinola, 1805, *q.v.*

Araucania [2] new genus for *Laura* Reed, 1930 *nec* Trinchese, 1873 [3] *nec* Lacaze-Duthiers, 1883.[4]

Type: *Laura chilensis* Reed, 1930 [= *Araucania chilensis* (Reed)].

Isogenotypic with *Laura* Reed, 1930, *q.v.*

[1] *Sphecidae:* Mem. Amer. Ent. Soc. no. 9, (1937). *Psammocharidae:* Trans. Amer. Ent. Soc., LXXII, pp. 65–137, (1946).

[2] After the Araucanian Indians of Chile.

[3] Trinchese, 1873, Mem. Accad. Sci. Ist. Bologna, (3), IV, p. 198.

[4] Lacaze-Duthiers, 1883, Mém. Acad. France, (2), XLII, no. 2, p. 1.

Arthrosapyga Pic, 1920. L'Echange, Revue Linnéenne (Moulins), [XXXVI], no. 400, p. 15; (Aug. 2, 1920). [Several species.]

Type: *Sapyga* (*Arthrosapyga*) *sancta* Pic, 1920. (Original designation.)

Cosilella Banks, 1913. Bull. Amer. Mus. Nat. Hist., XXXII, p. 237; (July 9, 1913).

Type: *Cosila* (*Cosilella*) *plutonis* Banks, 1913 [5] [= *Telephoromyia anthracina* Ashmead, 1898 = *Fedtschenkia anthracina* (Ashmead)]. (By original designation and monobasic.)

Eusapyga Cresson, 1880. Proc. Ent. Sect. Acad. Nat. Sci. Phila., 1880, p. xx *in* Trans. Amer. Ent. Soc., VIII, (Dec. 1880). [Five species.]

Type: *Sapyga* (*Eusapyga*) *rubripes* Cresson, 1880 [= *Eusapyga rubripes* (Cresson)]. (By designation of Ashmead. Jan. 5, 1903, Canad. Entom., XXXV, p. 3.)

Fedtschenkia de Saussure, 1880.[6] [*in* Fedtschenko], Reise in Turkestan, II, Zool. Th., 13 Hymenoptera: Scoliidae, p. 13. [Bull. Imp. Gesell. Fr. Nat. Hist., Anthropol., Ethnograph., XXVI, p. 10.]

Type: *Fedtschenkia grossa* de Saussure, 1880. (Monobasic.)

Hellus Fabricius, 1805. Systema Piezatorum, p. xiii [genus only]; p. 246. [Seven species.]

Type: *Hellus 6-punctatus* Fabricius, 1805 [7] [= *Scolia 5-punctata* Fabricius, 1781 = *Sapyga 5-punctata* (Fabricius)]. (Fixed by Shuckard, 1837, Essay Indig. Fossor. Hymen., p. 44.)
Isogenotypic with *Sapyga* Latreille, 1796, *q.v.*

Laura E. P. Reed, 1930 *nec* Trinchese, 1873 *nec* Lacaze-Duthiers, 1883. Rev. Chileña Hist. Nat., XXXIII, p. 508.

[5] After examining the type of *Cosila* (*Cosilella*) *plutonis* Banks, a female in the collection of the American Museum of Natural History, I am convinced that it is merely the opposite sex of the species which Ashmead described fifteen years earlier as *Telephoromyia anthracina.*

[6] The western North American species *anthracina,* which Ashmead in 1898 described and assigned to the Thynnid genus *Telephoromyia,* is referable to the genus *Fedtschenkia.*

[7] Fabricius indicated he considered, but did not designate, this species as type.

Type: *Laura chilensis* E. P. Reed, 1930 [= *Sapyga chilensis* (Reed) [8] = *Araucania chilensis* (Reed)]. (Monobasic.) Isogenotypic with *Araucania* new genus, *q.v.*

Monosapyga Pic, 1920. L'Echange, Revue Linnéenne, (Moulins), [XXXVI], no. 400, p. 15; (Aug. 2, 1920).

Type: *Sapyga (Monosapyga) Theresae* Pic, 1920. (Original designation and monobasic.)

Parasapyga Turner, 1910. Trans. Ent. Soc. London, 1910, p. 405.

Type: *Parasapyga mölleri* Turner, 1910. (Monobasic.)

Polochridium Gussakovskij, 1933. Ark. Zool. (Stockholm), 24 A, no. 10, p. 48.

Type: *Polochridium coum* Gussakovskij, 1933. (Original designation and monobasic.)

Polochrum Spinola, 1805. Fauna Liguriae Fragmenta, p. 7, (1805); Insectorum Liguriae . . . I, p. 19, (1806).

Type: *Polochrum repandum* Spinola, 1805.[9] (Monobasic.) Isogenotypic through synonymy with *Aclastocera* Förster, 1855, *q.v.*

Sapyga Latreille, 1796. Précis Caract. Insect., p. 134, (1796); [no species]. Hist. Nat. Crust. Insect., III, p. 346, (1802); [one species].

Type: *Scolia 5-punctata* Fabricius, 1781 [= *Sapyga 5-punctata* (Fabricius)]. (Fixed by Latreille, 1802, *v. sup.*) Isogenotypic through synonymy with *Hellus* Fabricius, 1805, *q.v.*

Sapygina A. Costa, 1887. Prospetto degli Imenotteri Italiani . . . II, p. 111.

Type: *Sapyga 10-guttata* Jurine, 1807 [= *Sapygina 10-guttata* (Jurine) [9]]. (Monobasic.)

[8] Reed originally described *Laura* as a Masarid wasp, but later (1932, Rev. Chileña Hist. Nat., XXXVI, pp. 141–143), at the suggestion of Bequaert, sank it as a synonym of *Sapyga*. However, as will be shown elsewhere, I consider the group generically distinct, and hence have proposed the new name *Araucania* for it.

[9] Arnold (1929, Ann. Transvaal Mus., XIII, p. 175) considers both *Polochrum* and *Sapygina* to be merely subgenera of *Sapyga*, but I believe each is sufficiently distinct to be accorded generic rank.

Report of Mosquitoes Collected at Fitzsimons General Hospital, Denver, Colorado, During the Seasons of 1944–1945

By William R. Lasky, Sgt., U. S. Army, Fitzsimons General Hospital, Denver, Colorado

(*Continued from page 193*)

Aedes trivittatus Coquillett

Aedes trivittatus was collected and found breeding throughout the two seasons in moderate to small numbers. As little is known about its breeding habits, some investigations were made that yielded good results. It was found to develop so fast under natural conditions that the few pupae found in a collection of half-grown *Aedes dorsalis* larvae were usually *A. trivittatus* pupae. If first instar larvae of *A. dorsalis* were collected, the two or three half- to full-grown intermingled larvae would be *A. trivittatus*. Therefore, unless frequent collections are made, it is very easy to miss. Good luck was had with rearing this species in the laboratory. Wild adult females were collected gorging and were found to oviposit readily on damp cotton. Three days elapsed between the last meal and oviposition. It was noted that all females so bred died following oviposition. To simulate natural conditions one batch of eggs was allowed to dry out slowly for 11 days, at the end of which time distilled water was added to the cotton and within 24 hours the first larvae had emerged. Five days were required for these larvae to pupate and adults emerged 24 hours following pupation. These larvae were fed on a suspension of cultured brewers yeast, *Saccharomyces*. Another female oviposited and her eggs were allowed to dry out. These eggs were slowly dried for 22 days, at the end of which time distilled water was added. These eggs did not hatch for nine days following moistening. These larvae pupated in eight days and emerged on the ninth. A third set of eggs collected in the same manner and slowly dried out for 21 days did not emerge until 29 days later. These larvae died after the first instar so further data could not be collected. From these data, it may be concluded that factors other than moisture influence the emergence of this larvae from the egg.

This mosquito was collected in moderate numbers by trap and a small number of individuals were collected biting in full daylight both on sunny and on dark days.

Larvae were first collected in the alkaline, grassy rain-water depressions in the meadows northwest of the post. Here four larvae of this species were collected July 13th, 1944, with *Aedes vexans* and *Aedes dorsalis*. Some were collected in this same area June 7th, 1945, and August 13th, 1945, with *Aedes dorsalis, Aedes nigromaculis* and *Aedes vexans*. A couple of larvae were also found in a similar rain-water, prairie pool at another location on June 7th, among large numbers of *Aedes dorsalis* and *Aedes vexans*. A few were taken from an irrigation ditch catch-basin west of Fitzsimons June 7th, 1945, and July 26th, 1945 together with *Culex tarsalis, Culiseta inornata, Aedes vexans* and *Psorophora signipennis*. This area is not a permanent one as it frequently becomes dry between irrigation periods. Lastly, larvae were collected in small numbers in a rain-water pool under some large cottonwoods located in the fields north of Fitzsimons, an area which periodically fills with rain water, then dries. The dates were June 12th, June 18th, June 26th, August 8th and August 13th, all in 1945. In the same pool were *Culiseta inornata, Culex pipiens, Culex tarsalis, Aedes dorsalis* and *Aedes vexans*. From all these different breeding areas a total of only 20 larvae were collected, so it can be seen that they were not common anywhere.

This mosquito is a savage biter when encountered and therefore a pest of moderate importance.

Aedes vexans Meigen

This species was the fourth commonest mosquito at Fitzsimons. Larvae were found in almost every type of locale wherein mosquitoes in this area breed. However, temporarily rain-filled pools in partial shade seem to show the largest numbers. This species was found in animal hoof prints filled with rain water, in alkaline, grassy pools, in the permanent irrigation ponds and marshes north of the post and in the irrigation ditch catch-basins. Larvae were found as early as May 4th and as late as August 13th. It was found associated with *Aedes dorsalis, Aedes trivittatus, Aedes nigromaculis, Culex tarsalis, Culiseta inornata, Culiseta incidens* and *Psorophora signipennis.*

Aedes vexans is one of the most important and numerous pests found on and in the vicinity of the post. It is common and a vicious biter, especially on overcast days and in the late afternoons. It was found in small numbers inside buildings, but, for the most part, seems to be an out-of-doors biter.

Culex apicalis Adams

The three specimens of *Culex apicalis* collected in this area were taken resting under Tollgate Creek bridge May 17th, 1945. Larvae have not been collected to date so nothing is known of its breeding habits.

This rare species cannot be considered a pest as it has not been known to feed on warm-blooded animals.

Culex pipiens Linnaeus

It is interesting to note that although *Culex pipiens* is to be found at Fitzsimons only during the last three months of the survey season: August, September and October, it is, nevertheless, the third commonest mosquito in numbers collected (2,-929), in the trap and by hand, including larvae and adults. Moreover, during these three months, *Culex pipiens* by far outnumbers all other species breeding and taken and is to be found in large numbers in most collections. In this area it appears to be a relatively choosy breeder and uses the more permanent types of breeding place but is occasionally found also, in small numbers, in receptacles such as waste disposal cans. *Culex pipiens* was never found in the alkaline, prairie, rain-water-filled pools that bred such large numbers of *Aedes* and even some *Culex tarsalis.* Most commonly its larvae were taken in the natural creek bordering the post; in the grasses and water plants all up and down this stream they were quite numerous, even in the presence of large schools of mosquito fish that are found in this creek. Larvae were also found in the catch-basins of our post irrigation system and, as mentioned above, in waste disposal cans that had several inches of rain water in the bottom. This species was found breeding mostly in pure culture; however, along the creek a few *Culex tarsalis*, *Culex salinarius* and *Culiseta inornata* were also present.

Culex pipiens is the third most numerous species of mosquito in this area and is found commonly within buildings and wards where it bites rather viciously in the evening and night. It seems remarkable that this mosquito, though numerous, has not been previously recorded as occurring in this state.*

Culex restuans Theobald

Only ten specimens of *Culex restuans* were taken in this area and all of them were taken in the light trap during 1944, between the middle of August and the first of September. Nothing further was learned of this species' breeding habits and occurrence in this area.

This species, due to its rarity, is unimportant as a pest. However, these records are the first published of its occurrence in Colorado.

Culex salinarius Coquillett

Culex salinarius is one of the rare species of mosquitoes found in this area. Only four specimens, two adults and two larvae, were collected during the two seasons. The two adults were taken by trap in the middle of September in 1945. The two larvae, collected during the 1944 season, were also taken in the middle of September at the side of Tollgate Creek in the grasses and water plants together with larvae of *Culex tarsalis* and *Culiseta inornata*.

* A mosquito was recorded as *Culex pipiens* in 1907 by Tucker (Kansas Univ. Sci. Bull. 4: 87) as follows "*Culex pipiens* Linne. . . .Colorado, Denver; August (Determined by Dr. H. G. Dyar)."

Dr. T. D. A. Cockerell in 1918 (Jour. Econ. Ent. 11: 198) says "*Culex pipiens* Linne. Recorded from Denver by Tucker in 1907, but record needs confirmation. It was supposed to have been determined by Dyar, but Mr. Knab states that the determination must have been made by Coquillett."

Dr. Harrison Dyar in 1924 (Insect. Insc. Mens. 12: 39) says "*Culex pipiens* Linne. Recorded from Denver by Tucker in 1907. . . . The identification was wrong. . . . The specimen still exists in the National Museum collection, being a male of *Aedes trivittatus* Coq."

Culex tarsalis Coquillett

This is the commonest species of mosquito in the area. More than half of the total of 29,391 mosquitoes and larvae that were collected in this study, that is 15,670, were *Culex tarsalis*. They were found as early as May 15th and were still about, in small numbers, up until the 31st of October, even after the hard frosts of this month. This mosquito was found resting throughout the daytime—under bridges, in tree cavities, in houses, sheds and, in fact, almost anywhere it was not excluded by screening. Breeding starts the end of May and continues until the first freeze of fall. As to breeding locales, this mosquito is not as choosy as *Culex pipiens* and breeds almost anywhere: in rain water ponds, both alkaline and fresh, in a neglected, ornamental fish pond, in the grasses along Tollgate Creek, in hoof-prints at the side of this creek, in the large irrigation reservoirs north of the post, in irrigation ditches and catch-basins and even in flooded, grassy areas in the duck refuge.

This mosquito is an important pest in this vicinity and a vicious biter. It is one of the most common varieties found within houses and ward buildings.

Culiseta incidens Thomson

Culiseta incidens was collected in small numbers throughout both seasons here. A total of 100 specimens was collected: 9 were taken by trap, 36 by hand, and 55 as larvae. The hand-collected adults were found mostly in the vicinity of the game refuge resting under the duck nesting-boxes; several were found resting under the Tollgate Creek bridge. This mosquito was not observed biting man, although repeated efforts were made to induce feeding in captivity. One female was induced to feed on a guinea pig. Larvae were collected in moderate numbers in an artificial fish pond on the post area. These larvae were collected the first and end of July and the first, middle and end of September in 1944. They were associated with the larvae *Culiseta inornata*, *Culex tarsalis*, *Aedes dorsalis* and *Culiseta melanura*. During 1945 this species was collected in this same fish pond July 3rd, after which time this area was filled in, making further breeding observations impossible. The only other area in which this mosquito was found to breed was in the catch-basins of the post irrigation system. One egg case, which later proved to be of this species, was collected here and four larvae were reared from it.

It is believed that, for the most part, this mosquito does not bite man.

Culiseta inornata Williston

This is the fifth commonest species of mosquito locally; 1,351 specimens of larvae and adults were collected during the two seasons. It was found commonly in the trap collections as well as resting collections from the first of May to the end of October. One female was collected while biting the author. This was the only observation made of this mosquito biting man, although gorged females were collected within ward buildings. Larvae were collected in almost all breeding locales. They were found in rain-water-filled hoof-prints, in the irrigation system and catch-basins on and off the post, in the ornamental fish pond on the post, in the grasses at the sides of Tollgate Creek, in the alkaline rain-water prairie ponds, in the large permanent irrigation ponds north of the post, in shady rain-water pools and, lastly, in a bedpan, partially filled with rain-water, on the post dump. This species, due to its widespread choice of breeding locales, was found breeding in association with all other species of this area.

In certain portions of its range *Culiseta inornata* does commonly attack man. As little was learned of the feeding habits of this species in our area, we cannot state of what importance its large occurrence in this area may be.

Culiseta melanura Coquillett

This species was collected only in 1944. Seven adults were taken in the trap between the end of June and the middle of August. One larva was collected June 16, 1944, in a hoof-print filled with rain water, in association with *Culiseta inornata* and *Culex tarsalis* larvae. The other *Culiseta melanura* larva was collected July 28, 1944, in the artificial fish pond on the post area, along with *Culiseta incidens*.

Culiseta morsitans Theobald

A single male of this species was identified from our 1945 collections. It was collected by hand in the vicinity of the game preserve. During the 1944 season several specimens, collected by hand in the same vicinity, were listed as of this species and were so published. These, I am now convinced, are really *C. incidens*.

Psorophora signipennis Coquillett

This species is fairly rare in our area, a total of 16 specimens being collected during the two seasons. Twelve were collected by trap, one by hand and three in collections of larvae. The few specimens taken in the trap were collected between the middle of July and the end of August. July 26, 1945, one adult was collected among freshly emerged *Aedes nigromaculis* and *Aedes dorsalis* by sweeping the net over the short grass bordering the alkaline, rain-water-filled hoof-prints and depressions of the big *Aedes dorsalis* breeding area. No *Psorophora* larvae were ever collected in this area, however. The three larvae collected were taken in the irrigation-ditch catch-basins west of the post golf course among larvae of *Culiseta inornata, Culex tarsalis, Aedes vexans* and *Aedes trivittatus*. One larva was collected at this site June 7, 1945, and the other July 26, 1945, indicating that two broods may take place.

Summary

1. During a two-season survey (1944–1945) 29,391 mosquitoes, both adults and larvae, were collected and identified.

2. Eighteen species of mosquitoes were found to occur on and in the vicinity of the post. Notes on their occurrence, breeding and biting habits are recorded.

3. Out of 29,391 larvae and mosquitoes identified not a single specimen of *Anopheles* was found.

4. Four new state records were made for Colorado as follows: *Aedes sticticus* Meigen, *Aedes triseriatus* Say, *Culex pipiens* Linnaeus, *Culex restuans* Theobald.

Notes on District of Columbia Wasps (Hym.: Sphecoidea)

By David G. Shappirio

Motes argentatus Pal. de Beauv.

The collecting season for wasps in the D. C. region extends usually into late October, but for *Motes argentatus*, a locally common species, there was no halt to the appearance of females from the Fall of 1944 to the Spring of 1945. It was possible during these months to go out at nearly any time of day during almost any kind of weather, and obtain one or two females. Rain alone kept them away, as even when snow was on the ground specimens could be seen flying around as if it were July or August.

The area in which they were obtained is ordinarily a good collecting-ground, being an open clay bank with pines to one side and second-growth plants on the other. Specimens were taken from Nov., 1944 to March, 1945 as follows: Nov. 26, 2 ♀♀; Dec. 19, 1 ♀; Jan. 28, 1 ♀ in snow; Feb. 11, 3 ♀♀; Feb. 25, 3 ♀♀; Mar. 10, 1 ♀ in light snow.

Thus, these insects, which one would normally associate with hot weather, were nevertheless found quite consistently throughout the winter. May this not necessitate a revision of our views on the seasonal appearance of wasps, at least of this species?

Bembecinus nanus Hdl.

Bembecinus nanus, ordinarily scarce in any locality, has been extremely common in the Washington area and in some localities more plentiful than nearly every other wasp.

On a cloudy, very hot and oppressive day in mid-July, wasps of all types were out in great numbers. They seemed to fly slowly, and lacked their usual energetic manner, as if the heat and humidity were almost too much for them. A *Bembecinus* female was seen flying along, carrying what appeared to be a leaf-hopper. She sensed intrusion as she was approached, dropped the prey, which was unfortunately lost, and left the vicinity. This occurrence was repeated several times and it was seen that another way of obtaining a specimen of the prey would have to be found.

After a wait of thirty minutes beside a *Bembecinus* burrow, the owner returned, carrying her prey. She was picked up by hand, since it was worth being stung to get her prey. The latter was found to be a leaf-hopper, *Graphocephala versuta* Say.* On another occasion, this species has been taken with fulgorid bugs as the prey but this record is unobtainable. *B. nanus,* it was found, returns to the burrow daily with fresh food for the larva, resembling in this habit many other of the bembecine wasps.

To my knowledge, this species was never recorded from this area until July, 1945, when it became very common, and continued so until Autumn. It has been common again in 1946, although not quite in the numbers of 1945.

Current Entomological Literature

COMPILED BY CHARLES HODGE IV, RAYMOND Q. BLISS, EDWIN T. MOUL, MAURICE E. PHILLIPS AND HENRY K. TOWNES JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Munro, J. W.—Entomology of stored products. [31] 24: 649–658. **Vappula, N. A.**—Finnish entomological literature published in 1942 including economic entomology and control of insect pests. [32] 9: 1–12.

* Kindly determined by Dr. P. W. Oman.

ANATOMY, PHYSIOLOGY, MEDICAL—**Boyce, J. M.**—Influence of fecundity and egg mortality on the population growth of Tribolium confusum Duval. [11] 27: 290–302. **Cooper, K. W.**—Detachment frequency of attached x-chromosomes in autosomal structural heterozygotes of Drosophila melanogaster. [26] 32: 273–275. **Cristol, Haller, Lindquist**—Toxicity of DDT Isomers to some insects affecting man. [30] 104: 343–344. **Ellenby, C.**—A micro-respirometer for single prepupae of Drosophila melanogaster Meigen. [16] 22: 85–87, ill. **Fraenkel and Blewett**—The dietetics of the caterpillars of three species of Ephestia, E. kuehniella, E. elutella and E. cantella and of a closely related species Plodia interpunctella. [16] 22: 162–171, ill. **Fraenkel and Blewett**—The dietetics of the clothes moth, Tineola bisselliella Hum. [16] 22: 156–161, ill. **Fraenkel and Blewett**—Linoleic acid, vitamin E and other fat-soluble substances in the nutrition of certain insects (Ephestia kuehniella, E. elutella, E. cantella and Plodia interpunctella.) [16] 22: 172–190, ill. **Glaser, R. W.**—Intracellular bacteria of the cockroach in relation to symbiosis. [20] 32: 483–489. **Hershberger, R. V.**—Differential stains of insect tissues. [22] 46: 152–162. **Kangas and Leskinen**—Pegohylemyia anthracina Czerny (Muscidae) als Zapfenschadling an der Fichte. [32] 9: 195–212, ill. **Khatib, S. M. H.**—Studies in Galerucinae. The internal anatomy of Galerucella birmanica (Jacoby). [25] 24B: 35–54, ill. **Possompes, B.**—Les glandes endocrines post-cérébrales des dipteres. I. Etude chez la larve de Chironomus plumosus L. [7] 72: 99–109, ill. **Stanley, J.**—The environmental index, a new parameter as applied to Tribolium. [11] 27: 303–314. **Sze, Li-chieh**—Cytological studies on Acrididae. IV. Structure of the x-chromosome in the meiosis of Phlaeoba infromata. [19] 79: 113–123, ill.

ARACHNIDA AND MYRIOPODA—**Brennan, J. M.**—Two new species of Trombicula: T. montanensis and T. aplodontiae (Acarina, Trombiculidae) from N.W. United States. [20] 32: 441–444, ill. **Cooper, K. W.**—Occurrence of the mite Cheyletiella parasitivorax (Megnin) in N. America, with notes on its synonymy and "parasitic" habit. [20] 32: 480–482. **Ewing, H. E.**—Notes on Trombiculid mites with descriptions of Walchiinae n. subf., Speotrombicula n. g., and Eutrombicula defecta n. sp. [20] 32: 435–440 (k), ill. **Fox, I.**—New genus, Boringuolaelaps, and new species of mites from rats in Puerto Rico. [20] 32: 445–452 (k), ill. **Turk, F. A.**—Studies of Acari V—Notes on and descriptions of new and little-known British Acari. [3] 12: 785–820 (k*), ill. **Wharton, G. W.**—Observations on Ascoschongastia indica (Hirst, 1915) (Acarinida: Thorbiculidae). [10] 16: 153–184, ill.

SMALLER ORDERS—Bonet, F.—Nuevos generos y especies de Hipogastruridos de Mexico (Collembola). [29] 6: 13–45 (k), ill. **Calvert, P. P.**—New species of Brazilian Libellulinae (Odonata) and their nearest allies. [6] 69: 1–4, ill. **Dampf, A.**—Notas sobre pulgas. I a VII. [29] 6: 47–69, ill. **Geijskes, D. C.**—Observations on the Odonata of Tobago, B.W.I. [34] 97: 213–235 (k), ill. **Guimaraes, L. R.**—Alguns aspectos bionomicos de Leptopsylla segnis (Schonh.) (Suctoria). [4] IV: 233–259. **Hickin, N. E.**—Larvae of the British Trichoptera 21. [34] 21: 61–65, ill. Larvae of British Trichoptera 22. [27] 21: 55–60, ill. **Hollenbeck, A. H.**—A practical method for mass production and transfer of Xenopsylla cheopis. [20] 32: 463–464, ill. **Longfield, C.**—Larvae of the Sympetrum fonscolombii (Selys) (Odonata). [27] 21: 47–48, ill. **Rehn, J. A. G.**—Five new species of earwigs of the Indo-Pacific genus Nesogaster (Dermaptera: Labiidae: Nesogastrinae). [23] 98: 219–239. **Saunders, L. G.**—A Canadian Japygid (Thysanura). [8] 78: 95. **Tjeder, B.**—Neuroptera and Mecoptera of N. Norway. [35] 63: 3–15, 1943.

ORTHOPTERA—Burtt, E.—Observations on east African Pamphaginae (Orthoptera) with particular reference to stridulation. [27] 21: 51–54, ill. **Filho, L. T.**—Tecnicas gerais seguidas no estudo da ordem mantodea Burmeister, 1838. [4] IV, 113–155; sobre a familia Acanthopidae Burmeister, 1838. [4] IV, 157–231, ill. **Glaser, R. W.**—(See Anatomy, etc.) **Sze, Li-chieh**—(See under Anatomy, etc.)

HEMIPTERA—Broadbent, L.—Alate aphides trapped in Northwestern Derbyshire, 1945. [27] 21: 41–46. **Carvalho, J. C. M.**—Mirideos neotropicais XXV, Genero Pachymerocerus Reuter e correcoes de trabalhos anteriores (Hemiptera). [6] 68: 1–9, ill. **Cleaves, H. H.**—The magic cicada on Staten Island, 1945. [28] 10: 73–80. **Dean and Chapman**—Biology and control of the Apple Redbug. [21] Bull. 716: 3–42, ill. **Emery, W. T.**—Temporary immunity in alfalfa ordinarily susceptible to attack by the pea aphid. [15] 73: 33–43. **Hartzell, F. Z.**—Methods of estimating foliage area injured by grape leaf-hoppers. [21] Tech. Bull. 277: 5–49, ill. **Jacob, F. H.**—New British species of Myzaphis van der Goot associated with wild roses, Myzaphis bucktoni sp. n.; and a comparison with M. rosarum (Kaltenbach) (Hem: Aphididae). [27] 15: 110–117, ill. **Koestner, J.**—Museum notes on the 17-year Cicada. [28] 10: 81–84. **Lambers and Rogerson**—New British Aphid from Prunus padus L., Myzus padellus sp. n. (Hem: Aphididae). [27] 15: 101–105, ill. **Metcalf, Z. P.**—Gen. Cat. of the Hemiptera. Fas. IV. Fulgoroidea. Part 8, Dictyopharidae. Smith College, Mass. **Pallister, J. C.**—Type material and specimens taken from the Davis collection of Cicadas, Staten Island Museum. [28] 10: 45–47; Cicadas described by Wm. T. Davis which should be in the Davis collection or place of deposit uncertain. [28] 10: 48– . **Usinger, R. L.**—Gen. Cat. of Hemiptera. Fas. V. Polycteridae. Smith College. **Usinger, R. L.**—Notes and descriptions of Ambrysus Stal with an account of the life history of Ambrysus mormon Montd. (Hemiptera: Naucoridae). [37] 31: 185–210 (*), ill. **Zakhvatkin, A. A.**—Studies on the Homoptera of Turkey. [34] 97: 149–176 (*), ill.

LEPIDOPTERA—Beall, G.—Seasonal variation in sex proportion and wing length in the migrant butterfly, Danaus plexippus (Danaidae). [34] 97: 337–353, fig. **Carpenter, G. D. H.**—Capture of butterflies in great numbers by the grass Setaria verticillata (L) Beauv. in east Africa. [27] 21: 49–50. **Clark, A. H.**—Two new butterflies from the Admiralty Islands. [24] 59: 119–120. **D'Almeida, R. F.**—Estudos biologicos sobre alguns Lepidopteros do Brasil. [4] IV: 32–70, ill.; Segunda nota suplementar a "Revisao das Terius americanas." [4] IV: 73–94, ill.; Revisao do genero Xanthocleis Boisd. [4] IV: 97–112, ill. **Franclemont, J. G.**—Revision of the species of Symmerista Hübner known to occur N. of the Mexican border (Lepidoptera: Notodontidae). [8] 78: 96–103 (k*), ill. **Fraenkel and Blewett**—(See under Anatomy, etc.) **Gardner, J. C. M.**—On larvae of the Noctuidae. II. [34] 97: 237–252 (k), ill. **McDunnough, J.**—Notes on Robinia-feeding Phycitid larvae (Lep.: Phycitinae). [8] 78: 109–110. **McDunnough, J.**—Gracillariid studies (Lepidoptera). [8] 78: 91–95 (*), ill. **Musgrave, A.**—Some butterflies of Australia and the Pacific. Swallowtails. [5] 9: 66–72, ill. **Richards, O. W.**—Rearing larva of the eyed hawk-moth, Smerinthus ocellatus (L), on apple and sallow. [27] 21: 72. **Richards, O. W. and Waloff, N.**—Study of a population of Ephestia elutella Hübner (Lep., Phycitidae) living on bulk grain. [34] 97: 253–298, ill. **Waloff and Richards**—Observations on the behaviour of Ephestia elutella Hübner (Phycitidae) breeding on bulk grain. [34] 97: 299–335, fig. **Wiltshire, E. P.**—Middle east Lepidoptera V. New genus, new species, and 2 new races from Iran, with taxonomic notes on other Persian Heterocera. [27] 15: 118–128, ill.

DIPTERA—Alexander, C. P.—Undescribed species of western nearctic Tipulidae. II. [12] 5: 93–103. **Brito da Cunha, A.**—Polymorphism in natural populations of a species of Drosophila. [18] 37: 253–256, ill. **Cooper, K. W.**—(See Anatomy, etc.) **Ellenby, C.**—(See under Anatomy, etc.) **Gerberick, J. B.**—An annotated bibliography of papers relating to the control of mosquitoes by the use of fish. [1] 36: 87–131. **Horsfall, W. R.**—Biol. and control of mosquitoes in the Rice area. [36] Bull. 427: 3–46, ill. **Hauber and Morrissey**—Limnochironomids in Iowa including their life histories. [13] 52: 287–292 (k), ill. **Jones, D. T.**—Domestic habits of two flies. [13] 52: 299–301. **Kangas and Leskinen**—(See Anatomy, etc.) **King and Hoogstraal**—New Guinea species of Culex (Culiciomyia), with descriptions of two new species. [24] 59: 143–154 (k), ill. **Knight and Laffoon**—Oriental species of the Aedes (Finlaya) Kochi group (Culicidae). [33] 72: 203–225 (k*), ill. **McGovern, Harnly and Gable**—A new approach to the pattern problem in Drosophila wings. [17] 102: 159–177, ill. **Pennak, R. W.**—Notes on Mountain Midges (Deuterophlebiidae) with a description of the immature stages of a new species from Colorado. [2] 1276: 1–10 (k), ill. **Possompes, B.**—(See Anatomy, etc.) **Sabrosky, McDaniel, Reider**—A high rate of natural Plasmodium infection in Anopheles crucians. [30] 104: 247–248. **Someren, E. C. C. van**—Ethiopian Culicidae. Tribe megarhinini—notes and descriptions. [34] 97: 177–186 (k*), ill. **Spencer, W. P.**—High mutant gene frequencies in a population of Drosophila immigrans. [22] 46: 143–151. **Strickland, E. H.**—An annotated list of the Diptera of Alberta. Additions and corrections. [9] 24: 157–173. **Trembley, H. L.**—Aedes atropalpus (Coq.) a new mosquito vector of Plasmodium gallinaceum Brumpt. [20] 32: 499–501. **Vargas, L.**—Cuatro nuevas especies y otros datos sobre Simulidos de Mexico. [29] 6: 71–82, ill.

COLEOPTERA—Benesh, B.—Systematic revision of the Holarctic genus Platycerus Geoffroy (Lucanidae). [33] 72: 139–202 (k), ill. **Boyce, J. M.**—(See Anatomy, etc.) **Jaques and Redlinger**—Preliminary list of the Carabidae known to occur in Iowa. [13] 52: 293–298, ill. **Brown, W. J.**—Notes on some species of Canthon and Dichelonyx (Coleo.: Scarabaeidae). [8] 78: 104–109, (k*). **Khatib, S. M. H.**—(See Anatomy, etc.) **Knull, J. N.**—A new species of Aplastus from Idaho (Coleoptera: Plastocerdiae). [22] 46: 142. **McKeown, K. C.**—Australian insects. XXVII. Water Beetles. [5] 9: 46–49, ill. **Stanley, J.**—(See Anatomy, etc.) **Salt and Hollick**—Studies of wireworm population. II. Spatial distribution. [16] 23: 1–46, ill.

HYMENOPTERA—Cockerell, T. D. A.—African colletid Bees. [3] 12: 836–851 (k*). **Holgersen, H.**—Ants of northern Norway. [35] 63: 3–33, ill., 1942. **Holgersen, H.**—Formica gagatoides Ruzs. in Norway. [35] 64: 3–17, ill., 1943. **Popov, V. B.**—Notes on the nomenclature of bees (Hymen: Apoidea). [27] 15: 106–109. **Richards, O. W.**—Observations on Bombus agrorum (Fab.). [27] 21: 66–71. **Romun, A.**—List of new finds of Ichneumonidae in Norway. [35] 60: 3–20, 1942. **O'Rourke, F. J.**—Discovery of rare ant Stenamma westwoodi Westwood, in Co. Wicklow. [14] 8: 413–414.

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1.—Amer. Midl. Nat. 2.—Amer. Museum Novitates. 3.—Annals & Mag. Nat. Hist. 4.—Arg. de Zool. 5.—Australian Mus. Mag. 6.—Bol. Mus. Nac. do R. de Jan. 7.—Bull. Soc. Zool. France. 8.—Canadian Entomologist. 9.—Can. Jour. Research. 10.—Ecological Monographs. 11.—Ecology. 12.—Great Basin Nat., Provo, Utah. 13.—Iowa Acad. Sci. 14.—Irish Naturalist Jour. 15.—Jour. Agr. Research. 16.—Jour. Exper. Biol. 17.—Jour. Exp. Zool. 18.—Jour. Heredity. 19.—Jour. Morphol. 20.—Jour. Parasitology. 21.—N. Y. State Agr. Exp. Sta. 22.—Ohio Jour. Sci. 23.—Proc. Acad. Nat. Sci. 24.—Proc. Biol. Soc. Wash. 25.—Proc. Indian Acad. Sci. 26.—Proc. Nat. Acad. Sci. 27.—Proc. Roy. Ent. Soc., B. 28.—Proc. Stat. Isl. Inst. Arts & Sci. 29.—Rev. Soc. Mexicana Hist. Nat. 30.—Science. 31.—Science Progress. 32.—Suomen Hyonteistieteelinen Aikakauskirja. 33.—Trans. Amer. Entom. Soc. 34.—Trans. Roy. Ent. Soc. 35.—Tromso Mus. Arshefter. 36.—Univ. Ark. Agr. Exp. Sta. 37.—Univ. Kansas Sci. Bull.

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.

Odonata—Will buy or exchange North and Central American species, both imagos and nymphs. Also will exchange other orders for Odonata. Carl Cook, Crail Hope, Kentucky.

I want to collect Rothschildia farbesi, agapema, galfina and io moths for interested persons. E. Frizzell, Route 4, San Benito, Texas.

Wanted—Information as to the existence and present location of a copy of Solodonikov, S. V. Contribution à l'étude de la faune et de la biologie des larves des Libellules du Donetz et de certains de ces affluents. [In Ukrainian.] Trav. Soc. Nat. Charkow 52: 249–268. 1929. [Quoted from Zool. Rec. 1936, Ins. p. 147, No. 3114.] P. P. Calvert, P. O. Box 14, Cheyney, Penna.

Wanted—Crane-flies (Tipulidae) of New Guinea, New Caledonia and Neighboring Islands, for revisional purposes. Also, names and addresses of individuals or institutions possessing any of these flies. Correspondence solicited. Chas. P. Alexander, Fernald Hall, Amherst, Mass.

Lepidoptera—Wanted, Hyloicus (Sphinx) and other Sphingidae in exchange for U. S. and Wisconsin Lepidoptera. Wm. E. Sieker, 119 Monona Ave., Madison 3, Wisconsin.

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Two New Wasps from Southern Arizona. (Hymenoptera: Sphecidae)

By V. S. L. Pate, Ithaca, N. Y.

In the material collected during the summer of 1946 in the southwestern United States by Mr. Howard E. Evans of East Hartford, Connecticut are the following two interesting and distinctive new wasps. One of these, *Hapalomellinus teren*, is the second species to be discovered of the peculiar and endemic western Nearctic Gorytine genus *Hapalomellinus*. I express my sincere thanks to Mr. Evans for his kindness in contributing this material.

Hapalomellinus teren [1] new species

The much finer and more delicate vestiture of white tomentum, which is golden on the upper face, vertex, and mesonotum, and the wholly red body differentiate *teren* from *albitomentosus*. Furthermore, in *teren* the front lacks the scattered coarse punctures which are so characteristic of *albitomentosus;* the omaulus is absent above and obsolescent below; the mesonotal-scutellar suture is simple, not foveolate as in *albitomentosus;* the stigma is eburneous; the pygidial area is polite and very sparsely punctate; and the first abdominal sternite shows no trace of a median keel on the apical half. Finally, the postocellar line of *albitomentosus* is twice the length of the ocellocular distance, whereas in *teren* the postocellar line is only one and a half the length of the ocellocular distance.

[1] τέρην, delicate: in allusion to the slender, dainty habitus and delicate vestiture of this little wasp.

Type. ♀; Along Santa Cruz River, Tucson, Pima County, ARIZONA. Elevation, 2350 feet. August 6, 1946. (Howard E. Evans; flying over sand.)

Female. Length 6.5 mm. Fulgid ferruginous; the following citrinous: labrum, clypeus, lower front and inner orbits, mandibles save for red apices, scapes anteriorly, and fore and middle tarsi. Second, third and fifth abdominal tergites with a narrow, apical, eburneous fascia. Wings hyaline; veins brunneous; stigma eburneous.

Head subcircular in anterior aspect; impunctate. Eyes convergent toward clypeus. Clypeus and lower front with a fine silvery sericeous pubescence; upper front and vertex with a very fine vestiture of aureous puberulent hair; temples thinly clad with fine silvery pubescence. Clypeus transversely subrectangular, twice as wide as long, median length three-eighths the vertical eye length, apical margin truncate, weakly flanged. Front bisected by a fine impression running down from median ocellus, without scattered pit-like punctures. Vertex with ocellocular line two-thirds the postocellar distance; occipital carina moderate, neither a complete circle in extent nor attaining the hypostomal carinule. Antennae situated slightly above dorsal margin of clypeus; subantennal sutures distinct; scape thick, obterete, one-half the vertical eye length; pedicel suborcate, subequal in length to first flagellar article; flagellum with first three segments subequal in length, penult article two-thirds the length of terete ultimate segment. Mandibles strongly decussate, apices acuminate, with a distinct preapical tooth on inner margin; lower margins entire.

Thorax fulgid, impunctate; dorsally with a fine aureous puberulent tomentum; pleura, sternum and propodeum with a very fine silvery tomentum. Pronotum with anterior dorsal margin and humeri rounded; propleural catch very weak. Mesonotum with notauli weak, arcuate, developed on anterior fourth; mesonotal laminae distinct, obliquely truncate and declivent; suture between mesonotum and scutellum efoveate; scutellum and postscutellum simple. Mesopleura with omauli absent above, obsolescent below; episternal suture oblique, present for entire length; episternauli weak; sternauli absent. Propodeum impunctate, without sculpture, fulgid; dorsal face with a large trigonal enclosure defined by strongly impressed, efoveate furrows and bisected by a strong line which continues onto and also bisects posterior face; posteriolateral angles broadly rounded.

Legs slender, elongate, clothed with a very fine silvery puberulent tomentum. Fore tarsi slightly flattened, with a pecten of long, slender, flattened, spatulate, flexible bristles. Middle and hind tarsi long, slender, the apices of the segments with a verticellate whorl of small spines; middle tarsi with claws asymmetrical, the outer claw much larger than the inner one; hind tarsi with segments weakly inflated. Middle tibiae weakly spined on outer faces; hind tibiae with very few spines.

Abdomen slender, elongate, petiolate, fulgid, impunctate; clad with a very fine inconspicuous pubescence dorsally, the tergites with narrow silvery sericeous apical fasciae, the sternites with a thin vestiture of puberulent silvery hair. First segment slender, subnodose at apex. Pygidial area trigonal, glabrous, polite, with a very few scattered fine punctures.

Paratypes. Two topotypical females which agree with the type in all essential features of livery and structural detail.

Moniaecera evansi new species

The strange and curious flagellar process, the simple and rounded ecarinate pronotum, and the fine, moderate puncturation of the head and thorax differentiate *evansi* from all other described species of *Moniaecera.*

Type. ♂; Banks of the Santa Cruz River, Tucson, Pima County, ARIZONA. Elevation, 2350 feet. August 2, 1946. (Howard E. Evans; flying over sand.)

Male. Length 4 mm. Aenaeruginonigrous; the following eburneous: palpi, mandibles except red apices, antennal scapes, fore and middle tibiae, fore and hind tarsi, fore and middle trochanters, fore femora save for a black stripe on outer faces, middle tibiae except for a black stripe on both inner and outer faces, and hind tibiae broadly annulate at base. Last abdominal segment pale fulvous. Wings clear hyaline, iridescent; veins and stigma badeous.

Head fulgid; clypeus and inner orbits with appressed silvery sericeous pile; vertex with sparse and scattered, decumbent puberulent silvery hair; temples thinly clad with silvery pubescence. Front strongly concave between inner orbits and weakly, transversely strigose; with a large, flattened, declivent spine medially just above antennal sockets; upper front longitudinally aciculate and with scattered, well separated moderate punctures, bisected by a strong impression running forward from anterior ocellus. Vertex transversely aciculate, with the punctures scattered and well separated anteriorly to contiguous posteriorly; ocelli large, arranged in an equilateral triangle, the postocellar and ocellocular lines subequal in length, postocellar line bisected by a fine furrow. Occipital carina distinct but not appreciably flanged, a complete circle in extent and not tangent below, but well separated from, the apex of the hypostomal carinule, the intervening region foveolate; temples and lower portion of head with fine, well separated, setigerous punctures, the latter area without tubercles or callosities. Antennae with scapes obterete, ecarinate, slender, one-half the vertical eye length; pedicel obterete, one and a half the length of first flagellar article; first seven flagellar articles short, annular, subequal in length and weakly fringed beneath, the eighth produced beneath into a very large flat, curved, laminate, subsecuriform process, penult segment three times the length of the first and two-thirds the length of the simple last article. Clypeus short, median length one-eighth the vertical eye length; linear laterally, deeply emarginate on each side of the flat, truncate median lobe. Mandibles as customary in genus; lower margins entire, and edentate beneath at base.

Thorax fulgid; dorsum subglabrous, pleura and especially the sternum with appressed silvery sericeous pile. Pronotum distinctly and closely punctate; dorsal surface flat, not notched medially; anterior margin and humeri rounded, ecarinate; posterior margin roundly emarginate medially. Mesonotum closely, distinctly, and evenly punctate throughout; suture between mesonotum and scutellum impressed and finely foveolate; axillae immarginate; scutellum gently tumid, punctate like mesonotum; postscutellum flat, punctate like scutellum. Mesopleura with puncturation similar to mesonotum but somewhat more separated; prepectus weakly margined anteriorly; episternal suture oblique, impressed; mesopleural pit very distinct; metapleura glabrous, impunctate; mesosternum rounded, immarginate anteriorly. Propodeum glabrous, with a fine favose sculpture throughout; dorsal face without a trigonal enclosure but bisected by a narrow, linear, immarginate, finely foveolate furrow which also bisects posterior face and is deep and widened discally there; lateral carinae obsolete.

Legs simple, normal for genus. All tibiae slender, obterete, not spinose. Fore and hind tarsi simple, unmodified; middle tarsi with metatarsi fusiform and four-fifths the length of four distal segments combined. Longer hind tibial calcar four-fifths the length of hind metatarsus which is subequal in length to four distal segments combined.

Fore wings short, not surpassing apex of third abdominal segment; marginal cell three and three-fifths as long as wide and squarely truncate at apex; radius with first abscissa about two-fifths (0.416) the length of second abscissa, the third abscissa one-sixth the length of second abscissa; transverse cubital vein oblique, inclivous, one-half the length of second abscissa of cubitus which is about three-fourths (0.77) the length of first abscissa of cubitus.

Abdomen fulgid; with a very sparse and inconspicuous clothing of short silvery hair. Tergites with a very fine, transverse aciculation; sternites impunctate. First segment slender, petioliform but not appreciably nodose at apex; the remainder of abdomen gradually ampliate toward the strongly clavate apex; last tergite transversely subsemicircular, without a pygidial area but with a few scattered punctures on disc; hypopygium wide, flat, apex entire and broadly rounded.

Paratypes. Two topotypical males which agree with the type in all essential features of livery and structural detail.

It gives me great pleasure to dedicate this bizarre little pemphilidine wasp to its collector, Mr. Howard E. Evans.

Area Sampling of Populations of Larval Mosquitoes in Rice Fields [1]

By William R. Horsfall, University of Arkansas, Fayetteville, Arkansas

Sampling of populations of larval mosquitoes in rice fields presents a unique problem because the fields provide uniform habitats of extensive acreage. The land is nearly flat with contour earth levees holding water over the surface to a depth of 4–8 inches. Larvae, when present, are usually distributed over the whole area. In order to obtain samples from representative parts of a field, an observer must wade, and such disturbance causes larvae (especially culicine larvae) to submerge.

Dipping is a familiar and standard method of sampling populations of mosquito larvae especially when observing diverse habitats where other methods are cumbersome. It has been used for sampling populations in rice fields (Knowles and Fisk, 1945). Larval densities determined by this method deviate with observers, and often comparable densities may appear divergent when recorded by the same observer in different places. Even with such habitual surface forms as anopheline larvae, attempts to relate capacity of dipping device to surface area have been unsatisfactory (Goodwin and Eyles, 1942).

Area sampling is a reliable means of comparing larval densities in a uniform habitat. Goodwin and Eyles used a floating device in the form of a hollow square of one-half to one square meter made by planking set on edge for comparing densities of *Anopheles quadrimaculatus* Say in different locations. At each location enclosed larvae were dipped out and counted. Cambournac, 1939, used a hollow rectangular chamber with metal sides enclosing an area of 0.1 square meter for sampling populations of larvae in rice fields in Portugal. Another means of area sampling used in rice fields since 1939 is that of a counting chamber consisting of a cylindrical screen cage with a cross-section area of one square foot (Horsfall, 1942, p. 16). The

[1] Research paper No. 816 Journal Series, University of Arkansas. Publication permitted by the Director of the Arkansas Agricultural Experiment Station.

cylinder is 13 inches high and is open at both ends. Support and weight are provided by a metal band at each end of the cylinder and four metal struts between them. In use the device is dropped at random intervals in a rice field in such a way that one end settles into the mud, and the walls enclose larvae present under one square foot of surface. Larvae are dipped out and counted as they rise to the surface. As a means of determining actual numbers of larvae present, this chamber has proved satisfactory for all species that rise to the surface.

Area sampling was more dependable than dipping as was shown by collections in an area where the exact population of larvae of *Psorophora confinnis* (Lynch-Arribálzaga) was known. Two hollow squares made of wide bands of sheet metal each enclosing 16 square feet were placed in a plot of rice having no larvae of this species present. One square was infested with 16 larvae (one larva to a square foot), and the other was infested with 64 larvae (four larvae to a square foot). Three hours later each enclosure was sampled by taking 100 dips and ten area samples of one square foot. Ten larvae were found in ten area samples in the enclosure containing one larva to the square foot, and 35 larvae were observed in ten area samples in the enclosure containing four larvae to the square foot. One hundred dips from the enclosure containing one larva to a square foot yielded two larvae, and 100 dips from the other yielded 17 larvae. Actual ratio of larvae, in the two enclosures, was 1:4 larvae. Comparison of populations in the two enclosures by means of the area sampler (one square foot) showed a ratio of 1:3.5 larvae. Comparison by means of a dipper showed a ratio of 1:8.5 larvae.

Area sampling of *Psorophora confinnis* was more accurate than dipping under field conditions also. Observations were made at intervals of 30 steps along each contour from one nearest the well to one near the low side of the field. At each station 10 dips and an area sample of one square foot were observed. Toward the upper part of the field where the larval population was visibly less, 28 stations yielded 36 larvae with the area sampler and 15 larvae in 290 dips, or a mean of 1.3 ± 0.3 [2] larvae to

[2] Standard Error.

a square foot and a mean of 0.5 $\pm$ 0.2 larvae in 10 dips. Where the larval incidence was visibly greater, 63 stations yielded 337 larvae in the area sampler and 117 larvae in 630 dips or a mean of 5.2 $\pm$ 0.5 larvae to a square foot and a mean of 1.9 $\pm$ 0.2 larvae in 10 dips. Fifty per cent of the stations in the area of lower incidence yielded larvae when the area sampler was used and only 27 percent showed larvae when the dipper was used. In the area of higher incidence, 95 per cent of the stations were positive when the sampler was used and 73 per cent were positive when the dipper was used.

Summary

An area sampling device consisting of a cylindrical screen cage open at both ends and having a cross-section area of one square foot is an effective means of accurately comparing larval densities in a uniform habitat such as rice fields. More accurate results were obtained in plot and field tests with this device than were obtained with a dipper. In two plots where actual populations of larvae of *Psorophora confinnis* (L.-A.) were as 1 to 4, the area sampler showed the ratio to be 1 : 3.5 larvae, and a dipper showed the ratio to be 1 : 8.5 larvae. Under field conditions where a population of these larvae was low, 50 per cent of the stations yielded larvae with the area sampler, and only 27 per cent showed larvae with the dipper. In an area where larvae were abundant, 95 per cent of the stations showed larvae with the area sampler, and only 73 per cent showed larvae by dipping.

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Undescribed Species of Crane-Flies from the Eastern United States and Canada (Dipt.: Tipulidae). Part X

By Charles P. Alexander, Massachusetts State College, Amherst, Massachusetts

The preceding part under this general title was published in Entomological News, **55**: *241–247*; 1944. Acknowledgment of sources of specimens discussed herewith will be given under the individual species.

Tipula (Arctotipula) thulensis n. sp.

Allied to *besselsi;* size large (wing, male, 17 mm.); general coloration gray, the praescutum with four darker plumbeous gray stripes; vestiture of head and thorax very long and conspicuous, chiefly black, that of the meron paler; antennae black throughout, flagellar segments chiefly subcylindrical, the verticils exceeding the segments; wings with a very faint brownish tinge, stigma oval, dark brown; male hypopygium with the tergite extensively covered with short black setae, somewhat more concentrated near the mesal portion of the lobes; caudal border of tergite with a relatively small U-shaped median notch, no ventral spinous armature; outer dististyle oval, yellow, the tip obtuse; inner dististyle narrow, the flattened beak obtuse; outer margin at near three-fourths the length with a strong, slightly curved black spine; outer basal lobe a slender glabrous blade.

♂. Length about 14 mm.; wing 17 mm.

Frontal prolongation of head relatively short, dark gray, conspicuously clothed with long black setae; nasus conspicuous. Antennae short, black throughout, scape pruinose; flagellar segments short-suboval to subcylindrical, with scarcely developed basal swellings; verticils longer than the segments. Head gray, with abundant black setae; anterior vertex broad; no vertical tubercle.

Pronotum gray, with unusually abundant long dark setae, arranged primarily in a large group on either side. Mesonotum gray, the praescutum with four darker plumbeous gray stripes that are poorly defined against the ground; interspaces, including the lateral border, with abundant erect black setae; posterior sclerites of notum similarly provided with long black setae, parascutella obscure testaceous yellow. Pleura light gray; dorsopleural membrane buffy yellow; propleura, sternopleurite and meral region with long setae, the last group paler in color; pleurotergite and all dorsal pleurites, as well as the actual meron, glabrous. Halteres with stem blackened, knob conspicuously pale yellow. Legs with the coxae light gray, with very long conspicuous pale setae; trochanters gray; femora and tibiae obscure brownish yellow, the tips narrowly blackened; tarsi passing into black; claws (male) with a small tooth. Wings with a very faint brownish tinge to subhyaline; stigma oval, dark brown; cell *Sc* slightly darker than the remainder of ground; veins brown. Squama with setae; veins virtually glabrous; distal section of vein R_{4+5} with scattered trichia almost to base. Venation: *Rs* about three times *m-cu;* petiole of cell M_1 longer than *m*.

Abdomen blackish gray, pruinose, the tergites slightly darker medially; posterior borders of segments narrowly yellow, more extensive on segments three to five; styli yellow. Male hypopygium with the ninth tergite extensively covered with short black setae, somewhat more concentrated near the mesal portion of the lobes; caudal border with a relatively small U-shaped median notch, the adjoining lobes lying slightly more ventrad, jutting beyond the level of remainder of tergite; lobes with abundant erect pale setulae; margin of notch glabrous or with exceedingly small microscopic setulae; no ventral spinous armature, such as in *besselsi* and *suttoni*. Outer dististyle an oval yellow lobe, about one-half longer than its greatest width, the tip obtuse; provided with abundant yellow setae, including a strong row near lower edge. Inner dististyle narrow, the flattened beak obtuse, glabrous; outer margin at near three-fourths the length with a strong slightly curved black spine; surface of blade opposite this spine with five or six black setae; outer basal lobe appearing as a slender glabrous blade.

Habitat.—Canadian Northwest Territories. *Holotype:* ♂. Baffin Island, River Clyde, 70° North Latitude, June 1945 (Jack P. Woolstenhulme); through George F. Edmunds, Jr.

This interesting species is closest to *Tipula* (*Arctotipula*) *besselsi* Osten Sacken, *T.* (*A.*) *besselsoides* Alexander, and *T.* (*A.*) *suttoni* Alexander, differing from all in the structure of the male hypopygium. Lackschewitz (Trav. Ins. Zool., Acad. Sci. URSS, **4**: 288–291; 1936) has placed *T.* (*A.*) *alascaensis* Alexander as a synonym of the north European *T.* (*A.*) *ciliata* Lundstrom, and *T.* (*A.*) *aleutica* Alexander as a synonym of *besselsi,* both quite incorrectly so. It may be emphasized that both *alascaensis* and *aleutica* are entirely valid species. It may further be noted that Lackschewitz's identification of *besselsi* (following Riedel) is not that species but is closer to the present fly though differing in all details of structure of the male hypopygium. *Tipula* (*Arctotipula*) *salicetorum* Siebke, of northern Europe, is more like *besselsi* yet again apparently quite distinct. It appears that there are rather numerous Arctic and Subarctic species in this subgenus and that these do not have the vast range over the Holarctic Region that was believed by Lackschewitz.

Limonia (Geranomyia) remingtoni n. sp.

Size relatively large (wing, male, over 7 mm.); rostrum very long, approximately three-fourths the length of the body; mesonotal praescutum with three dark brown stripes; scutal lobes brownish black; pleura chiefly pale, the ventral sternopleurite a little darkened; femora brown, the tips conspicuously blackened; wings weakly tinged with gray, the oval stigma dark brown; Sc_1 ending about opposite three-fifths *Rs,* cell *1st* M_2 long, exceeding the distal section of vein M_{1+2}; abdominal tergites bicolored, dark brown ringed with yellow; male hypopygium with the lateral tergal lobes low, widely separated, each with a group of blackened setae; ventral dististyle large and fleshy, its area about four times that of the basistyle, rostral prolongation short and stout, the two spines from very unequal tubercles; gonapophyses with the mesal-apical lobe long, straight and slender.

♂. Length, excluding rostrum, about 8 mm.; wing 7.4 mm.; rostrum about 6 mm.

Rostrum of unusual length, as shown by the measurements, being approximately three-fourths the length of remainder of body, pale brown. Antennae black; flagellar segments subcylindrical, with verticils that are shorter than the segments; terminal segment about three-fourths the length of the penultimate. Front, hinder portion of posterior vertex and occiput buffy yellow, the remainder of vertex brown, the narrowed anterior vertex a trifle paler.

Pronotum light testaceous yellow, the scutellum paler yellow. Mesonotal praescutum with three dark brown stripes, the interspaces only a trifle paler; humeral region extensively light yellow, the lateral borders of the sclerite less extensively so; median region of scutum testaceous yellow, the lobes brownish black; scutellum brown; postnotum dark brown, pruinose, pleurotergite abruptly whitened. Pleura, including the dorsopleural membrane, chiefly pale, the sternopleurite weakly infuscated, the metapleura almost white. Halteres short, stem testaceous, knob dark brown. Legs with the coxae greenish, the fore pair a trifle darker; trochanters light green; femora brown, the tips rather broadly and conspicuously black, the amount subequal on all legs; remainder of legs dark brown, the outer tarsal segments passing into black; claws with basal spine. Wings with a very weak grayish tinge, the prearcular field more whitened; stigma oval, dark brown, very conspicuous; veins brown, paler in the prearcular field. Venation: Sc long, Sc_1 ending about opposite three-fifths Rs, Sc_2 near its tip; Rs long; cell *1st* M_2 elongate, exceeding the distal section of M_{1+2} in length; $m\text{-}cu$ at fork of M.

Abdominal tergites bicolored, the basal rings and, on the more proximal tergites, the very narrow caudal margin yellow, the slightly more extensive remainder of each segment dark brown; sternites yellow, on the posterior margins more darkened; eighth and ninth segments yellow, the styli more infuscated, especially the outer faces of the ventral dististyles. Male hypopygium with the tergite transverse, the caudal margin broadly and shallowly emarginate, glabrous except for the low widely separated lateral lobes, each of which bears about 16–18 setae, the more lateral ones stouter. Basistyle small, its ventromesal lobe simple. Dorsal dististyle a strongly curved hook, a little widened on outer third, the distal end narrowed to the obtuse tip. Ventral dististyle large and fleshy, its area about four times that of the basistyle; rostral prolongation very short and stout, with two subequal rostral spines from very unequal tubercles, in one the tubercle about three-fourths as long as the spine, in the other a little more than one-third the spine. Gonapophysis with mesal-apical lobe long, straight, slender.

Habitat.—LOUISIANA. *Holotype:* ♂, Chalmette, Orleans Parish, October 17, 1944 (Charles L. Remington).

I take great pleasure in naming this species for Mr. Charles L. Remington, to whom I am greatly indebted for Tipulidae from various parts of the United States, New Caledonia and the Philippines. It is very distinct from the other regional members of the subgenus in the unusually long rostrum, coloration of the body, wings and legs, and in the structure of the male hypopygium. The darkened stigma is most like that of the otherwise distinct *Limonia* (*Geranomyia*) *perfecta* Alexander (Arizona to Mexico).

Dicranoptycha microphallus n. sp.

Size small (wing, male, under 7.5 mm.); general coloration brownish gray, the praescutum without distinct stripes; antennal flagellum black; legs pale brownish yellow, all pairs generally similar, tips of femora and tibiae undarkened; wings with a faint brownish tinge, the costal border narrowly light yellow; costal fringe (male) short; *m-cu* about its own length beyond the fork of *M;* abdomen brown, the subterminal segments brownish black; male hypopygium with the outer dististyle relatively slender, strongly curved to the long black terminal spine, the surface of outer half with abundant spines but no setulae; gonapophyses dark-colored, the mesal apical lobe relatively slender, the tip obtuse, pale; aedeagus unusually small and slender, especially the outer third or fourth which is pale and even narrower.

♂. Length about 6.5 mm.; wing 7.2 mm.

Rostrum and palpi black. Antennae with scape and pedicel brown, flagellum black; verticils long and conspicuous. Head light gray; anterior vertex broad.

Pronotum gray. Mesonotum brownish gray, the praescutum without distinct stripes, the ground appearing light brown, heavily pruinose; median region of scutum and the scutellum paler brown; pleurotergite similarly pruinose. Pleura yellow, clearest on the ventral portion, somewhat darker on dorsal half, the region below the dorsopleural membrane conspicuously darker. Halteres yellow. Legs with the coxae and trochanters yellow; remainder of legs pale brownish yellow, all similar to one another, the tips of the femora and tibiae undarkened; tarsi passing into brown. Wings with a faint brownish tinge, the prearcular region and narrow costal border light yellow; no stigmal or other darkening; veins light brown, paler in the yellow portions. Costal fringe short. Venation: Sc_1 ending a short distance beyond the fork of *Rs*, Sc_2 a little removed from its tip; *m-cu* about its own length beyond the fork of *M;* cell *1st* M_2 subequal in length to or a trifle longer than M_4.

Abdomen brown, the subterminal segments brownish black, the ninth segment again paler, the basistyles yellow. Male hypopygium with the outer dististyle relatively slender, strongly curved to the long black terminal spine; surface of outer half with abundant semierect spines, those of outer half somewhat more appressed; a few delicate setulae on basal portion of style but lacking among the spines. Inner dististyle longer, very gradually narrowed outwardly, the tip broadly obtuse. Gonapophyses dark-colored, the mesal apical lobe relatively slender, the tip obtuse, pale. Aedeagus unusually small and slender, especially on its outer third or fourth which is even narrower and pale; on basal half the width of the aedeagus is about equal to that of the mesal-apical lobe of the gonapophysis across its base.

Habitat.—Georgia. *Holotype:* ♂, Blood Mountain, September 11, 1945 (*P. W. Fattig*).

I am indebted to Professor Fattig for several very interesting Tipulidae from Georgia. The nearest ally of the present fly is

Dicranoptycha septemtrionis Alexander, of the northeastern United States. This has the hypopygial structure most like that of the present fly but differs in all details, particularly the stouter aedeagus and the different armature of the outer dististyle.

Neolimnophila capnioptera n. sp.

Allied to *ultima;* praescutal stripes distinct; wings narrow, with a strong brownish tinge; vein R_2 more than one-half its own length before the fork of R_{3+4}; cell *1st* M_2 narrow, about equal in length to vein M_4; male hypopygium with the outer spine of basistyle unusually large, about two-thirds as long as the major spine, both spines hairy; inner dististyle with abundant long erect setae.

♂. Length about 7.5 mm.; wing 7.8 × 1.8 mm.

Rostrum blackish gray; palpi black. Antennae black throughout; fusion-segment involving four segments, there being ten free ones beyond; verticils long and conspicuous. Head gray, the central portion of posterior vertex more infuscated.

Pronotum dark gray. Mesonotum dark brownish gray, the praescutum with four brown stripes that are moderately clear-cut, the intermediate pair about twice as wide as the median interspace; posterior sclerites of notum and the pleura clear gray. Halteres pale, knobs weakly infuscated. Legs with the coxae gray pruinose; trochanters obscure yellow; remainder of legs black, the femoral bases restrictedly obscure yellow; fore tibiae without spurs, middle and hind pairs spurred. Wings relatively narrow, as shown by the measurements; strongly tinged with brown, the extreme base more yellowed; stigmal region vaguely more darkened; veins dark brown. Venation: Sc_1 ending just before the fork of *Rs*, Sc_2 longer, placed near its extreme tip; vein R_2 more than one-half its own length before the fork of R_{3+4}; cell *1st* M_2 long and narrow, about equal to vein M_4; cell M_1 subequal to its petiole; *m-cu* about its own length beyond the fork of *M;* vein *2nd A* straight, the cell relatively narrow.

Abdomen, including hypopygium, brownish black. Male hypopygium with the spines near the proximal end of basistyle more nearly equal in size than is the case in *ultima,* the outer one about two-thirds the length of the major more basal spine and fully as stout, both provided with appressed setae. Inner dististyle with the elongate erect setae more abundant, erect and conspicuous.

Habitat.—Georgia. *Holotype:* ♂, Winder, Barrow Co., November 8, 1945 (*P. W. Fattig*).

Neolimnophila capnioptera, while allied to the common and wide-spread *N. ultima* (Osten Sacken), differs in the narrow darkened wings and in the details of structure of the male hypopygium, particularly the spines of the basistyle and the inner dististyle. In Japan and China, rather numerous further species of the genus occur and it seems possible that still other forms may be found to occur in the southern Appalachians, thus conforming to the type of geographical distribution found in many genera of plants and certain groups of Tipulidae (as *Dolichopeza: Oropeza; Dicranoptycha*).

Whether the genus *Neolimnophila* Alexander should be placed in the tribe Hexatomini or in the Eriopterini still remains in question. The middle and hind tibiae have long conspicuous spurs which is definitely a Hexatomine character but the affinities with such other groups as *Chionea* Dalman, *Cladura* Osten Sacken and *Crypteria* Bergroth seem so obvious that for the time being, at least, it seems better to retain all of these groups in the more primitive Eriopterini.

Personal

Dr. J. McDunnough, outstanding specialist on North American Lepidoptera and recently retired chief of the Systematic Unit of the Division of Entomology, Canadian Department of Agriculture, has accepted a Research Associateship at the American Museum of Natural History, New York City, where he will continue his studies on North American moths. His work will be of particular value to the Museum since it has been many years since there has been a moth specialist on the staff of this institution. Dr. McDunnough's first research project will be to complete a revision of the large and difficult geometrid genus *Eupithecia.*

Two New Stenosphenus (Coleoptera: Cerambycidae)

By JOSEF N. KNULL, The Ohio State University *

In identifying the *Stenosphenus* in our collection with the recent synopsis by Fisher,† I found that the two following species did not agree with the described forms. Mr. W. S. Fisher kindly compared these and agreed that they were new.

Stenosphenus piceus n. sp.

Male. Slender, elongate; shining black throughout.

Head irregularly, coarsely punctate, median groove between antennae; antennae extending over two segments beyond elytra when laid over top, scape stout, coarsely punctured, other segments finely punctate, segments three to seven inclusive spinose at apices, spines decreasing in length apically; surface densely clothed with short pubescence, intermixed with much longer hairs.

Pronotum wider than long, widest about middle, wider at base than at apex; sides broadly rounded; disk convex, with transverse depression at base; surface glabrous, with irregularly placed large and small punctures in all but central area, a long white hair arising from each puncture. Scutellum transverse, rounded in rear, densely pubescent.

Elytra at base wider than widest part of pronotum; sides subparallel, broadly rounded on apical fourth to sinuate apices which are spinose on sutural and outer angles; surface densely, uniformly, coarsely punctured, separated by about their own diameters, a short semi-erect white hair arising from each puncture.

Abdomen beneath smooth, finely, sparsely punctate. Prosternum smooth in front and in middle, separating to densely, coarsely punctured areas.

Length 8.7 mm.; width 2.3 mm.

* Contribution from Department of Zoology and Entomology.

† W. S. Fisher, Jour. Wash. Acad. Sci. 36, 86–94: 1945.

Female. Differs from male by antennae not extending to apices of elytra.. Prosternum smooth in front and middle with finely, densely punctured pubescent area on each side.

Holotype ♂ and *allotype* labeled Davis Mts., Texas, July 1, D. J. & J. N. Knull collectors. *Paratypes,* Davis Mts., July 7, H. A. Wenzel, and Chisos Mts., Tex., July 17, 1946, D. J. & J. N. Knull. Paratype in H. W. Wenzel collection, The Ohio State University, rest of type material in collection of author.

According to Fisher's key this species would run to *S. dolosus* Horn. Aside from differences in color, pubescence of elytra is shorter, apices lack prominent spines, and pronotum is more densely punctured.

Stenosphenus texanus n. sp.

Male. Slender, elongate, shining, prothorax all but anterior margin and femora all but apices red, rest of insect black.

Head irregularly coarsely punctured, median groove between antennae; antennae extending over three segments beyond apices of elytra when laid over top, scape stout, coarsely punctured, other segments finely punctate, segments three to seven inclusive spinose at apices, spines decreasing in length apically, surface clothed with short pubescence, intermixed with longer hairs.

Pronotum wider than long, widest in middle, wider at base than at apex; sides broadly rounded; disk convex, with transverse depression at base; surface glabrous, with irregularly placed large and small punctures in all but central area, a long white hair arising from each puncture. Scutellum broadly rounded in rear, densely, finely pubescent.

Elytra at base wider than middle of pronotum; sides subparallel, rounded in apical quarter, apices truncate, sutural and outer angles spinose; surface densely, uniformly punctured, punctures separated by less than their own diameters, a short semi-erect hair arising from each puncture.

Abdomen beneath, smooth, shining, sparsely, finely punctate. Prosternum smooth in front, a densely, coarsely punctured area on each side separated in middle by transverse rugulose area.

Length 11.2 mm.; width 2.8 mm.

Female. Antennae extending to about apices of elytra. Prosternum transversely rugulose.

Holotype male and *allotype* labeled Davis Mts., TEXAS, July 3, D. J. & J. N. Knull collectors. *Paratypes* with same data; also from same locality, July 7–27, H. A. Wenzel and Chisos Mts., Tex., July 9, 1936, D. J. & J. N. Knull. Paratypes in H. W. Wenzel collection, The Ohio State University, rest of type material in collection of writer.

According to Fisher's key this species runs to *S. rossi* Lins. It differs by having antennae longer than body in male; pronotum more densely punctured and all of femora in part red.

Current Entomological Literature

COMPILED BY CHARLES HODGE IV, RAYMOND Q. BLISS, EDWIN T. MOUL, MAURICE E. PHILLIPS AND HENRY K. TOWNES JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, 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. 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: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of Journals given at the end of the literature. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). 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).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Anon.—Frank Ellsworth Blaisdell, Sr. (Obituary). [27] 22: 99. **Anon.**—Mosquito Psychology. [Time Magazine] Oct. 14, 1946. **Adams, C. V.**—A Method of Marking Insects. [13] 79: 169–171. **Chen, S. H.**—Evolution of Insect Larva. [35] 97: 381–404. **Cockerell, T. D. A.**—N. Sp. and Sub sp., Collected in a Month in Guatemala. [22] 54: 203–206. **Collin, J. E.**—On the Selection of a Genotype for a Genus in Which No Named Species Was at Any Time Included by Its Author. [22] 54: 207–210. **Dibb, J. R.**—Nomenclature (II). [14] 82: 253–254.

Fletcher, F. C.—DDT and the Insect Collection. [38] 20: 32. **Fletcher, F. C.**—Non-professional Entomology. [38] 20: 12–13. **Grant, C.**—Spirit. [21] 38–48. **Kerrich, G. J.**—On Some Terms Used in Insect Morphology and Taxonomy. [14] 82: 252–253. **Moore, G. A.**—Presidential Address. [17] 76: 5–9. **Oman, P. W. and Cushman, A. D.**—Collection and Preservation of Insects. [36] 601: 1–42, ill. **Pradhan, S.**—The utility of statistical methods in entomological research. [20] 7: 243–247. **Romney, Van E.**—The insect community found on a perennial peppergrass in southern New Mexico and s.w. Texas. [12] 27: 258–262. **Snowball, G. J.**—A consideration of the insect population associated with cow dung at Crawly, West Australia. [23] 28: 219–245, ill. **Teale, E. W.**—Insect trapper. [18] 8: 74–77, ill. **Weiss, H. B.**—The contributions of physicians to entomology in the United States from 1723 to 1865. [22] 54: 309–314.

ANATOMY, PHYSIOLOGY, MEDICAL—Bellomy, M. D.—Cardiographs for Grasshoppers. [19] 11: 8–10, ill. **Dobzhansky, Th.**—Complete reproductive isolation between 2 morphologically similar species of Drosophila. [12] 27: 205–211, 1946. **Grant, C.**—Transmetamorphic Memory vs. Instinct. [21] 38: 46–47. **Hoffman, C. H. et al.**—Field Studies on the Effect of DDT on Aquatic Insects. [U.S. D.A. Bur. of Ento.] E-702: 1–20 + ill. and 4 tables. **Lempke, B. J.**—Some remarks on Lasiocampa quercus, L. [16] 58: 133–135. **Waloff, N. and Richards, O. W.**—Observations on the behaviour of Ephestia elutella Hübner (Phycit) breeding on bulk grain. [35] 97: 299–335.

ARACHNIDA AND MYRIOPODA—Chamberlin, R. V.—A New Chilopod Genus of the Family Sogonidae. [11] 78: 69–71 (k). **Chickering, A. M.**—The Salticidae of Panama (Spiders). 97: 5–474 (k*), ill., 1946. **Cooley, R. A.**—Ixodes holdenriedi a N. Sp. of Tick from a Pocket Gopher in Calif. (Acar. Ixod.). [27] 22: 103–104, ill. **Farner, D. S.**—A New Host and Locality Record for the Trombiculid Mite W. americana Ewing w/a note on its Morphology. [29] 48: 185–186. **Rapp, J. L. C.**—List of spiders taken in Champaign Co., Ill. during the fall and winter of 1944–1945. [22] 54: 315–319. **Southcott, R. V.**—Studies on Trombidiidae (Acarina). [30] 70: 312–316, ill. **Southcott, R. V.**—On the family Smarididae (Acarina). [30] 70: 173–178 (k), ill. **Turk, F. A.**—On 2 new false scorpions of the genera Tridenchthonius and Microcreagris. [2] 13: 64–70, ill.

THE SMALLER ORDERS.—**Back, E. A.**—Silverfish. [U.S.D.A. leaflet 149] : 1–4. **Bohart, R. M.**—A N. Sp. of Halictophagus Parasitic on Cercopidae (Strep., Halic.). [29] 48: 200–202. **Davis, C.**—Revision of the Embioptera of Western Australia. [23] 28: 139–147, ill. **Despax, R.**—Contribution à l'étude du genre Isopteryx Pict. (Chloroperla Newm.) (Plecoptera). [10] 76: 205–233 (*), ill. **Despax, R.**—Valeur des caractères sexuels pour la distinction des espèces de genre Perla Geoffr. (Plecoptera). [10] 77: 65–74, ill. **Freeman, R. B.**—Pitrufquenia coypus Marelli. (Mall., Gyrop.) an Ectoparasite on Myocastor coypus Mol. [14] 82: 226–227. **Ross, H. H.**—Hydropsyche Antilles, an unusual N. Sp. from Santo Domingo (Trich., Hydro.). [29] 48: 182–184. **Ross, H. H.**—A Review of the Nearctic Lepidostomatidae (Trich.). [3] 39: 265–291 (k*), ill.

HEMIPTERA.—**Caldwell, J. S.**—Notes on Haplaxius Fowler w/desc. of N. Sp. (Homo. Ciyi.). [29] 48: 203–206. **Carvalho, J. C. M.**—Mirideos neotropicais XXIV: Generos Cystotylus Bergroth, Peritropis Uhler e Poeas Distant (Hemiptera). [39] 67: 1–10, ill., 1946. **China and Fennah.**—On the genera Tetigonia Geoff., Tettigonia F., Tettigoniella Jac., and Iassus Fab. (Hemiptera, Homoptera). [2] 12: 707–712. **Evans, J. W.**—A Natural Classification of Leaf-Hoppers (Homo., Jass.,), Part 2, Aetalionidae, Hylicidae, Eurymelidae, [35] 97: 39–54, ill. **Evans, J. W.**—New leaf-hopper (Homoptera: Jassoidea) from W. Australia. [23] 27: 143–163, ill. **Hsiao, T.**—The genus Neella Reuter, with descriptions of four new species (Miridae). [24] 36: 385–387 (k*). **Kullenberg, B.**—Studien über die Biologie der Capsiden. [40] 23: 1–522, ill., 1944. **Metcalf, Z. P.**—A N. Sp. of Delphacodes from Alberta (Fulgor.). [11] 78: 63–65, ill. **Monte, O.**—Duas N. Sp. de Tingitideos da Bolivia. [6] 5: 27–28. **Ribaut, H.**—Demembrement des genres Athysanus Burm. et Thamnotettix Zett. (Homoptera: Jassidae). [10] 77: 259–270 (k). **Torre-Bueno, J. R. de la**—A N.A. Dieushes (Heter. Lygae, Beosini). [9] 41: 126–128 (*). **Torre-Bueno, J. R. de la.**—A Synopsis of the Hemiptera-Heteroptera of America North of Mexico, Part III, Family XI—Lygaeidae. [15] 26: 1–40; 41–88 (to be contd.).

LEPIDOPTERA.—**Beall, G.**—Seasonal variation in sex proportion and wing length in the migrant butterfly, D. plexippus (Dan.). [35] 97: 337–53. **Bell, E. L.**—Some Corrections to the "Studies in the Pyrrhopyginae." [22]

54: 199–201. **Eliot, N.**—Continental Drift and Precis lavinia. [13] 79: 225–228. **Hinton, H. E.**—On the Homology and Nomenclature of the Setae of Lepidopterous Larvae, with Some Notes on the Phylogeny of the Lepidoptera. [35] 97: 1–37, ill. **Lempke B. J.**—(See under Anat, etc.) **McDunnough, J.**—Note on Certain Dichrorampha Sp. (Lep. Lasp.). [11] 78: 65–67 (*). **McDunnough, J.**—New N.A. Eupithecias, II (Lep., Geometr.). [11] 78: 86–89. **McDunnough, J.**—Some Coleophoridae of Eastern Ontario and N.W. Nova Scotia. [11] 78: 54–63 (*), ill. **McDunnough, J.**—The Spp. of the Truncata Group of the Genus Dysstroma (Lep. Geometr.). [11] 78: 71–78. **Palmer, E. L.**—Some butterflies and moths. [26] 39: 417–424, ill. **Sperry, J. L.**—Two Apparently New Geometrid Moths from Southern California. [9] 41: 137–139. **Turner, A. J.**—Revision of Australian Lepidoptera. Oecophoridae XIII. [30] 70: 93–120 (k*). **Waloff, N. and Richards, O. W.**—(See under Anat., etc.)

DIPTERA—Alexander, C. P.—Records and Descriptions of Neotropical Crane-flies (Tip.), XXI. [22] 54: 293–397 (*). **Alexander, C. P.**—New or little-known Tipulidae (Dip.), LXXVI. Neotropical Species. [2] 12: 734–765. **Ashby, D. G. and Wright, D. W.**—The immature stages of the carrot fly. [35] 97: 355–379. **Carrera, M. e. Lane, J.**—Diptera de Caiboá (Est. do Paraná) (Dip. Stratiomi, e Taban.). [33] 4: 127–136, ill. **Carrera, M.**—Duas N. Sp. de Cyrtidae (Dip.) de Brasil. [28] 7: 79–86, ill. **Carrera, M.**—Pequenas Notas Sobre Asilidae (Dipt.). [28] 7: 93–100 (S), ill. **Carrera, M.**—Sobre Algumas Esp., do Genero Atoniomyia Herman 1912 (Asil.). [28] 7: 113–128 (Sk*), ill. **Cerqueira, N. L. and Boshell-Manrique, J.**—Note on Haemagogus Spegazzinii Brothes, 1912 (Culic.). [29] 48: 191–200. **Dobzhansky, Th.**—(See under Anatomy, etc.). **Hardy, G. H.**—Miscellaneous notes on Australian Diptera, XI. Evolution of characters in order: venation of the Nemestrinidae. [30] 70: 135–146 (k), ill. **Hart, T. A.**—Breeding Habits of A. farauti (A. punctulatus var. moluccensis) in New Guinea. [25] 6: 89–90. **Huckett, H. C.**—The Subgenera Craspedochaeta and Acrostilpra in N.A. Genus Hylemyia Sens. Lat. (Musc.). [9] 41: 110–125, Pl. III (k*). **Hull, F. M.**—The Genus Lepidostola Mik. [1] 1326: 1–15 (k*), ill. **Johannsen, O. A.**—Revision of the North American species of the Genus Pentaneura (Tendiped: Chironom.). [22] 54: 267–289 (k*). **King, W. V.**

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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.

Lepidoptera—Wanted, Hyloicus (Sphinx) and other Sphingidae in exchange for U. S. and Wisconsin Lepidoptera. Wm. E. Sieker, 119 Monona Ave., Madison 3, Wisconsin.

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Wanted—Ataenius and allied Aphodiinae from all parts of the world, especially Mexico, Central and South America. O. L. Cartwright, Clemson, S. C.

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