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CHARLES ROBERT OSTEN SACKEN,
1828–1906

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E. T. CRESSON, JR., Associate Editor

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JANUARY, 1928

ENTOMOLOGICAL NEWS

Vol. XXXIX No. 1

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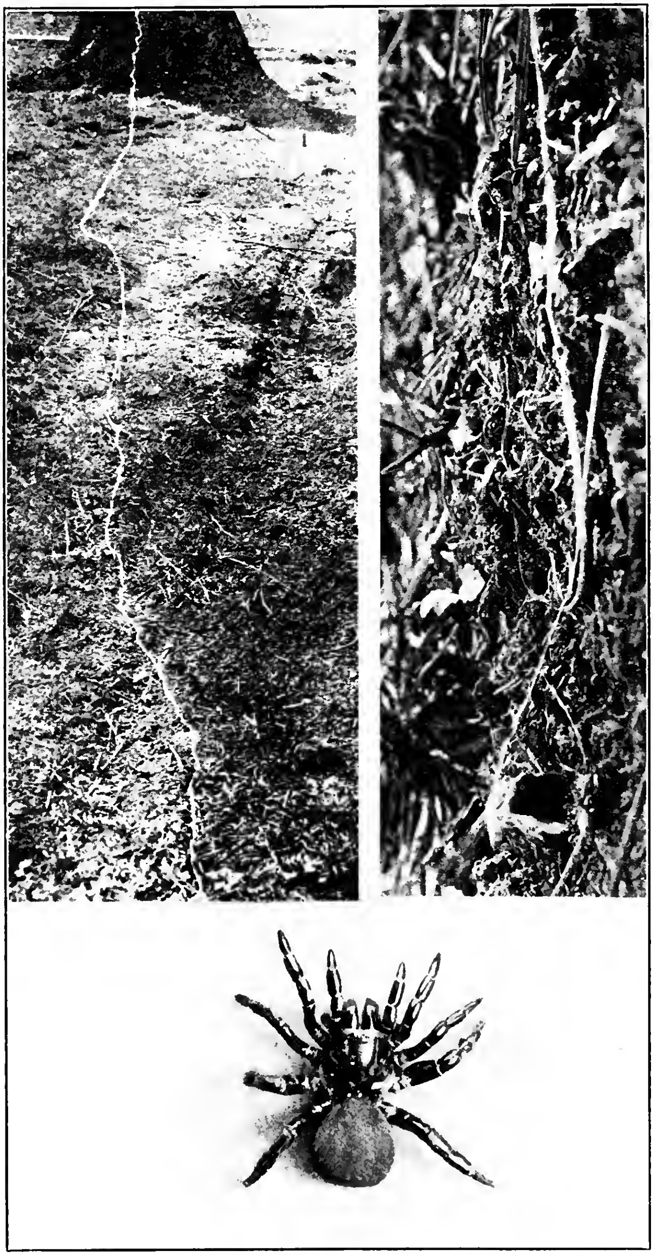


TRAPDOOR SPIDER, PACHYLOMERUS CARABIVORUS.—BAERG.

ENTOMOLOGICAL NEWS

VOL. XXXIX JANUARY, 1928 No. 1

Some Studies of a Trapdoor Spider.† (Araneae: Aviculariidae).

Plate I.

By W. J. BAERG, University of Arkansas, Fayetteville, Ark.

The trapdoor spider, *Pachylomerus carabivorus* Atk.*, was described by George F. Atkinson, in 1886[1]. He made a very careful study[2] of the building of the nest, and especially of the trapdoor. In addition, he made some observations on the feeding habits of the trapdoor spider. Although this species has so far been recorded only from North Carolina and District of Columbia, it is probably quite common all through the southern states. In and near Fayetteville, Arkansas, it is found in considerable numbers. The studies that I have made deal mainly with the ballooning habit of the young and with the effect of the poison and habits of defense of the adult spiders.

For about a week in March (from about the 15th to the 22nd) one can find on the university campus, as well as elsewhere in the neighborhood, numerous silken bands which are the trails laid down by the young trapdoor spiders. These silken bands, about two mm. in width, are most easily seen on the bark of trees. From the base of the tree the trail can usually be traced to the nest of the mother. On the ground the bands are not so regular as on the trees, having a tendency to become so thin in places that they are difficult to trace. As a rule, the silken band at its origin is fastened to the trap door of the mother's domicile.

During the spring of 1927, and the one preceding, about thirty of these trails were observed. They varied in length on the ground from ten feet to sixty-eight feet, with an average of about twenty feet. The general direction is almost always

†Research Paper No. 56, Journal Series, University of Arkansas.

*Determined by Alexander Petrunkevitch, Yale University, New Haven, Connecticut.

a straight line to the nearest tree of considerable size. A tree less than six inches in diameter is usually ignored, even if it is much nearer than some larger tree. No evidence could be found indicating that the spiders prefer going in any one direction.

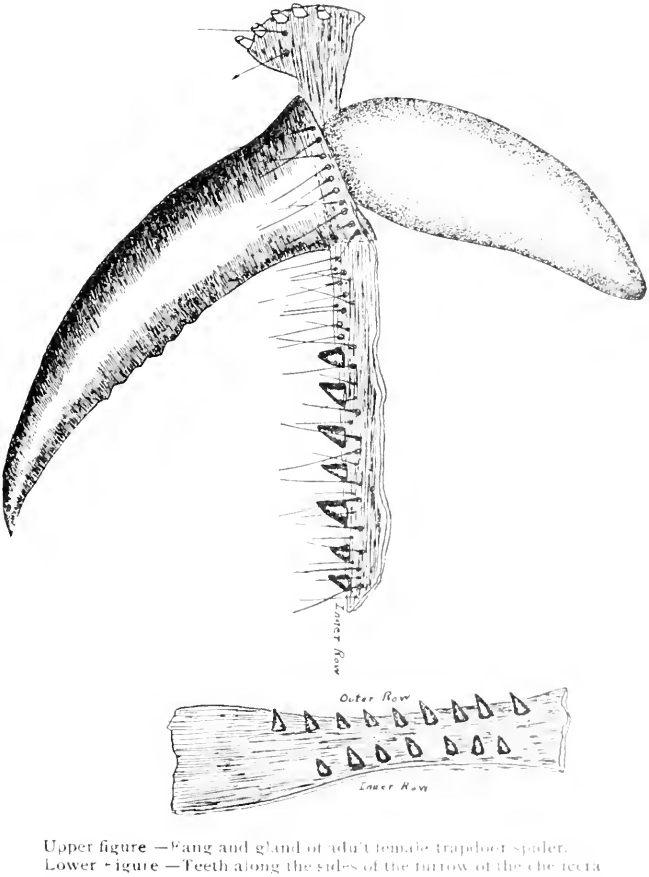
On the trees the trail leads fairly straight up to a height depending, it seems, largely on the velocity of the wind at the time when the spiderlings are travelling. Six trails examined for this feature led to heights varying from thirteen to thirty feet. One trail made on a very windy day faded out at a height of thirteen feet from the ground. As a rule the trail ends on a lateral limb.

When setting out on the aeronautic expedition, the young spiders, varying in number from eighty to one hundred and five, according to a few counts, leave their maternal home between nine o'clock and ten o'clock A. M., travelling single file, in greater or smaller squads, so that the whole family is spread out over a distance of four to six feet. Limited observations indicate that they go at a rate of about twenty inches in ten minutes, and as a rule reach the desired height between twelve and one o'clock P. M. Having reached this height, the young spiders spread out over a distance of about three feet and each one proceeds to spin out a thread of silk, which when having sufficient buoyancy carries the spiders off and out into the world. I have not actually seen the spiders being wafted away, but the conclusion seems obvious.

In only one observed instance have the young spiders selected a building in order to reach a higher altitude. The nest was located near one of the university buildings, and on leaving the nest the spiders took a direct course toward a narrow part of the stone foundation between two windows. Arriving here they were apparently disappointed and took a course parallel to the wall of the building. After going a short distance they came to the wall of a projecting part, which must have added to already considerable confusion, so that instead of going to a tree quite near by here, they went up on the side of the building to a height of about eighteen feet, whence they sailed.

An adult female trapdoor spider when first disturbed or annoyed appears very pugnacious. A cockroach held within reach of the spider is promptly seized with the fangs and held for several minutes. On being released the cockroach runs off as if uninjured.

A young white rat (about six months old) was bitten five



Upper figure —Fang and gland of adult female trapdoor spider.
Lower figure —Teeth along the sides of the furrow of the chelicera

or six times. The spider had no difficulty in penetrating the skin on the inside of the hind leg. While the punctures were clearly visible, there was no trace of any liquid having come from the fangs. The rat showed no symptoms other than squealing just when it was bitten.

In view of the fact that the spider has well developed glands above the fangs, but apparently did not inject any poison when biting, it seemed desirable to make an injection of the contents of the glands. Since the glands are not readily taken out, the entire chelicerae were removd and ground up in one c.c. of distilled water. This extract, like that made of the glands from the locally common tarantula (*Eurypelma californica* Ausserer), has a decided tendency to form froth. As in the previous test, the extract when injected into the hind leg of a young white rat produced no noticeable effect. The rat did not even lift the leg immediately after the injection.

When trying the bite of the trapdoor spider on myself, I allowed the fangs to be inserted on the inside of the third finger and remain for about a minute and a half. Aside from the two small punctures there were no appreciable effects.

While making these poison tests, I learned with some surprise that the pugnacity which the spider presents when it is first disturbed is of very short duration. The spider rapidly becomes more and more sullen, so that if it is not induced to bite at once, it will refuse to do so. In this sullen attitude, the spider soon becomes limp and behaves as if it were about to expire from too rough handling. When put back in the jar containing its nest, it soon regains the former vigor and when disturbed again will appear prepared to fight. Whether this assumed debility has been developed in an attempt to deceive a predatory wasp, or whether it is a resignation of the inexorable fate as Fabre[3] has suggested, I am not prepared to say.

REFERENCES TO LITERATURE.

1. ATKINSON, GEORGE F., 1886, Entomologica Americana, Vol. II, p. 133.

2. ID., 1886,. A new trapdoor spider. Amer. Nat., Vol. 20, p. 583-593.

3. FABRE, J. H. Life and love of an insect, p. 168.

EXPLANATION OF PLATE I.

Upper left: Trail leading over the ground and up a tree.
Upper right: Trail, or silken band, attached to trap door.
Lower: Adult female trapdoor spider.

Coleoptera as Guests of other Insects and Animals.*

By W. Knaus, McPherson, Kansas.

A worth-while but only occasionally worked field for energetic collectors of Coleoptera, is to be found in a careful examination of the homes and burrows of other insect orders, and in the nests and burrows of animals. Herewith are a number of examples illustrating the truth of the above statement.

Hymenoptera, especially ants and wild bees have as their guests and parasites, various genera and species of Coleoptera. The solitary wild bee, *Anthophora occidentalis* Cresson has as a parasite in Central Kansas, and extending west and southwest into the States of Colorado, Oklahoma, Texas and New Mexico, that abnormal larva-like Sitarinid, *Leonidia neomexicana* Cockerell. The minute but very active larva of the *Leonidia* fastens itself to a hair on the leg of the bee and is carried into the burrow and the cell, where it remains, and feeds on the food stored for the bee larva, transforms into a pupa and emerges as an imago a week or ten days before the unparasitized bee pupa emerges as an imago and begins to construct and store her cell for the brood of next year; and so the process continues until the bee colony is almost or quite exterminated. Colonies of *Anthophora* and *Leonidia* have been examined in McPherson, Ellsworth and Kiowa Counties, Kansas, and they can be found in many of the Western and Southwestern counties of the state. A similar parasite, *Hornia minutipennis* Riley, is an unwelcome guest of a wild bee in Missouri. Another parasitic species is *Tricrania sanguinipennis* Say in Massachusetts, and still another Sitarinid is *Tricraniodes stansburyi* Hald. in Utah. The larvae of other genera of Meloidae are also parasitic on grasshoppers.

Many species of Staphylinidae are welcome guests of ants. A notable example coming under my observation was one of the numerous genera and species of the Myrmedoniini, a Myrmicophilous tribe of the Staphylinidae. A sudden rise in June, 1922, in a small stream in the eastern edge of McPherson,

*Presented at the meeting of the Kansas Academy of Science, April 15, 1927.

due to a heavy rain caused an overflow on a small piece of low ground, and Professor H. H. Nininger, of McPherson College, while walking along the edge of the overflow saw a colony of small black ants being drowned out of their home. He gathered the drowning colony in his handkerchief, and took them to his office. While sorting them over he noticed a few very small Staphylinids with the ants. These he turned over to me, and I sent them to Professor W. M. Mann of the Division of Entomology, U. S. National Museum, Washington, D. C., who pronounced them to be *Ecitonidia wheeleri* Wasmann, and the ants to be *Eciton schmitti* Emery. The McPherson specimens of *Ecitonidia* were the third to be reported to the Department. The type locality was Austin, Texas. *Ecitonidia wheeleri* closely mimics in appearance its *Eciton* host.

Many species of Pselaphidae are also guests of ants. One species of ants so far as I have observed entertains only one species of Pselaphid guests. *Fustiger knausi* Sch. was taken by the writer in 1904-05 in the nests of *Lasius americanus,* in the Sacramento mountains of New Mexico, at Cloudcroft, at an elevation of 9,000 feet, in June. Another Pselaphid taken at Cloudcroft was *Euplectus acomana* Csy. These were found in the burrows of Scolytids, under the decaying bark of dead spruce logs and stumps.

A tribe of the Scarabaeidae, Cremastocheiliini, has many species as the guests of ants. Those coming under my notice were *Trinodia setosifrons* Csy., Western Kansas, on the mounds of the mound-building prairie ants, and *C. quadricollis* Csy., a specimen of which was taken early in April, 1902, near Waco, Texas, also on a mound of the mound-building ant.

Coprophagous Scarabaeidae frequent the burrows and nests of various animals, and the nests even of the larger birds. The insect guests of the Florida Land Tortoise were collected and described by H. G. Hubbard in 1893. Some of the Coleoptera taken from the burrows of the Tortoise were *Copris gopheri, Onthophagus polyphemi, Aphodius troglodytes,* and a species of Staphylinid, *Philonthus gopheri;* also a species of Histerid, *Chelyoxenus xerobatis.*

The burrows and nests of the Prairie Dog should yield a number of genera and many new species of Coleoptera to the collector who will expend the energy necessary to excavate the burrows and homes of this little rodent. So far I know of but little actual work having been done in Kansas, to discover the Coleopterous guests of this widely distributed animal. Last June, Professor W. J. Brown of the A. & M. College at Stillwater, Oklahoma, visited the Miller Bros. 101 Ranch in Noble County, and using a small hand trowel removed the soil an inch in depth from the bottom of several burrows as far as he could reach. From the dirt so removed he collected a number of new species of Coleoptera, among them being a fine large *Onthophagus*, two *Aphodius* and one or more Staphylinidae. With such results obtained by a few hours' work in Oklahoma, southwest Kansas Dog towns should prove an attractive field for work with satisfactory returns in undescribed new species. Not only do the Prairie Dog burrows hold promise of rich returns in new species, but the burrows and dens of other and larger animals undoubtedly shelter many insect guests.

Even the birds should not be forgotten when looking for new or rare Coleoptera. Professor R. H. Beamer, of the University of Kansas, found that handsome Chrysomelid, *Griburius montezuma* (Suffr.) mating in buzzards' nests in Kiowa and Ellsworth counties, Kansas, the first half of July, 1923, and collected and observed the transformation of the pupae into the imagos the following June and July. This species is a leaf eater as a perfect insect but its larvae are coprophagous. I have in my collection a species of *Trox* taken from a crow's nest near Ottawa, Kansas, by Howard K. Gloyd, of Ottawa University.

The successful collector of insects and especially of Coleoptera should leave "no stone unturned", no vegetation unsearched, no burrow uninspected, if he desires to add to his collection the new and rare species, and to himself and others some modicum of knowledge of the life and habits of the insect world; some of it so intricate and wonderful, that it seems to have passed the border line of instinct into the realm of reason.

The Habitat of Tropidischia xanthostoma, Scudder (Orthop.: Tettigoniidae).

By B. B. Fulton, Iowa State College, Ames, Iowa.

Of all the species of western Orthoptera which I hoped to add to my collection, while at Corvallis, Oregon, the unique *Tropidischia xanthostoma* Scudder, proved to be the most elusive. The meager records concerning the few specimens housed in museums and the locality labels with three specimens in the Oregon Agricultural College collection informed me that it inhabited forested country, but that was all. I wanted it because it is rare and because it stands in a group by itself, but more than that I wanted to find out how such an extraordinary insect with such attenuated appendages lived. From its appearance I expected it to have habits similar to other cave and camel crickets of the Rhaphidophorinae. There were no caves, but loose bark and hollow trees were plenty. I rolled over old logs by the scores and hacked at loose bark until I felt ashamed for disfiguring the forests—still no *Tropidischia*. Smaller Rhaphidophorinae I found in animal burrows and under stones and logs, but not in the fir forest where *Tropidischia* had been caught. I had almost come to the conclusion that it must inhabit the tops of these loftiest of trees and supposed that the occasional specimens taken were some that had fallen down. I was contemplating the difficulties of looking for it in such places when my search came to an unexpected end.

The Biological Club of the College was holding its annual spring field trip in a delightful valley in the coast mountains, where the old government military trail crosses the headwaters of the Yaquina River by an ancient log bridge. We were just breaking our camp in the premature dusk of the deep fir forest when Professor H. M. Wight, zoologist, approached me with something in his hand. When I saw two thread-like antennae protruding between thumb and finger I knew that the thing I wanted had been found. It had been caught at the edge of the log bridge. I had never thought of looking under bridges for them, but now it seemed a most likely place.

Armed with a flash light and killing bottles we descended onto the slippery, mossy rocks under the bridge and looked back into the almost totally dark spaces between the great supporting logs where they joined the bank. The first flash of light revealed several of the shadowy creatures back beyond reach, suspended by their fantastically long legs to the underside of the floor logs. Then we began to see other large ones and innumerable little fellows. Here were more specimens of this insect than the museums of the world contained. They stood motionless except for their wig-wagging antennae. Some of them started moving toward the inaccessible recesses so we began to catch those within reach.

They were not difficult to catch for they did not attempt to jump unless the hand touched their antennae. They could run rapidly and those that started for the far corners soon escaped. We filled several killing bottles with the larger ones which I thought at the time were adults, but which proved to be in the last nymphal instar.

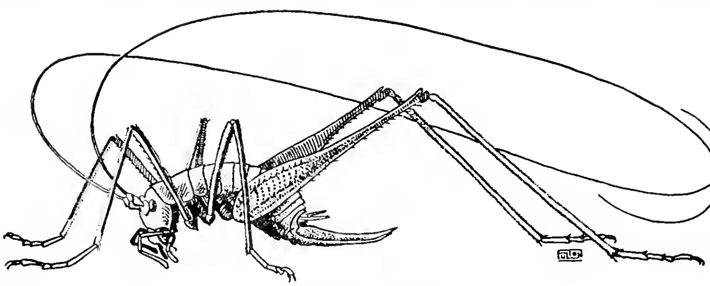
On the following day, May 25, 1924, I went out to examine bridges over small mountain streams near Corvallis. *Tropidischia* was found under a low log bridge in the fir forest and under a plank bridge with steel girders in a place which was formerly forested but now a quarter-mile removed from the nearest patch of woods. One adult was captured under the last. Bridges over the same streams but located in the open valley plain and surrounded by prairie or oak woods did not harbor the insects, even though some had ideal dark retreats under them.

Since bridges are not natural features I attempted to find the species beneath undercut banks, under fallen trees and in other dark retreats near the water, but the search revealed nothing. Other log bridges in the fir forest were visited. Every one which had almost totally dark spaces under it contained a colony of these shadowy crickets, always standing about in groups, apparently with nothing to do.

I left Oregon two weeks after finding the species so my observations on it are limited, but during the last week I took time to make a night visit to one of the bridges where I had found it before. As I suspected the insects were night prowlers. A number of the large nymphs were wandering about the water's edge. Another was standing by a small mushroom that had a chewed place in the edge—circumstantial evidence which I did not have time to verify. The light from the pocket flash sent most of the insects running up the bank to their cave so I did not learn much concerning their food habits. If they feed on fungi they are well supplied from the hanging gardens under the log bridges. My guess is that they are as omnivorous as many other darkness-loving Rhaphidophorinae.

I collected two adult specimens before leaving Oregon and have received a few others from H. M. Wight and T. M. Thompson. The adult stage is more common in the middle of the summer. The college collection contained adults taken in August and September and a half grown nymph taken in November. The prevalence of both very small and very large nymphs at one time indicates that there are probably two rather distinct broods but nothing is known about the length of the life cycle.

The living insects have a dark, rich, chocolate-colored body with a velvety appearance. The legs and head are a lighter,



Tropidischia xanthostoma Scudder.

almost purplish brown; the tips of the tibiae and tarsi of the fore and middle legs are pale, somewhat flesh-colored. The antennae have pale annulations. The clypeus and mouth parts are dull yellowish; palpi pale flesh color with brownish tinged areas. The most unique feature about the insect is the shape of the tibiae which are perfectly square in cross section and each of the four corners is finely serrated with short spines.

The antennae of an adult male measured 120 mm. in length. The hind femora of the same were 30 mm. long and the tibiae 37 mm. It would be possible for this insect to extend itself to a length of eight inches from tips of the antennae to the hind tarsal claws, while the body itself even in the living insect would measure only about 20 mm. The smallest nymphs found had bodies 6 mm. long; hind femur 8.5 mm.; hind tibiae 11 mm., and antennae 40 mm.

The species was described by Scudder[1] from one male taken under a large stone at Crescent City, California. In a later publication Scudder[2] also records specimens from Mendocino, California, and Philomath, Oregon. Specimens listed by Caudell[3] extend the known range from Los Angeles, California, to British Columbia. Oregon specimens that I have examined besides those collected by myself are from Mary's Peak and Philomath in the Coast Range, Bohemia and Cascadia in the western part of the Cascades, and Waldport on the coast. All other localities mentioned above and all specific localities listed by Caudell are on the coast.

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[1]Scudder, S. H. Proc. Boston Soc. Nat. Hist. 8:12, 1861.
[2]Scudder, S. H. Canad. Ent. 31:117, 1899.
[3]Caudell, A. N. Proc. U. S. Nat Mus. 49:657, 1916.

Two New Cerambycidae (Coleop.).

By J. N. Knull, Pennsylvania Bureau of Plant Industry, Harrisburg, Pa.

Elaphidion (Anoplium) masoni n. sp.

Brunneus above and below, rather robust, head with coarsely granulate prominent eyes, surface with irregular large punctures, crenulate on vertex, moderately pubescent, antennae when laid back over dorsal surface, reaching to apical fourth of elytra in female, first joint stout, second small cylindrical, third not quite as long as fourth and fifth taken together, fourth to ninth inclusive of about equal length, tenth shorter than ninth, eleventh longer than tenth, third to tenth joint inclusive carinate, antennae densely pubescent. Thorax wider than long, widest in middle, surface irregularly coarsely punctured, punctures more numerous laterally, a central area smooth, dorsal surface moderately pubescent. Scutellum triangular, with numerous punctures. Elytra wider than widest portion of thorax, sides parallel, apices rounded, surface irregularly coarsely punctured, punctures becoming light toward apex, each puncture containing a long silky hair. Abdomen with ventral surface somewhat smooth, lightly punctured, pubescence sparse, last ventral segment broadly rounded. Length 10 mm., width 3 mm.

Type: ♀, labeled Edgebrook, Illinois, June 18, in the collection of the author. *parátype*: ♀, labeled Edgebrook, Illinois, Aug. 5, E. Liljeblad collector, in the collection of the late Mr. F. R. Mason after whom the species is named. The author is indebted to Prof. H. C. Fall, who kindly compared the specimen with the material in his collection.

Oberea delongi n. sp.

Piceous above and below with exception of head, ventral portion of thorax, scutellum, last abdominal segment, humeral angles of elytra and legs, which are yellow. Head with dark area on each ocular region, and at apices of mandibles, front convex, a median line extending from thorax to labrum, irregularly finely punctate in front, coarse punctures on vertex intermixed with much finer punctures, surface densely pubescent, antennae when laid back over dorsal surface, extending beyond middle of elytra in female, slightly longer in male, scape stout, second joint small, third longer than fourth, fifth shorter than fourth, sixth to ninth inclusive of about equal length, tenth shorter than ninth, eleventh shorter than tenth.

Thorax cylindrical, widest in middle, constricted anteriorly and posteriorly, smooth callosity in center, one on each side of central area and a lateral one on each side near base, surface irregularly coarsely punctured, short appressed pubescence intermixed with long hairs. Scutellum triangular, densely finely punctured and pubescent. Elytra wider than thorax at base, sides nearly parallel, dilate on apical fourth, apices truncate, sutural costa raised on each elytron, surface coursely irregularly punctured, lightly clothed with appressed pubescence, a long hair arising from each puncture.

Abdomen with ventral surface covered with minute punctures which give a somewhat granulate appearance, a closely appressed hair arising from each of these small punctures, larger punctures irregularly placed each containing a longer hair, last ventral segment of female concave, strongly emarginate at tip, a median line through center, dorsal segment slightly emarginate, tumid.

Type: ♀, length 10.5 mm, width 2.5 mm. The *allotype* ♂ has the last ventral segment much more concave with tip slightly emarginate, the last dorsal segment nearly truncate and slightly convex. The last abdominal segment, scutellum and vertex of head are piceous. The color varies with the sex in the specimens at hand.

Type, allotype and two *paratypes* collected at Cedar Point, Ohio, on June 21, 1917, by Dr. D. M. DeLong, who kindly presented the series to the author. *Paratype* collected at Zanesville, Ohio, on June 25, 1924, by Dr. A. E. Miller, who kindly loaned me the specimen. I am indebted to Mr. W. S. Fisher of the U. S. National Museum for comparing the species with the Casey types and the material in the National Museum.

A Case of the Botfly (Bogeria buccata) as a Parasite upon the Common House Mouse (Mus musculus). (Dipt.: Oestridae).

By D. F. Miller, Ohio State University, Columbus, Ohio.

While many kinds of mammals and even birds and reptiles are sometimes hosts to the Oestridae, certain types of hosts are rare and are worthy of mention when found. Because of their small size and habits of remaining concealed during the daytime mice are not likely to be parasitized by botflies and instances of its occurrence are seldom met with in the literature upon the subject.

Brauer (1864) tells of a bot larva found by Professor Hering upon a field mouse, *Avicola arvalis* Pallas. C. O. Waterhouse (1881) had on display at the meeting of the Entomological Society of London three larvae of an *Oestrus* obtained from *Mus musculus* and sent to him from Peru. Riley and Howard (1893) mention two "warbles" sent to them from California where they had been obtained from a parasite mouse *Sitomys californicus* which had been trapped on the upper Temecula River. They recognize the larvae as *Cuterebra* but of unknown species.

While moving a pile of lumber in an old building on his farm near Mantua, Ohio, Mr. D. B. Husted found a common house mouse infested with a bot. In regard to his discovery he writes as follows:—"the mouse was found among a pile of boards in an old building. It was just barely dead, I think, when I picked it up. I thought it had got pinched in moving the boards and as I walked to the door and threw it out, I saw, as it went, the button on its groin, I recovered it and mailed it the same day."

The specimens were received by Professor R. C. Osburn, of Ohio State University, and turned over to me for rearing. The mouse was thoroughly emasculated by the bot larva which had left the dead mouse but was itself still alive, active and mature. There was no indication of its having attacked any other part of the mouse. I placed it upon a pot of earth which was covered with a breeding cage and left upon a shelf before my window. The larva buried itself immediately. This was September 30, 1926. Pupation must have followed very soon afterward.

During the fall and winter months which followed it remained undisturbed upon the window shelf which was directly over a steam radiator. This probably kept the temperature slightly above that of the room most of the time. About the only attention it received was a little water at irregular intervals, sometimes twice in a week, sometimes once in two weeks. On March 4, 1927, a well formed male fly emerged. The fly *Bogeria buccata*, (also called *Cuterebra*), and the mouse *Mus musculus* are in the possession of Mr. James S. Hine of the Ohio State Archaeological Museum to whom I am indebted for the identification.

The finding of the above case brings a letter from D. R. Beardsley, of Geneva, Ohio, to the effect that he—"found a mouse with a 'warble' in its flank well back between its legs on the left side. I think it was quite well matured. It was a small house or barn mouse. It was in the latter part of October." He also states that the larva was of a brownish color. Unfortunately, Mr. Beardsley did not rear his specimen or preserve either the larva or the mouse.

Having reared large numbers of botflies from the larvae it seems to me that the common idea that they are difficult to rear is a mistake and it is to be greatly hoped that those who find them hereafter will either rear them or send them to someone who is interested in so doing. Many of the references in the literature are to very doubtfully classified specimens based upon the larva alone.

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RILEY AND HOWARD, 1893, Insect Life, vol. vi, 46.

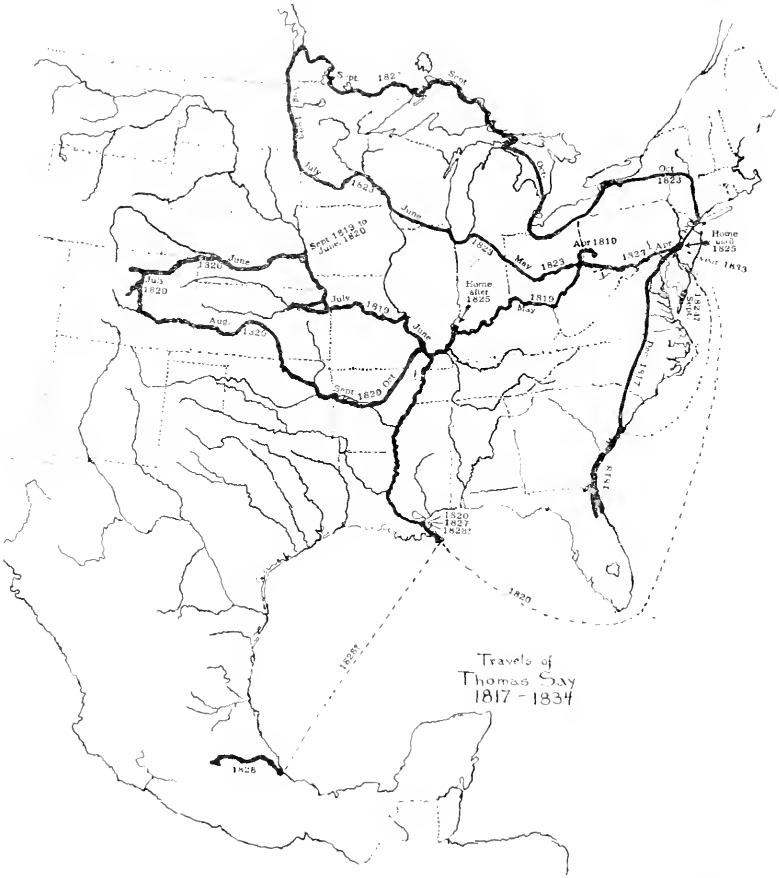
WATERHOUSE, C. O., 1881, Proc. Ent. Soc., London, Sept. 7, 1881.

Thomas Say's Unrecorded Journey in Mexico.

By H. S. BARBER, Bureau of Entomology, Washington, D. C.

When definite type localities are not recorded for species described long ago, it is of the utmost importance that the modern systematist understand what geographical sources could have contributed material to the describer up to the time of his study. But it often requires a long and tedious search through the records of a pioneer naturalist such as Thomas Say before any clear idea can be formed of the areas from which collections were available at different times in the progress of his studies. If we should now attempt to identify the weevil, *Lymantes scrobicollis* Schoenherr 1837, a species long considered unrecognizable, whose type locality is recorded as "America borealis. A Dom. Say amice communicatus," it would be of importance to know if the faunae of Mexico City and Vera Cruz need to be considered in addition to the better known collecting grounds of the sender. The numerous species described by Say without more definite locality than the laconic "Inhabits Mexico" have been a source of perplexity to modern workers, some of whom have interpreted this locality as New Mexico, but, as is shown below, there is ample evidence that Say actually visited Mexico City. It is probable that all of his Mexican forms were collected along the old road between Vera Cruz, Jalapa, Mexico City and Tacuba.

Personal experience with the honey-storing, papernest wasp, *Nectarina mellifica* (Say) (see Proc. Ent. Soc. Wash., vol. 7, 1905, p. 25), led the writer to read Say's account of this species (below quoted), so it was quite a surprise to find later that no mention of his journey to Mexico appears in the biographies of this fine old naturalist. The "trail map" here shown is



drawn chiefly from the maps of the two expeditions of Major Long in which Say participated, but much additional information has been taken from certain remarks appended to descriptions of species.

In 1829, Say described numerous flies, and in 1831 numerous weevils from Mexico without definite locality. In another paper, published in December, 1831, he several times names Mexican species from specimens collected by William Bennett and presented to him by Mr. Maclure, and among these he describes *Corixa mercenaria*, with comparisons and remarks, in the first person, as follows, indicating that Say had, himself, been in Mexico City:

Passing through the market in the city of Mexico I obtained a few specimens from the quantity of at least a peck, exposed for sale by an Aztec woman. They are made use of as food.

Commenting on a rove-beetle (*Oxytelus rugulosus*) described by him in 1834, he says: "I obtained three specimens of the *rugulosus* in Mexico."

Again, in a posthumous paper published in 1837, in describing two species of stingless bees from Mexico, he says of one:

My specimens are workers, and I did not find the nest or ascertain the kind and importance of the honey they make.

Of the other he says: "Of this I obtained but a single specimen—."

But even more convincing is his account of the honey-storing, papernest making wasp which he describes as *Polistes mellifica*, in which he says:

Not being able to find my notes relative to this species, I can only state, that near Jalapa, my attention was attracted by a group of Indians, who were eating honey from a paper nest which was then so far dissected in their repast that I could not ascertain its proper form. The honey had a pleasant taste, and as far as I could gather from their gestures, the nest was obtained in a tree. Some of the specimens above described I found crawling feebly away and others I extracted from the cells in a perfect state. [He then continues, still writing in the first person, with lengthy technical remarks.]

On referring to his papers on Conchology a number of more convincing remarks are to be found, a few of which may be quoted here:

Inhabits Mexico. I obtained several specimens in a ditch beside the road between the capital and Tacuba.

Occurs in plenty a short distance below Vera Cruz. We found them immediately behind the sand hillocks of the coast . . . . did not see a living specimen.

We collected many . . . in the marshes near New Orleans and on the banks of the Carondelet Canal.

I obtained a few single valves . . . . at New Orleans during a short sojourn in that city with Mr. Maclure in 1827.

Discussing artifacts from the prehistoric mounds (Disseminator for June 23, 1831—not seen by present writer*) Say says a certain

—implement which probably served as a knife—resembles the obsidian knives of the ancient Aztecks, or perhaps of the Tultecks, of which we found a great many near the Mexican city of Chalco—

and the Prince of Wied, who had visited Say at New Harmony and from whose book (Travels in the Interior of North America, english translation, 1843, p. 80.) the last quotation has been taken, further discusses these

Instruments . . . . found even now in Mexico, some of which Mr. T. Say brought with him from his journey to that country, and wrote a paper respecting them.

In Lockwood's narrative of the New Harmony Movement (Appleton, 1905) the presence of Say and Maclure at New Harmony in 1827 is mentioned as well as the latter's departure for Mexico in 1828 leaving Say in charge of his interests in New Harmony.

Through the kindness of Mr. Wade his as yet unpublished bibliography of Thomas Say in "Bibliography of Biographies of Entomologists" has been available to me, but no mention of Say's Mexican journey has been noticed in the articles cited. An outline of his journey to Florida appears in two letters dated Washington, Dec. 12, 1817, and Philadelphia, June 10, 1818 (Ent. News 1901, vol. 12, p. 233-236) mentioning his

*Mr. B. E. Montgomery has looked up this publication in the library at New Harmony and finds this article is anonymous and that the date is June 25, 1831, instead of June 23. The Prince of Wied may have had knowledge that it was written by Say.

journey with Maclure in carriage from Philadelphia via Washington to Charleston, S. C., where they shipped to Savannah and, joining Ord and Peale, proceeded slowly by sloop to St. John's River. The two-year trip with Long to the Rockies is briefly narrated by Say in another letter dated at Philadelphia, Aug. 29, 1821, (see Ent. News 1901, vol. 12, p. 314-6), and the six-month journey to Lake Winnipeg with Long is outlined in another letter from Philadelphia dated Nov. 30, 1823, (see Ent. News 1902, vol. 13, p. 39-40). Perhaps further evidence of his journeys to New Orleans and Mexico, or elsewhere, can be contributed by some one who knows of unpublished letters from New Harmony. After a rather careful search through the numerous but fragmentary accounts of this very impressive character, the opinion voiced by Dr. Dall almost forty years ago in the footnote to his appreciative account (Proc. Biol. Soc. Wash. 1888, vol. 4, p. 101) may well be quoted: "A better biography of Say is greatly needed."

Postscript, November, 1927.

Since writing the above, two very important published statements of such definite nature as to almost demand deletion of the word "unrecorded" from the title of this article, have been found and the writer is greatly indebted to Miss Hazel Bartlett of the Library of Congress, Washington, and to Mr. Wm. J. Fox, of the Academy of Natural Sciences, Philadelphia, for the references.

S. G. Morton, in his Memoir of William Maclure, read in 1841 and published in Philadelphia (2nd edition, 1844, p. 21) wrote:

We accordingly find him [Maclure] in the autumn of 1827 embarking for Mexico in company with his friend Mr. Say. They passed the winter in that delightful country . . . . and on the approach of summer they returned to the United States.

E. J. Nolan, in his account of the Philadelphia Academy of Natural Sciences (Founders Week Memorial Volume, Philadelphia, 1909, p. 156) states:

The communistic experiment in which they were engaged having proved a failure he [Say] accompanied Mr. Maclure to Mexico. He remained there for twelve months and was then compelled by business engagements to return to New Harmony.

The source of information of either of these statements is not known.

From a work of fiction (Seth Way, A Romance of the New Harmony Colony, by Caroline Dale Owen—Houghton Mifflin Co., 1917) one may better comprehend than from historical memoirs, the characters, ideals and inspirations which found their expression in the New Harmony undertakings. "In character and scientific attainments the hero is Thomas Say" but in the story he (Seth Way) appears to be a wandering lad working at New Harmony before the arrival of Say who is thereafter rarely mentioned.

"The Communism of Thomas Say" is the subject of a very recent paper by Weiss & Ziegler (Journ. N. Y. Ent. Soc., vol. 35, pp. 231-239) but unfortunately Coates' Memoir of Say was not before them and Ord's statements which they adopt, of Say's supposed handicaps in education and literary style seem a matter of personal taste, inconsistent with the known utility of Say's writings. According to this paper (probably adopted from Ord) Maclure and Say remained at New Harmony until 1828 when the former went to Mexico leaving his interests in the latter's charge but this disagrees with the above evidence that they spent the winter of 1827-8 in Mexico. Coates and Ord differ in many points, the latter, for instance, inferring that Say remained quietly at New Harmony after his departure from Philadelphia in 1825, while the former describes Say's appearance during a visit to Philadelphia some months before his death. Ord states that as a mark of respect Say was subsequently called one of the founders of the Academy while Coates publishes minutes of meetings showing Say to be one of the original group mentioned in, and signing the first resolution although unable to attend the first meeting.

ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., JANUARY, 1928.

The Labeling of Plates.

The editor of the NEWS read with joy the following passages written by C. T. Hurst, published in *Science* for July 8, 1927, page 38:

Not very long ago a very excellent paper of considerable length and illustrated by well-drawn figures in a half dozen or more plates came to me. This paper was a zoological thesis from one of the major universities of the country. As it happened to be along a line of especial interest to the writer, it was read with care. But the ease of reading and the degree of pleasure and profit enjoyed were seriously marred by the fact that the figures on the various plates were labeled with abbreviations and that one had to turn to a distant page to find the key to these abbreviations. It would have been bad enough had the key been on the page facing the plate, or at the bottom of the plate itself. Often, to make such a bad matter worse, the terms were not alphabetically arranged—they may even be omitted by error in some cases. Needless to say, a study of such plates involves a great deal of time, patience, labor and even temper. In many instances, unless such papers are of immediate interest, they go unread insofar as a careful examination of the plates is concerned.

In the plates above mentioned, it was noticed that there would have been plenty of room to spell the labels out in full directly on the face of the plates, thus doing away with the necessity for a key, and at the same time effecting a saving of time and labor in the ultimate consumption. The artistic qualities of the drawings would not suffer in the least by such a procedure; on the other hand, accuracy and availability would be greatly enhanced.

The present system of indirect labeling of plates is archaic and absolutely unscientific. It should be changed to a system of direct labeling on the figures, together with any necessary explanatory matter (not a key) on the page *facing* the plate. Direct labeling can be easily carried out in all cases except possibly in those rare instances where the details are exceptionally small and numerous. In such cases the key should face the plate and it should be arranged in an alphabetical fashion.

Contributors to the NEWS take warning!

Personals.

Dr. Frank E. Blaisdell, of San Francisco, has retired from his medical teaching, after 27 years of continuous attention to anatomy and pathology. He is planning to spend some months in travel in the East next year.

Prof. J. G. Needham wrote from Peking, China, on October 16, 1927: "I went dragonfly collecting in the valley beyond this pagoda [Marble Pagoda at Yü Ch'üen Shan] today. Only *Sympetrum* and *Anax* still flying. Having an interesting time over here. All well. All peaceful in Peking."

Mr. Samuel Henshaw's recent resignation of the directorship of the Museum of Comparative Zoology at Harvard University was referred to in *Science* for November 11, 1927. He was director for fifteen years; previous thereto he was assistant entomologist and curator of insects for eighteen years, succeeding Dr. H. A. Hagen, to whom he was assistant for two years. He took charge of the Museum at a very critical time in its history. During his directorship the collections have greatly increased, especially in reptiles, birds and insects. Entomologists gratefully recall his *List of the Coleoptera of North America* and Supplements thereto, his lists of synopses of genera of Coleoptera, the first four parts of the Bibliography of Economic Entomology, his bibliographies of Le Conte, Horn and Packard, his list of the Hemiptera described by Uhler, his generous aid to various zoological and entomological undertakings and wish him many years of health and happiness.

Impressions of the Tring Museum, England.

We sail for India and Siam October 28. The other day I went to see the Rothschild Museum at Tring and was shown over by Dr. Karl Jordan. The beauty of the collections surpasses anything you could well imagine and the long series of all sorts of interesting Lepidoptera amazed me. All the collections are well cared for in a fine large building in cabinets of the latest and best types and you could not find a more delightful place to work. But, alas! they don't go in for Hymenoptera. I also saw the vast collection of fleas and Dr. Jordan's great series of Anthribidae, some of them resembling Longicorns.
T. D. A. Cockerell.

Gold Mines of the Naturalist in Nicaragua.

Managua, Nicaragua, Dec. 2.—(AP)—Chontales Mines Company, Ltd., owning gold mines in the Department of Chontales which it has worked for many years, to-day went into voluntary liquidation.—Philadelphia *Public Ledger,* Dec. 3, 1927.

We reached Pavon, one of the mines of the Chontales Company, and passing the Javali mine soon arrived at Santo Domingo, the headquarters of the gold-mining company whose operations I had come out to superintend. [Feb. 23?, 1868] . . . . I finally left the mines September 6, 1872, on my way to England.—THOMAS BELT, *The Naturalist in Nicaragua, A Narrative of a residence at the Gold Mines of Chontales . . .* London, 2nd edition, 1888, pp. 60, 385.

The Clark Collection of Lepidoptera.

The Boston Society's collection of moths and butterflies has been greatly enriched by the addition of the collection of the late Howard Lee Clark, not only in the number of species but by large series showing variations. As a member of the Society he took a great interest in the New England collection and frequently contributed new and interesting species. It was undoubtedly Mr. Clark's personal concern in the building up of the Society's collection that induced Mrs. Clark to present his valuable collection to the Society.

Mr. Clark was born May 25, 1857, and died November 3, 1926. He was long interested in the study of the Lepidoptera, some of the specimens having been collected as early as 1884. The greater part of the collection, however, was made by Mr. Clark between 1912 and 1919 on his beautiful place in the northern part of Bristol, Rhode Island, at the mouth of Warren River. He called his place "North Farm", and here he bred many interesting species and studied their life histories. From his trap light he selected the rarer species and only perfect specimens of the common forms. These he mounted and spread with the greatest care, which accounts for the unusually large number in such perfect condition.

The collection contains about 1100 species represented by over 7200 specimens. The largest group is the family Noctuidae, comprising 586 species and 4136 specimens. The finest series of these is that of the genus *Catocala* (the beautiful "underwings") with 102 species and 898 specimens. Mr. Clark bred many of these and described the life history of *Catocala relicta* (Can. Entom., vol. 20, p. 17-20, 1888). A series of 50 *Catocala relicta,* 20 *C. cara,* 25 *C. amatrix,* 30 *C. ultronia,* 20 *C. ilia,* 50 *C. gracilis,* 20 *Allotria elonympha,* and 24 *Euparthenos nubilis,* showing all gradations between the lighter and darker forms, constitutes a very handsome and instructive exhibit. Among many rare species there is a good specimen of *Catocala herodias.* There is also a large series of *Zale* and other "similar-winged noctuids". A *Thysania zenobia* taken at Providence, Rhode Island, is the second New England record for this southern species. Of the Geometridae there are 246 species and 839 specimens, a number of which are new to the collection. The Notodontidae are represented by 44 species and 344 specimens. There are but few Microlepidoptera, but among these are some interesting southern forms, such as the Pickle and Melon Moths, *Diophania nitidalis* and *D. hyalinata*, and the beautiful *Atteva punctella*, all taken in Rhode Island. Of the Arctiidae or tiger-moths there are 61 species and 451 specimens. There is an exceedingly beautiful series of the large Saturnoidea, 25 species and 211 specimens. These include such moths as the Luna, Polyphemus, Cecropia, Io, etc. The Sphingidae or hawk-moths, represented by 42 species and 242 specimens, are exceptionally fine, a number of the more southern species being represented. The butterflies number 107 species and 624 specimens. While the series of the genus *Papilio* are especially good, Mr. Clark was not as enthusiastic over them as he was over the moths, and large series showing variation are wanting.

With this addition the Society's collection of New England Microlepidoptera becomes almost complete. The large series make it a particularly valuable study collection.

C. W. J. (in Bul. Boston Soc. N. H., No. 45, p. 5-6.)

Assembly of Ground-Beetles (Coleop.: Carabidae).

On November 6th, 1927, while collecting in this locality for Carabidae with Mr. G. E. Hudson, a student of this College, I turned over a stone not more than a foot in diameter, and beneath it found 31 Carabids, representing six species as follows:—

Dicaelus elongatus .....24 specimens, about equal as to sexes.
Dicaelus ovalis .... 2, both females.
Galerita janus .... 1 male.
Chlaenius laticollis ..... 2.
Chlaenius nemoralis .... 1.
Chlaenius aestivus ..... 1.

No copulation or attempts thereat were in progress, nor was there any visible food or other attraction. It is not uncommon to find several specimens of Galerita or Chlaenius under one covering object, but I do not remember ever to have seen any species of Dicaelus thus congregated, certainly not in such numbers. Three of the *elongatus* departed from the normal in having 3 setae on right-hand margin of the thorax in front of the middle whereas the normal number is two. The *ovalis* were both typical with one such seta.

On that day in about 2½ hours, we secured 29 species of Carabidae, and yet lacked many which are surely present at this season.

Franklin Sherman, Div. of Ent. and Zool., Clemson College, South Carolina.

List of the Titles of Periodicals and Serials Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annals of the Carnegie Museum. Pittsburgh, Pa.
4. Canadian Entomologist. London, Canada.
5. Pysche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology. Concord, N. H.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Entomologische Zeitschrift. Frankfurt a. M., Germany.
15. Natural History, American Museum of Natural History. New York.
16. American Journal of Science. New Haven, Conn.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Internationale entomologische Zeitschrift. Guben, Germany.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
20. Societas entomologica. Stuttgart, Germany.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bollettino del Laboratorio di Zoologia generale e agraria della R. Scuola superiore d'Agricultura in Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
26. Entomologischer Anzeiger, hersg. Adolf Hoffmann. Wien, Austria.
27. Bolletino della Società Entomologica. Genova, Italy.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. The Maine Naturalist. Thornaston, Maine.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janiero. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles.
34. Zoologischer Anzeiger, hrsg. v. E. Korschelt. Leipzig.
35. The Annals of Applied Biology. Cambridge, England.
36. Transactions of the Entomological Society of London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chileña de historia natural. Valparaiso, Chile.
45. Zeitschrift für wissenschaftliche Insektenbiologie. Berlin.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
48. Wiener entomologische Zeitung. Wien, Austria.
49. Entomologische Mitteilungen. Berlin.
50. Proceedings of the U. S. National Museum. Washington, D. C.
51. Notulae entomologicae, ed. Soc. ent. helsingfors. Helsingfors, Finland.
52. Archiv für Naturgeschichte, hrsg. v. E. Strand. Berlin.

53. Quarterly Journal of Microscopical Science. London.
54. Annales de Parasitologie Humaine et Compareé. Paris.
55. Pan-Pacific Entomologist. San Francisco, Cal.
56. "Konowia". Zeit. für systematische Insektenkunde. Wien, Austria.
57. La Feuille des Naturalistes. Paris.
58. Entomologische Berichten. Nederlandsche ent. Ver. Amsterdam.
59. Encyclopédie entomologique, ed. P. Lechevalier. Paris.
60. Stettiner entomologische Zeitung. Stettin, Germany.
61. Proceedings of the California Academy of Sciences. San Francisco.
62. Bulletin of the American Museum of Natural History. New York.
63. Deutsche entomologische Zeitschrift "Iris". Berlin.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
66. Report of the Proceedings of the Entomological Meeting. Pusa. India.
67. University of California Publications, Entomology. Berkeley, Cal.
68. Science. New York.
69. Comptes rendus hebdoma. des séances de l'Académie des sciences. Paris.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
73. Quarterly Review of Biology. Baltimore, Maryland.
74. Sbornik entomolog. národniho musea v Praze. Prague, Czechoslavokia.
75. Annals and Magazine of Natural History. London.
76. The Scientific Monthly. New York.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
80. Lepidopterologische Rundschau, hrsg. Adolf Hoffmann. Wien.
81. Folia myrmecol. et termitol. hrsg. Anton Krausse. Bernau bei Berlin.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
85. Genetics. Princeton, New Jersey.
86. Zoologica, New York Zoological Society. New York.
87. Archiv für Entwicklungs mechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
96. La Cellule. Lierre, Belgium.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
99. Mélanges exotico-entomologiques, Par Maurice Pic. Moulins, France.

Entomological Literature

COMPILED WITH THE ASSISTANCE OF BIOLOGICAL ABSTRACTS UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

GENERAL.—Blair, K. G.—Insect remains from oil sand in Trinidad. [36] **75**: 137-142. **Cain, B. C.**—Interesting boy scouts in Entomology [12] **20**: 679-681. **Crampton, G. C.**—Eugereon and the ancestry of the Hemiptera, Psocids and Hymenoptera. [19] **22**: 1-13. **Giglio-Tos, E.**—Obituary and bibliography. [34] **5**: 35-37, ill. **Hardy, G. A.**—Report on a collecting trip to Garibaldi Park, B. C. [Rep. Prov. Mus. N. H., B. C.] **1926**: 15-32, ill. **Heikertinger, F.**—Mimikry, Schutzfärbung und sonstige Trachtanpassungen bei Insekten. [45] **22**: 212-218, cont. **Holdhaus, K.**—Die geographische Verbreitung der Insekten (Fortz.). [Schröder: Handb. d. Ent.,] **2**: 771-914. **Howard, L. O.**—The parasite element of natural control of injurious insects and its control by man. [Smith. Rep.] **1926**: 411-420. **Ives, J. D.**—Cave fauna with especial reference to ecological factors. [J. El. Mitchel Soc.] **43**: 84-90. **Lutz, F. E.**—Wind and the direction of insect flight. [40] No. 291: 4 pp. ill. **Peairs. L. M.**—Some phases of the relation of temperature to the development of insects. [Abs. of Theses, Univ. Chicago] (Sci Ser.) **3**: 309-313. **Richards, O. W.**—Sexual selection and allied problems in the insects. [Biol. Rev. Cambr., Engl.] **2**: 298-364, ill. **Rüschkamp, F.**—Systematik und Stammesgeschichte. [49] **16**: 420-422. **Smith, H. S.**—California's interest in the insects of Australia and New Zealand. [55] **4**: 36-37. **Verity, R.**—On the use of names in the study of Variation. [21] **39**: 144-147. **Weiss &**

Ziegler.—The communism of Thomas Say. [6] **35**: 231-239.

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SPECIAL NOTICES.

Die Hydracarinen Schwedens.—Beitrag zur Systematik, Embryologie, Oekologie, und Verbreitungsgeschichte der schwedischen Arten. Von O. Lundblad. [Zool. Bidrag, Uppsala] 11: 185-540, ill. This monographic treatise will probably be interesting to American students of this Order.

When books appear they are always "much needed", but this term was never more truthfully applied in my opinion than now for KINGSBURY AND JOHANNSEN'S "HISTOLOGICAL TECHNIQUE" recently issued by John Wiley and Sons, Inc., New York City viii. pp. 1-131, 16 figs, 1927.

I may be but one of few instead of many, who has floundered somewhat in the complex preparation of stained insect and other animal tissue in order to differentiate cytoplasm and its inclusions. Methods of fixation, dehydration and staining are legion in the numerous periodicals, but they are often insufficiently described and inadequately tested, besides being widely scattered in the literature. In Kingsbury and Johannsen's volume there is now compiled as complete a set of directions for both general and specialized histologic technique as could be desired by the beginner and more advanced worker. It doubtless contains the tested and successfully demonstrated technique of Kingsbury's earlier "Laboratory directions in histology" based on years of contact with advanced students in animal histology, and the extensive experience of Johannsen in insect morphology and histology.

At first glance the insect histologist might wish that the volume were devoted to the preparation of insect tissues alone, or he might wish that it had been practicable to concentrate the technique upon the Arthropoda in several chapters rather than find it largely in one chapter on "Special methods for various animal forms" and in scattered paragraphs throughout the volume; but a working knowledge of what the volume contains would probably soon obviate any difficulty in finding just which fixers, methods, or stains are suitable for emphasizing certain insect tissues.

In making histologic preparations, what are good directions for some are inadequate for others. This is because one who presents his schema for fixation and staining, omits detailed steps in procedure which he thinks any worker in histology should know. In reality the worker doesn't know, because he is not working under similar conditions or with the same equipment. Consequently perfection in histologic technique becomes rather a matter of trial and experience. But it will be found decidedly advantageous to have this volume of Doctors Kingsbury and Johannsen handy for the correction of errors in technique from their unusually complete directions, and to use it as a basis for broadening one's histologic training into the later and more specific methods of differentiating cell structures. R. W. LEIBY.

OBITUARY.

The death of FREDERICK LEONARD WASHBURN, professor of economic vertebrate zoology at the University of Minnesota from 1918 to 1926, which occurred on October 15, 1927, was announced in *Science* for October 21. He was born at Brookline, Massachusetts, April 12, 1860, son of Nehemiah and Martha (Parmalee) Washburn, received the A. B. from Harvard in 1882, and was a graduate student at Johns Hopkins and at Harvard, which latter gave him the A. M. in 1895. He was instructor of zoology at the University of Michigan 1887-88, professor of zoology at Oregon Agricultural College and entomologist at the Experiment Station 1888-1894, professor of biology at the University of Oregon 1894-1902, State biologist of Oregon 1899-1902, professor of entomology at the University of Minnesota and State entomologist of Minnesota 1902-1918. He married Frances L. Wilcox of Minneapolis, December 27, 1887, and had two daughters, both of whom married.

In addition to his official reports as State Entomologist of Minnesota, he published, in 1918, a book entitled *Injurious Insects and Useful Birds* (Lippincott, Philadelphia and London), which was reviewed in the NEWS for February, 1919 (p. 54). His most recent contribution to this journal appears to be a brief note on the cotton worm moth, *Alabama argillacea*, in Minnesota in 1914, published in our number for May, 1915 (p. 207).

The death on October 22, 1927, after a short illness, of Dr. ANTONIO BERLESE, director of the R. Stazione di Entomologia Agraria, at Florence, Italy, is announced. He was the author of the well-known text-book, *Gli Insetti, loro organizzazione, sviluppo, abitudini e rapporti coll'uomo*, in two large volumes (Milan, 1909 and later). His contributions to entomology include studies on the Italian Coccidae, 1893-95, a monograph of the Myrientomata (Redia, vol. 6, pp. 1-182, 17 plates, 1910), on metamorphosis (Redia, vol. 9, pp. 121-136, 1913) and cuticular sense organs; and on the phenomena of metamorphosis in metabolic insects (Revista di patologia vegetale 1897 and later).

The number of the NEWS for December, 1927, was mailed at the Philadelphia Post Office on December 14th, 1927.

CORRECTION: On title page of Volume XXXVIII, 1927, under Advisory Committee, for Max Lisliuk, Jr. read Max Kisliuk, Jr.

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Stated Meetings of The American Entomological Society will be held at 7.30 o'clock P. M., on the fourth Thursday of each month, excepting June, July, August, November and December, and on the third Thursday of November and December.

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

The printer of the "News" will furnish reprints of articles over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 35 cents; three or four pages, twenty-five copies, 70 cents; five to eight pages, twenty-five copies, $1.40; nine to twelve pages, twenty-five copies, $2.00; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be the corresponding multiples of these rates.

ENTOMOLOGICAL NEWS

Vol. XXXIX FEBRUARY, 1928 No. 2

The Entomology of Sir Thomas Browne's Pseudodoxia Epidemica.

By Harry B. Weiss, New Brunswick, New Jersey.

When Sir Thomas Browne, scholar and naturalist of the seventeenth century, exploded or attempted to explode popular fallacies in his "Pseudodoxia Epidemica," he did not overlook some entomological ones. He was always interested in animals and plants, and observations on natural history of one sort or another are scattered throughout his works. Hallam[1] did not rate Browne's "Pseudodoxia" at all highly. While admitting that it displayed considerable erudition, he was of the opinion that as late as 1646 only ignorant and unlearned people believed in the phoenix or the basilisk, and said that few required a correction of their false beliefs with such an amount of proof as Browne had supplied. Hallam thought that he occupied his mind with too many trifling questions and said that "A man of so much credulity and such an irregular imagination as Browne was almost sure to believe in witchcraft and all sorts of spiritual agencies." Browne did believe in witchcraft. On March 10, 1664, "Amy Duny and Rose Cullender, two widows of Lowestoft, were indicted for bewitching" some seven persons, and "Sir Thomas Browne, then Dr. Browne, who was present at the trials, being a 'person of great knowledge', was 'desired to give his opinion what he did conceive of them, and he was clearly of opinion that the persons were bewitched . . . . for he conceived that these swooning fits were natural, and nothing else but that they call the mother, but only heightened to a great excess by the subtility of the Devil, co-operating with the malice of these which we term witchs, at whose instance he doth these villainies."[2] Apparently Browne's skepticism did not extend to witchcraft. Nor did it extend to the Ptolemaic theory, because he thought the

[1]Literature of Europe, Vol. IV, 1839, London.

[2]The Geography of Witchcraft, by M. Summers, 1927, New York.

Copernican theory was against Holy Scripture. However, even naturalists are likely to hold peculiar beliefs on some subject or another, and Hallam's estimate seems somewhat too severe, because Browne was an estimable person and had many good qualities.

Returning to his "Pseudodoxia Epidemica," we find him, under the title "Of some Insects, and the properties of several Plants," disposing of the superstition connected with the tapping of the "death-watch" beetle. He says, "For this noise is made by a little sheath-winged gray Insect found often in Wainscot, Benches, and Wood-work, in the Summer. We have taken many thereof, and kept them in thin boxes, wherein I have heard and seen them work and knack with a little *proboscis* or trunk against the side of the box, like *Apicus Martius*, or Woodpecker against a tree. It workest best in warm weather, and for the most part giveth not over under nine or eleven stroaks at a time." He then states that whoever can "extinguish the terrifying apprehensions" caused by the noise of this beetle, will prevent "many cold sweats in Grandmothers and Nurses."

He then takes up the idea that the finding of certain insects one year forecasts famine, war, or pestilence the succeeding year, it having been supposed that the presence in oak apples, of either maggots, flies, or spiders foretold famine, war, or pestilence the next year. He says that flies and maggots are found every year and that the flies are first maggots. He admits that there may be some truth in the "Analogy or Emblematical phansie. For Pestilence is properly signified by the Spider, whereof some kinds are of a very venemous Nature. Famine by maggots, which destroy the fruits of the Earth. And War not improperly by the Fly; if we rest in the phansie of Homer, who compares the valiant *Grecian* unto a Fly;" also that an abundance of flies and maggots in the sap of a tree may indicate its decaying state.

Under the title "Of the Picture of a Grashopper," he corrects the confusion which existed in ordinary minds, between grasshopper and cicada, and writes, "Again, Between the Cicada and that we call a Grashopper, the differences are very many, as may be observed in themselves, or their descriptions in *Matthiolus, Aldrovandus* and *Muffetus.* For first, They are differently cucullated or capuched upon the head and back, and in the Cicada the eyes are more prominent: The Locusts have *Antennae* or long horns before, with a long falcation or forcipated tail behind; and being ordained for saltation, their hinder legs do far exceed the other. The Locust or our Grashopper hath teeth, the Cicada none at all; nor any mouth according unto *Aristotle*: The Cicada is most upon trees; and lastly, the fritinnitus or proper note thereof, is far more shril than that of the Locust; and its life so short in Summer, that for provision it needs not have recourse unto the providence of the Pismire in Winter." He then corrects other interpretations, Biblical ones, and goes on to say, "It must be likewise understood with some restriction what hath been affirmed by Isidore, and yet delivered by many, that Cicades are bred out of Cuccow spittle or Woodsear; that is that spumous, frothy dew or exudation, or both, found upon Plants, especially about the joints of Lavender and Rosemary, observable with us about the latter end of May. For here the true *Cicada* is not bred, but certain it is that out of this, some kind of Locust doth proceed; for herein may be discovered a little insect of a festucine or pale green, resembling in all parts a Locust, or what we call a Grashopper." He says that owing to the absence of the cicada in England, they have not "fallen upon its proper name." Many years later, however, the cicada was discovered there.

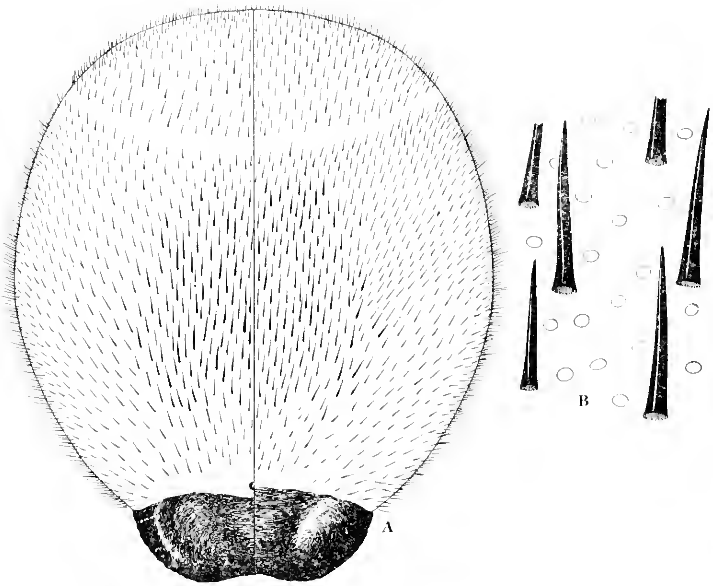
Browne's other entomological subjects include the glowworm, a description of its light, disappearance with its death, etc., the wrong belief that earwigs are wingless, and the humming sounds made by bees, flies, etc., in which he uses the explanations of Aristotle and Scaliger and advances his own views. All these are to be found under the heading, "Compendiously of sundry Tenents concerning other Animals which examined, prove either false or dubious."

In addition to being a good observer, Browne was an assiduous collector, and his house in Norwich was full of medals, books, curios, and natural history specimens. He was curious about everything and he wanted to know the truth.

The Larva of Olfersia vulturis Van der Wulp. (Diptera: Hippoboscidae).

By G. F. Ferris, Stanford University, California.

In September, 1925, the writer obtained at San Blas, Nayarit, Mexico, from a single specimen of the black vulture, *Catharista urubu*, sixteen specimens of a Hippoboscid fly. At least as many more individuals of the fly escaped, so that the total Hippoboscid population of this one bird was at least somewhere between thirty and forty. The species is that described by Van der Wulp as *Olfersia vulturis*. Elsewhere I have joined in an expression of the opinion that *vulturis* is a synonym of *Olfersia spinifera* (Leach), but I am not now so certain that this is the case. I shall not enter into a discussion of the question here and for the present at least I am reverting to the use of the name *vulturis*.



Olfersia vulturis Van der Wulp: A, larva; B, portion of derm of larva.

From these flies there were obtained three newly deposited larvae. Two of these were found in the insect net in which the flies were caught and one was attached—perhaps accidentally—to the feathers of the host. As far as I am aware no larva of any species of this genus has yet been described. These at hand present certain very striking peculiarities that distinguish them from any other Hippoboscid larvae that have so far been described or with which I am familiar.

In its general form the larva of this species is the same as that which is characteristic of the family, its length on the slide about 5 mm. The stigmatic plate is similar to that of such forms as *Ornithoctona nigricans*, *O. strigilecula*, *Ornithomyia lagopodis* and *Hippobosca maculata*. The posterior end of the body is capped by a single plate, representing probably a fusion of the usual paired spiracles, this plate being pierced by a number of small, pore-like openings which communicate with trachael trunks. It has been impossible to determine the arrangement of these pores, for the stigmatic plate is so heavily chitinized and deeply pigmented that it is quite opaque in uncleared specimens and attempts to clear it in caustic potash resulted merely in its complete disintegration.

The peculiar feature of the species is the fact that the entire body, excepting only the stigmatic plate and a narrow transverse zone which extends entirely about the body near the cephalic end, is thickly beset with short spines (Fig. B). These are spines, not setae, there being no socket. They vary somewhat in size, being noticeably larger near the center of the body on both dorsal and ventral sides. In addition to these the derm is everywhere marked by small, sub-circular, clear areas. The transverse zone which is free from spines marks the line along which the puparium splits at the time of emergence of the adult.

In all the other species that have been described and that I have seen, the derm of the larva is entirely free from spines or irregularities of any sort.

At the University of California, E. O. Essig, associate professor of entomology and associate entomologist, has been appointed professor of entomology and entomologist at the experiment station. Dr. Edwin C. Van Dyke, associate professor of entomology, has been appointed professor of entomology.—*Science*, Dec. 30, 1927.

A New Species of Meloid Beetle, with a Key to the North American Species of the Genus Leonidia Cockerell.* (Coleop.)

By Clarence E. Mickel, University of Minnesota, St. Paul, Minn.

The following new species of *Leonidia* was reared from the cells of the bee, *Anthophora occidentalis* Cresson, which were collected in the vicinity of Colorado Springs, Colorado, by Mr. G. W. Goldsmith, of the Alpine Laboratory, Manitou, Colorado.

Leonidea anthophorae n. sp.

♂. Piceous; elytra fulvous, at the sides entirely covering the first abdominal segment; length 12 mm.

Head piceous, except the front very dark mahogany red; labial palpi 3-segmented, the maxillary palpi 4-segmented; last segment of the maxillary palpi equal in length to the third (Fig 2, a); mandibles edentate, blunt at the tip; labrum somewhat depressed anteriorly, the anterior margin very slightly and broadly emarginate, moderately punctate throughout, clothed with sparse, erect, black hairs, anteriorly with a fringe of shorter, fuscous hairs; clypeus glabrous and with scattered punctures, the latter slightly larger than those of the labrum, anterior margin of clypeus broadly concave with a small median tooth; suture between the clypeus and the front indistinct; front and vertex glabrous, the interantennal area of the front with scattered, very minute punctures, remainder of front and vertex with sparse, rather large punctures interspersed with very minute punctures like those of the lower part of the front; front and vertex clothed with sparse, erect, black hairs; antennae 10-segmented, the first two segments glabrous, sparsely punctate, the remaining eight segments densely punctulate and pubescent; first segment campanulate, second segment slightly shorter than the first and almost equilateral; third segment longer than either the second or the fourth; fourth to ninth segments almost equal in length but the distal ones narrower and more rectangular; ultimate segment almost twice as long as the penultimate, and acute at the tip (Fig. 2, b).

Prothorax piceous, glabrous, clothed with sparse, erect, black hairs; anterior half sparsely punctate, interspersed with very minute punctures; posterior half very scatteringly punctate; prothorax four-fifths as long as wide, the base margined and

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somewhat sinuate; scutellum large, prominent, glabrous, punctate and clothed with sparse, erect, black hairs; elytra fulvous, rugose, punctured, clothed with sparse, erect, black hairs, at the sides entirely covering the first abdominal segment.

Abdomen piceous to blackish brown, the hind margins of the segments testaceous; all of the segments subcorneous, the basal sternites somewhat less so medially than elsewhere; abdominal tergites with sparse punctures, and with sparse, erect, black hairs; sternites punctured and pubescent like the tergites, except sternites four to seven inclusive with a narrow, transverse area of dense, erect, black hairs; ultimate sternite biparted on the median line.

Legs piceous, clothed with sparse, erect, black hairs; tibiae with well developed spurs; tarsi slender; tarsal claws with a long, basal bristle.

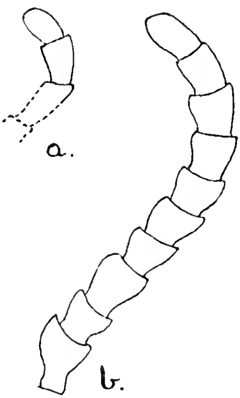

Fig. 1

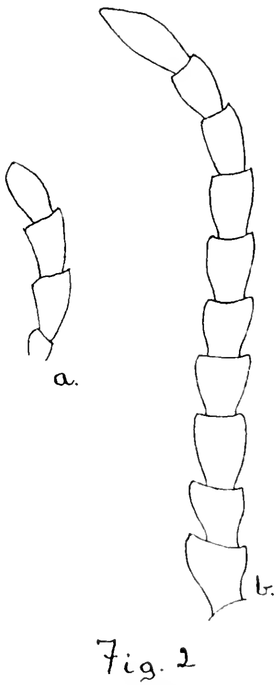

Fig. 2

Fig. 1—*Leonidia neomexicana* Cockerell: a, maxillary palpus; b, antenna. (Original.)
Fig. 2—*Leonidia anthophorae* n. sp.: a, maxillary palpus; b, antenna. (Original.)

♀. Similar to the male; more ferruginous; antennae of same form but slender, not so robust; abdominal tergites much less corneous, almost membranous; abdominal sternites two to six inclusive membranous medially, subcorneous laterally; sternites seven and eight entirely subcorneous, the eighth entire, not biparted on the median line.

Holotype: ♂, Colorado Springs, Colorado, emerged from cell of *Anthophora occidentalis* Cresson, June, 1926; in collection of University of Minnesota. *Allotype*: ♀, Colorado Springs, Colorado, emerged from cell of *Anthophora occidentalis* Cresson, June, 1926; in collection of University of Minnesota. *Paratypes*: 7 ♂ and 6 ♀, Colorado Springs, Colorado, emerged from cells of *Anthophora occidentalis* Cresson, June, 1926; in collections of University of Minnesota, American Entomological Society of Philadelphia, and Dr. M. H. Hatch.

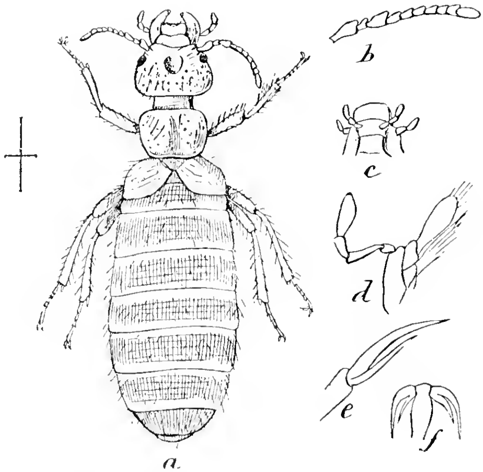

Fig. 3—*Leonidia rileyi* Dugès: a, adult female; b, antenna; c, labium; d, maxilla and palpus; e, tarsal claw from the side; f, tarsal claw from above. (From E. Dugès Insect Life, U. S. Dept. Agr.)

This species is closely related to *L. neomexicana* Ckll. It differs from *neomexicana* principally in the form and the comparative lengths of the ultimate segments of the maxillary palpi and the antennae, as is shown in Fig. 1, a and b (*neomexicana*) and Fig. 2, a and b (*anthophorae*). The figures were made by the author from the type in both cases. *Anthophorae* appears to be the most primitive of the three species of this genus so far known from North America, on account of the fact that in certain of the paratypes the last segment of the antennae displays remnants of a suture, indicating that at some previous time the antennae have been eleven segmented, the last two segments having fused to form the present ten-segmented antennae.

Key to the Species of Leonidia.

1. Second and third segments of the antennae oblique, with one side produced, Fig. 3, b; last segment of the maxillary palpi almost twice as long as the third segment, Fig. 3, d. . . . . *rileyi* Dugés.
   Second segment of the antennae almost equilateral, with one side scarcely produced, the third segment equilateral; last segment of the maxillary palpi not longer than the third segment . . . . 2.
2. Last segment of the antennae acute at the tip, almost twice as long as the penultimate segment, Fig. 2, b; last segment of the maxillary palpi equal in length to the penultimate segment, Fig. 2, a. . . . . *anthophorae* n. sp.
   Last segment of the antennae rounded at the tip, only slightly longer than the penultimate segment, Fig. 1, b; last segment of the maxillary palpi distinctly shorter than the penultimate segment, Fig. 1, a. . . . . . . *neomexicana* Ckll.

Specimens of the genus *Leonidia* shrivel and become greatly distorted when pinned in the same manner as other Coleoptera. This is especially true of the abdominal region which is only slightly chitinized. To overcome this distortion the type material of *anthophorae* was prepared in the following manner: The live specimens were dropped in boiling water and removed immediately; they were then dehydrated in alcohols, being allowed to stand 24 hours in 30%, 50%, 75%, 85% and 95% alcohol respectively; they were then transferred to xylol, in which they remained four or five days; the specimens were then pinned in the usual manner. This method produced very good mounts. The hot water treatment, however, results in the segments of the body and appendages remaining distended after mounting, while in specimens pinned in the usual way the segments of the body and appendages contract into one another upon drying. This accounts for the extraordinary length of the antennae in Fig. 2, b, as compared with Fig. 1, b. It was taken into account in the identification of the material.

Scale Insects of Pennsylvania (Homop.: Coccidae).

By F. M. Trimble, Bureau of Plant Industry, Harrisburg, Pa.

The economic importance of the Coccidae or scale insects is recognized by plant growers throughout the world and the interest in this group in the United States has been unusually strong since the introduction of the San Jose scale in California about 1870. This family is represented in the fauna of Pennsylvania by one hundred and twelve species. In 1917 only forty-two species had been recorded in the state, but subsequent explorations by the writer and other members of the Bureau of Plant Industry have revealed seventy other species, three of which were new to science. Although only twelve of the total number are economic pests on out-door plants yet these are sufficiently abundant at times to cause enormous losses if not controlled by artificial means. In greenhouses and conservatories nine species have been recorded as generally injurious.

The peculiarities in form and habitat of this family are not unlike those of many other families of insects and the amateur must closely scrutinize infested plants in order to find many of them.

Those found in Pennsylvania are as follows:

*Icerya purchasi Maskell. Fluted scale. Infests pittospermum and citrus varieties.

Matsucoccus matsumurae Kuwana. A rare species and recorded but once,—imbedded in the cambium of twigs of the past year's growth on pitch pines. Originally described in Japan.

Xylococcus betulae Pergande. Recorded from one locality on black birch and *Alnus incana*. The scales were imbedded in the cambium where the bark was cracked.

*Orthezia insignis Dougl. Greenhouse orthezia. A common pest of lantana and coleus indoors.

O. solidaginis Sanders. Occasionally taken on goldenrod and cinquefoil.

Nipponorthezia ardisiae Kuwana. A rare coccid found in an ant nest near fort Hunter. Originally described in Japan.

Newsteadia americana Morrison. A rare species described

*Note: Greenhouse species marked by an asterisk.

from material taken by Prof. J. G. Sanders in Pennsylvania on tree roots.

*ASTEROLECANIUM BAMBUSAE Bdvl. Bamboo scale. Common on bamboo in greenhouses.

A. VARIOLOSUM Ratz. Pit-making oak scale. Occasionally injurious to white and English oaks.

A. SP. An unidentified species taken on *Osmodium caroliniana*, *Viola emarginata* and *Fraxinus* sp.

LECANIODIASPIS CELTIDIS Ckll. Taken on horsechestnut and tulip poplar.

L. PRUINOSA Hunter. One record from black locust.

L. TESSELLATA Ckll. Recorded on rhododendron and high-bush huckleberry.

KERMES ANDREI King. Rare on white oaks.

K. ARIZONENSIS King. Recorded but once in Pennsylvania, on white oak.

K. GALLIFORMIS Riley. Occasionally taken on red oak.

K. KINGII Ckll. Occasionally taken on red oak.

K. PETTITI Ehrh. Common on black oak.

K. PUBESCENS Bogue. Common on mossy-cup oak in southeastern Pennsylvania.

GOSSYPARIA SPURIA Modeer. European elm scale, a common pest of all varieties of elms in Pennsylvania.

*ERIOCOCCUS AZALEAE Comst. Azalea bark louse. A common pest of azaleas and hybrid rhododendrons in greenhouses.

E. KEMPTONI Parr. Rare on *Ammophila breviligulata*, taken on Presque Isle in Lake Erie.

E. QUERCUS Comst. Oak eriococcus. Rare on bear oak.

PHENACOCCUS ACERICOLA King. Wooly maple-leaf scale. A common pest of sugar maples.

P. SERRATUS Ferris. A rare species taken on beech.

P. sp. An unidentified species found dwarfing ragweed.

TRIONYMUS sp. An undescribed species taken under a stone associated with ants.

*PSEUDOCOCCUS ADONIDUM Linn. Long-tailed mealy bug. A common pest of many greenhouse plants.

*P. CITRI Risso. Short-tailed or citris mealy bug. Occasionally found on various greenhouse plants.

P. COMSTOCKI Kuwana. Recorded from *Catalpa bungei* and *Buxus sempervirens*.

P. MARITIMUS Ehrh. A common mealy bug on many out door plants.

*P. NIPAE Maskell. Kentia mealy bug. A common pest of kentia palms.

RIPERSIA MINIMA T. and K. On grass roots in ants' nest.

R. BLANCHARDI K. and C. On grass roots in ants' nest.

PULVINARIA ACERICOLA Walsh and Riley. Cottony maple-leaf scale. Injurious to silver maples.

*P. FLOCCIFERA Westwood. A rare greenhouse species taken on *Dilffenbachia.* sp.

P. VITIS Linn. Cottony maple scale. Common on grape, maple and sycamore.

PSEUDOPHILIPPIA QUAINTANCII Ckll. Cottony pine scale. A rare species taken on *Pinus rigida* and *Pinus virginiana.*

ERIOPELTIS FESTUCAE Fonsc. Cottony grass scale. A rare species taken on orchard grass in eastern Pennsylvania.

*EUCALYMNATUS TESSELLATUS Sign. Tessellated scale. A common pest of palms and many other greenhouse plants.

*COCCUS ELONGATUS Sign. The elongate scale. A rather common pest of rubber plants in greenhouses.

*C. HESPERIDUM Linn. Soft brown scale. A common greenhouse pest.

*C. PSEUDOHESPERIDUM Ckll. Occasionally taken on orchids.

TOUMEYELLA LIRIODENDRI Gmel. Tulip tree soft scale. A common pest of tulip trees and ornamental magnolias.

T. PINI King. Occasionally found on pitch pines. Honeydew excreted by this species is rich in the rare sugar melizotose.

LECANIUM CARYAE Fitch. Brown elm scale. Common on elms and hickory.

L. CORNI Bouche. European fruit scale. A widely disseminated scale of little importance in Pennsylvania.

L. CORNUPARVUM Thro. Magnolia soft scale. A scarce insect recorded chiefly on cucumber trees.

L. CORYLI Linn. A rare Lecanium taken on *Pyracantha;* previously imported from France.

L. FLETCHERI Ckll. A common scale taken on arborvitae and junipers.

L. NIGROFASCIATUM Perg. Terrapin scale. A bad pest of peach and plum trees in eastern and central Pennsylvania.

L. PERSICAE Fab. European peach scale. Taken on imported barberry.

L. PRUNASTRI Fonsc. Globular scale. A new pest of peach and plum in Central Pennsylvania.

L. QUERCIFEX Fitch. Oak lecanium. A common scale taken on white oak.

*SAISSETIA HEMISPHAERICA Targ. Hemispherical scale. A common greenhouse pest on ferns and various other plants.

*S. NIGRA Nietn. Black scale. An occasional pest of rubber plants and ferns.

*S. OLEAE Bernard. Olive scale. Occasionally taken on ferns and palms.

PHYSOKERMES PICEAE Schrank. Spruce bud scale. Common on white, red and Norway spruces. The spruce Christmas trees shipped into Pennsylvania have often been found to be heavily infested with this pest.

CHIONASPIS AMERICANA Johns. Elm scurfy scale. A pest of American elms.

C. CARYAE Cooley. A rare scale taken on black walnut.

C. CORNI Cooley. Common on *Cornus amomum*.

C. EUONYMI Comst. Euonymus scale. A serious pest of euonymus.

C. FURFURA Fitch. Scurfy scale. A pest of apple trees.

C. LINTNERI Comst. Lintner's scale. A common pest on *Cornus amomum*.

C. ORTHOLOBIS Comst. Cottonwood scurfy scale. A common pest of cottonwoods in northern Pennsylvania.

C. PINIFOLIAE Fitch. Pine-leaf scale. A pest of all pines and occasionally spruces.

C. SALICIS Linn. An imported species introduced on lilac and *Tilia* sp.

C. SALICIS-NIGRAE Walsh. Willow scurfy scale. A common scale on willows in western Pennsylvania.

C. SYLVATICA Sanders. Gum scurfy scale. Common scale on sour gum.

*HOWARDIA BICLAVIS Comst. Mining scale. Scarce on *Tamarindus indacus* in conservatories.

*DIASPIS BOISDUVALLI Sign. Boisduvall's scale. A common pest on many greenhouse plants.

*D. BROMELIAE Kerner. Pineapple apple. Taken on Bromeliaceae in greenhouses.

D. CARUELI Targ. Juniper scale. A common pest of junipers.

*D. ECHINOCACTI Bouche. Cactus scale. Recorded on many greenhouse cacti.

AULACASPIS ROSAE Bouche. Rose scale. A common pest of roses and all bramble berries.

*HEMICHIONASPIS ASPIDISTRAE Sign. Aspidistra scale. Common on aspidistra and ferns.

*PINNASPIS BUXI Bouche. An occasional pest of dracaenas.

LEUCASPIS JAPONICA Ckll. Maple bark scale. Found in Pennsylvania on sugar maple and Japanese maples.

L. BAMBUSAE Kuw. Taken on bamboo in a conservatory.

*Fiorinia fioriniae Targ. European fiorinia. Often injurious to camellias and gardenias.

*F. theae Green. Tea scale. A common pest of the commercial tea.

Aspidiotus abietis Schrank. Hemlock scale. Common on hemlock.

A. ancylus Putnam. Putnam's scale. A common scale with a long list of host plants.

*A. brittanicus Newst. Laural scale. Occasionally found on bay trees and imported boxwood.

A. comstocki Johns. Often taken on the twigs and leaves of sugar maple.

*A. cyanophylli Sign. Recorded from pandanas in greenhouses.

A. forbesi John. Cherry scale. Common on cherry trees.

*A. hederae Vall. Ivy scale. A common pest of greenhouse plants.

A. juglans-regiae Comst. English walnut scale. Often recorded on walnut.

*A. lataniae Sign. Latania scale. A common pest of latania, *Areca lutescens* and coconut palms.

A. osborni Newell and Ckll. Common on chestnut trees.

A. ostreaeformis curt. European fruit trees scale. Recorded on plum trees.

A. perniciosus Comst. San Jose scale. The most pernicious of all scale insects recorded in Pennsylvania.

*A. rapax Comst. Greedy scale. A common pest in greenhouse plants.

A. townsendii Ckll. A rather rare species on the twigs and leaves of ornamental magnolias.

A. ulmi John. Elm aspidiotus. Often taken on elms.

A. uvae Comst. Grape scale. Often abundant on grape and sycamore.

Cryptophyllaspis liquidambaris Kot. Sweet gum gall scale. Common on sweet gum in southeastern Pennsylvania.

*Pseudaonidia paeoniae Ckll. Frequently taken on greenhouse azaleas.

*Chrysomphalus aonidum Linn. Circular scale. A common pest of dracaenas and rubber plants.

*C. aurantii Mask. Red scale. Occasionally taken on greenhouse plants.

*C. dictyospermi Morgan. Morgan's scale. A widely disseminated greenhouse pest.

C. OBSCURUS Comst. Obscure scale. Rather common on red oaks and English oaks.

*GYMNASPIS ACHMEAE Newst. Common on *Bromelia* and *Bilbergia* varieties.

*LEPIDOSAPHES BECKII Newm. Purple scale. Common on camellia, citrus, etc.

*L. CAMELLIAE Hoke. Camellia scale. Common on camellia.

*L. GLOVERII Pack. Glover's scale. Scarce on citrus varieties.

*L. PINNAEFORMIS Bouche. On citrus varieties recently imported from France.

L. ULMI Linn. Oyster shell scale. A pernicious pest of ornamental shrubbery and trees.

*ISCHNASPIS LONGIROSTRIS Sign. Thread scale. Common on palms and camellia.

*PARLATORIA PERGANDII Comst. Chaff scale. Common on citrus trees and ivy.

*P. PROTEUS Curt. Recorded from crotons.

Notes on the Cercopidae of America North of Mexico (Homoptera).

By E. D. BALL, Sanford, Florida.

In a recent article the writer summarized the present knowledge of the genus *Clastoptera* for the region north of Mexico. A few interesting notes with reference to the remainder of the family follow.

Monecphora bicincta Say. The writer found the nymphs of this species down in the bottoms of grass clumps in damp situations around Washington, D. C. Places where seepage was appearing on side hills with south slopes appeared to be favorite spots. In Florida this species occurs in grass clumps in damp areas and forms large frothy masses often partly below the level of the ground.

This insect differs widely from the representatives of other Cercopid genera in this country in the manner of leaving the froth mass. All the other species observed leave in the nymphal state, climb up a stem or branch, fix their claws securely in the bark and remain stationary, allowing their skin to dry. The nymphal skin splits down the back and the insect crawls out leaving the dry skin, in almost its original shape, clinging to the stem. This is usually done in the early morning, in order to give the wings time to fully expand before the heat of the day hardens them. Not so with the *Monecphora* nymph—when ready to emerge it crawls up out of its damp retreat among the stems and roots, selects an open but usually partly shaded situation on the under side of a grass blade and forms a single large sphere of froth. This sphere is made up of a lower solid mass of bubbles and an upper hollow hemisphere formed of a single layer of almost uniform sized and relatively transparent bubbles. On the lower solid mass the nymph comes to rest, partly dries its skin, then splits it down the back from end to end and spreads it out like a rug on the floor. Standing on this raft, and sheltered by the glittering dome of bubbles above, it spreads out its wings and dries them at leisure. This usually occupies the morning and when it finally leaves its frothy bower it leaps free, spreads its wings and is away like a flash.

Aphrophora saratogensis Fh. The writer has taken the adults of *saratogensis* and *parallela* in abundance on pine in Wisconsin, Massachusetts and Virginia but has never found any nymphs on pine except those of the latter species. In Florida, *saratogensis* is abundant but *parallela* has not been taken so careful watch was kept for froth masses on pine but without success. One day in sweeping an area where luxuriant clumps of the common ditch fern (*Woodwardia virginica*) were growing near scattered clumps of pines a number of large froth masses were found on the ferns and from them were taken nymphs that later developed into *A. saratogensis* adults. From that time on froth masses were found on ferns in many places but none on pines. The writer had long suspected that *parallela* was the only one of our species of *Aphrophora* that fed on pine in the nymphal stage. Both *saratogensis* and *signoreti* are much more closely related to the western forms, in which the known nymphs are found feeding on vegetation below the pines, than they are to *parallela*.

Aphrophora signoreti Fh. This species is rare in collections and has only been reported from Ontario, N. Y., and

North Carolina. It is very likely restricted by its nymphal food plant to an Appalachian and northern habitat and when that is found its distribution will be explained and the numbers in collections increased.

Stearns evidently confused this species with *annulata* Ball as he reports having examples of *annulata* from N. H. and N. C. These were no doubt *signoreti* as he does not record examining examples of *signoreti* nor give drawings of its genitalia. *A. annulata* Ball is a western form known at present from Colo., Utah and California and all of these examples were taken in the higher mountains. The male plates are broad and flat at the base with the outer margins parallel or slightly widening to just before the black tips, the inner margins cut out obliquely, and the whole structure clothed with long hairs. In *signoreti* the male plates are much less divergent longer and narrower, almost finger like, without hairs. Stearn's drawing of the plates of *annulata* as a very broad crescent is not typical of either species.

PHILARONIA Ball.

Van Duzee in his Catalog lists *bilineata* (Say) as the logotype of the genus *Philaronia* but gives no authority. Lallemand in 1912 designated *P. abjecta* as the type.

Stearns states that he has examined specimens of *P. abjecta* from North Carolina but these were probably examples of *Lepyronia angulifera* which is abundant in this region and has frequently been determined as *abjecta*.

P. bilineata var. *infuscata* Stearns (Hemp. Conn. p. 230-1923)=var. *orbicularis* Ball, Proc. Ia. Ac. Sc. 25, p. 145-1919 which Stearns omitted.

P. bilineata var. *pallidus* Stearns p. 230 is so near the type form as to be scarcely worth considering as a variety. If this form is recognized at all Stearns' name will fall before var. *americana* Bak. (Can. Ent. p. 112 1897) shown by a Baker type in the writer's possession. Baker described *americana* as "resembling in color *P. lineatus*" while Stearns uses exactly the same words "color pale yellow"; to describe var. *pallidus* and *P. lineatus.* There does not however seem to be any valid reason for maintaining a varietal name.

The Invalidity of the Tentamen Names of the Butterflies (Lepid. : Rhopalocera).

By W. J. Holland, Carnegie Museum, Pittsburgh, Pennsylvania

Mr. Wm. T. M. Forbes published in *Science*, October 28, 1927, pp. 396-397, an article anent the names used in Hübner's *Tentamen*. He endeavors to reply to my article published in *Science* on July 1, 1927. Because of Opinion 97 of the International Commission on Scientific Nomenclature all the *Tentamen* names become unavailable as generic terms attributable to Hübner under date of 1806. *Cela va sans dire.* It is evident that if these names are to be recognized as having generic standing, it must be because they have been used in a generic sense subsequently to the issue of the *Tentamen*. Mr. Forbes claims that they were so used by Hübner himself from 1806-1816. I take issue with him. I say that they were *not* so used by Hübner, Mr. Forbes to the contrary notwithstanding. Mr. Forbes evidently does not grasp Hübner's "system," or is wilfully perverting it. He and those who hold and have held with him, including my good friend of bygone years, the late Dr. Samuel H. Scudder, have imported into their construction of Hübner's terms concepts derived from modern usage, apparently without heeding the warnings of Hübner himself. Having studied the works of Hübner page by page and being familiar with all of them, I think it is beyond doubt, as most authors have held, that Hübner consistently employed in all of his earlier writings a *trinomial* nomenclature, in which he entirely ignored generic terms both in his *own* and in the *modern sense* of the term. It is in defiance of Hübner himself that generic value has been attributed by Scudder and a few recent students to the category of names, which Hübner designated as *Stirpes* (Stämme).

As my article published in *Science* may not be easily accessible to some of the readers of the present paper, I here again give the outline of Hübner's System of Classification:

Order LEPIDOPTERA

a. *Phalanges* (*Germanice* Horden; *Anglice* hordes) = SUB-ORDERS, in modern parlance.

b. He divided the *Phalanges*, or Hordes, into *Tribus* (*Germanice* Rotten; *Anglice* tribes) = SUPER-FAMILIES.

c. He subdivided the *Tribus* into *Stirpes* (*Germanice* Stämme; *Anglice* races, or clans) = FAMILIES, as now used.

d. He subdivided the *Stirpes* or races, into *Familiæ* (*Germanice* Familien; *Anglice* families) = SUB-FAMILIES, as now used.

e. He subdivided the Families into *Coitus* (*Germanice* Vereine; *Anglice* unions) = GENERA in the Linnæan sense.

f. He subdivided the *Coitus* into *Genera* (*Germanice* Gattungen. *Anglice* kinds, or species) = SPECIES in the Linnæan sense, and as now employed.

In my article Mr. Forbes charges me with some sins of omission. Purposely, for the sake of brevity, I omitted alluding to a number of things, to which Mr. Forbes calls attention. I was merely *stating* the law; I was not *construing* it in its application to particular cases. Mr. Forbes takes up the particular case of the word *Limnas*. He evidently is somewhat mystified and puzzled as to the status of that particular word. He flounders, and finally asks the question: "What would Dr. Holland do about it?"

So far as the names of the butterflies in the *Tentamen* are concerned the reply I make to Mr. Forbes follows hereinafter.

As I fully explained in my article published July 1, 1927, Hübner in his *Tentamen* was not writing about *genera*, but, as he explicitly states, about *stirpes* (*families* in the modern sense). As I pointed out, he wrote after the name of each *Stirps* (family), which he provisionally suggested in the *Tentamen*, the name of a familiar species (Gattung) with which all of his readers might be supposed to be well acquainted, in order to show them what kind of a butterfly might be included in the STIRPS. He *absolutely was not using the words in a generic sense*, although a reader, familiar with our modern use of terms in combination, might jump to such a conclusion, as has actually been done by some, including Dr. Scudder, Mr. Forbes, and Messrs. Barnes and Benjamin. That what I say of Hübner's employment of terms in the *Tentamen* is positively true is proved by all the subsequent writings of Hübner, in which, until he came to publish Vol. II of the *Sammlung exotischer Schmetterlinge*, he always had in mind, or used, a *trinomial form of nomenclature*. In the legends of his plates, *Sammlung exotischer Schmetterlinge*, Vol. I, pls. 1-213, the legends are all trinomial: giving 1st, the name of *Stirps* (*family* in the modern sense); 2nd, the name of the *familia* (Hübnerian); 3rd, the name of the *genus* (Gattung, or *species* in our modern understanding of the term). We must always remember that Hübner used the word *genus* for what we today call *species*. In the *Systematisch-Alphabetisches Verzeichniss*, published in 1822 (?), which is, as Hübner states in the Introduction, the Index to his *Sammlung europäischer Schmetterlinge*, he consistently uses *trinomial* terms, although the plates in that work only carried the names of the species (Gattungen), and were in fact uninomial. In the *Anzeiger* (undated), but which cannot have been published earlier than 1827, probably later, he furnishes a catalog of *all* of his published species, which are listed in the *Verzeichniss bekannter Schmettlinge* (*sic*). In this catalog, which accounts for the species published both in the *Sammlung europäischer Schmetterlinge*, and the *Sammlung exotischer Schmetterlinge*, and which may be justly regarded as "the final layout" of his "system," the points I brought out in my article of July 1, 1927, are made as clear as the sun.

Evidently Mr. Forbes does not understand and has not thoroughly acquainted himself with the writings of Hübner. In fact he confesses in his article that one of them he has not seen, and queries its existence in America. There are copies of this work in America, one of which lies before me as I write, thanks to the kindness of its amiable possessor, Professor H. T. Fernald of Amherst, Mass., whose honored father was one of the leading students of the Hübnerian literature in his day. There is another in the library of the

Academy of Natural Sciences in Philadelphia, which I have recently consulted. It is a rare book.

The butterflies in the *Tentamen* and throughout the writings of Hübner were divided by him into two *tribus* (Rotten): the "nymphales"; and the "gentiles." In the *Tentamen* he suggests the subdivision of these *Tribus* into *Stirpes*. He says so in positive terms. The names of the *Stirpes* (*families* in the modern sense) of the first Tribe he consistently used in his later writings; the *stirps*-names proposed for the second Tribe he used in the trinomial legends of Vol. I of his *Sammlung exotischer Schmetterlinge*, but subsequently simply ignored them, and substituted other *stirps*-names, when he came to publish the index to his *Sammlung europäischer Schmetterlinge* and subsequently, as I shall show later in this article.

"TRIBUS I, nymphales"*

"Stirps I, NEREIDES—Nereis Polymnia"

The word *Nereis* is employed by Hübner in the *Tentamen* and elsewhere as the name of a *Stirps* (Stamm) of butterflies. It is so used in the titles of Pls. 1-17 in the *Sammlung exotischer Schmetterlinge*, it occurs in the *Verzeichniss bekannter Schmettlinge*, pp. 8-14, as the equivalent, as Hübner himself states, of the *Heliconii* of Linné and Fabricius. It is cited in his *Anzeiger*, 1827, p. 2, in the category of *Stirpes* and nowhere else. Under the *Nereides* Hübner assembled the following genera: *Hymenitis, Ithomia, Oleria, Thyridia, Aeria, Ceratinia, Sais, Dismorpha, Mechanitis, Eucides, Melinæa, Migonitis, Sunias, Apostrophia, Sicyonia*, and *Ajantis*. The name *Nereis*, which never was used by Hübner in a generic sense (*Cf. Anzeiger*, p. 2) under any construction of terms cannot be used as a generic name in the Lepidoptera, because it is preoccupied in the *Vermes* (Linnæus, 1791). That is that!

"Stirps II, LIMNADES—Limnas Chrysippus"

Limnas, suggested by Hübner in the *Tentamen* as the name of a *Stirps* (Stamm) was so employed by him in Vol. I of the *Sammlung exotischer Schmetterlinge*, Pls. 18-33. On these plates are represented fifteen species, belonging to two

*The headings in quotation-marks are transcribed from the *Tentamen*.

families (in modern parlance), the *Danaidæ* and the *Riodinidæ*, and nine genera. The use of *Limnas* as a generic name must be attributed to Boisduval, who, knowing that Hübner had not used the word in a generic sense, employed it in 1836 (*Spec.* Gén. I, pl. 20, fig. 1) for a genus of *Riodinidæ* (*Erycinidæ*), as he had a perfect right to do. He designated the genotype as *pixe*, a well known and common Central American species. Blanchard four years later used the word in the same sense as Boisduval, but wrote it with a variant spelling "*Lymnas*." The word so spelled should be designated as a synonym of *Limnas* Boisd. (Kirby, Stichel, and Seitz to the contrary nothwithstanding.) The generic use of *Limnas* for any species of the *Danaidæ* is without warrant, though several reputable authors have made this error.

"Stirps III, LEMONIADES—Lemonias Maturna"

Lemonias, proposed by Hübner in the *Tentamen* as the name for a *Stirps* (Stamm), was subsequently employed by him as such in the titles of plates and in the *Verzeichniss*, p. 26; and the *Anzeiger*, p. 2. It was never used by Hübner as a generic term (*me judice*). The *Lemoniades* of Hübner (*Cf. Verzeichniss l. c.*) include a heterogeneous assemblage of genera: *Stalachtis* (*Riodinidæ*[1]) *Actinote* and *Telchinia* (*Acræidæ*), *Melitæa*, *Schœnis*, *Byblia*, and *Cinclidia*[2] (*Nymphalidæ*). The first employment of *Lemonias* as a generic name among the diurnal lepidoptera was by Hoffmansegg (Wiedemann's Zoöl. Magazin, I, ii, 1818, pp. 99-100). But, as has been shown by Stichel, (Genera Insectorum, fasc. CXII, p. 377) *Lemonias* Hoffmansegg (1818), falls before *Nymphidium* Fabr. (1807) and the word, with all its derivatives, drops into the synonymy. The use of *Lemonias* as a generic name in substitution for *Melitæa*, by Barnes and Benjamin in the "List of the Butterflies of Boreal America," is incorrect, and founded upon a misunderstanding of the status of the term, which, though long used in the *Riodinidæ* (*Erycinidæ*), has been so used without warrant, as is clearly indicated by Stichel (*l. c.*).

[1]Misspelt "*Rhiodinidæ*" in Barnes & McDunnough's Check-List, p. 13

[2]*Cinclidia* Hübner is synonymous with *Melitæa* Fabr.

"Stirps IV, DRYADES—Dryas Paphia"

Dryas is suggested by Hübner in the *Tentamen* as the name of a *Stirps*, and as such is used by him subsequently, but was never employed by him in a generic sense (See his writings *passim*: *Sammlung exot. Schmett.*, Vol. 1, 1806-1819; *Systemat.-Alph. Verzeichniss*, 1822; *Verzeichniss bekannter Schmettlinge*, 1816-1827, p. 29; and the *Anzeiger* 1827 (?), p. 2). It has no standing whatever as a generic term, and its use as such by several authors (*e. g.* Tutt) and by Barnes and Benjamin in their recent "List of the Butterflies of Boreal America," is in error. The *Dryades*, composing Stirps IV of Hübner, according to him include the genera *Phyciodes*, *Brenthis*, *Argynnis*, *Issoria*, *Acidalia*, *Dione*, *Colænis*, and *Argyronome*. (*Cf.* Hübner's *Verzeichniss*, p. 29, *et seq.*; *Anzeiger*, p. 2.)

"Stirps V, HAMADRYADES—Hamadryas Io"

Hamadryas suggested by Hübner in his circular letter, known as the *Tentamen*, as the name of a *Stirps* (Stamm), was not used by him as a generic name (*Cf. Syst. Alph. Verz.*, pp. 2-6 *et seq.*; *Verz. Bek. Schmett.*, p. 32; *Anzeiger*, p. 2). The genera, which he included under the *Hamadryades*, are *Vanessa*, *Pyrameis*, *Precis*, *Anartia*, *Temenis*, *Junonia*, *Alcyoneis*, *Apatura*, *Historis*, *Athena*, *Polygonia*, *Eugonia*, *Inachis*, *Elymnias*, and *Araschnia*. As expert systematists know, the genera assembled under this category are somewhat incongruous, but superficially they resemble each other. *Hamadryas* as a generic name must be credited to Boisduval, 1832, who applied the name in a generic sense to *Papilio zoilus* Fabr., which is the genotype. The insect is found in the Austral-Asian region. (*Cf.* Voyage de l'Astrolabe, Lepidoptera, p. 91; Doubleday & Hewitson, Gen. Diurn. Lep., 1847, pl. 18*, fig. 1; Kirby, Syn. Cat. Lep., 1871, p. 18.) The name *Hamadryas* cannot be used as a generic name for any North American insect.

The word *Hamadryas* has been used as a generic name in the *Ophidia*, the *Mammalia*, and the *Mollusca* by authors writing since Boisduval (1832). In these three cases it is *nomen preoccupatum*.

"Stirps VI, NAJADES—Najas Populi"

Najas, proposed and used by Hübner as the name of a *Stirps* (Stamm) was never used by him as a generic term. The many genera included by Hübner under the *Najades* are mostly tropical American, African, and Asiatic *Nymphalidæ*, of which only *Ageronia*, *Hypolimnas*, and *Callicore* have been listed as occurring within the United States. Its generic use in the lepidoptera attributable to Hübner (1806) is incorrect; it is, however, apparently preoccupied in the *Mollusca*, Lamarck, 1809.

"Stirps VII, POTAMIDES—Potamis Iris"

Potamis is used by Hübner to designate a *stirps* (*Potamides*), including a large number of genera belonging in our accepted modern classification to the *Nymphalidæ*, the *Morphidæ*, *Brassolidæ*, &c. It was never used in his category of *coitus* (genera, in our accepted sense of the latter term). Such use is inadmissible, if Hübner is to be the reputed author of the genus.

"Stirps VIII, OREADES—Oreas Proserpina"

The *Oreades* of Hübner are arranged by him in eight families including a long list of genera, mainly referable to the *Satyridæ*. The use of the word in a generic sense is impossible, with Hübner cited as author.

The *Stirps*-names for butterflies, suggested by Hübner under his "Tribus II gentiles," appear in the *trinomial* legends of the plates in Vol. I of the *Sammlung exotischer Schmetterlinge*, as everybody knows, but they are there consistently used as *Stirps*-names, not as generic designations. The use of *Rusticus*, *Princeps*, *Mancipium*, *Consul*, and *Urbanus* as *Stirps*-names was subsequently abandoned by Hübner. In his *Systematisch-Alphabetisches Verzeichniss* (1822) he makes the following substitutions:

For *Rusticus*	he	substitutes	*Agrodiætus*;	Stirps	*Agrodiæti*;
" *Princeps*	"	"	*Archon*;	"	*Archontes*;
" *Mancipium*	"	"	*Anthropodum*;	"	*Anthropoda*;
" *Consul*	"	"	*Hypatus*;	"	*Hypati*;
" *Urbanus*	"	"	*Astycus*;	"	*Astyci*.

The *Systematisch-Alphabetisches Verzeichniss* was in fact the index to his *Sammlung europäischer Schmetterlinge*. In 1822 he threw the names of the *Stirpes* used in the first volume of his *Sammlung exotischer Schmetterlinge* into the discard. Hübner regarded all of his work prior to the issue of the *Verzeichniss bekannter Schmettlinge* as more or less tentative. He brings this out clearly in his Introduction to the *Systematisch-Alphabetisches Verzeichniss* (1822), in which he says at the outset: "The great number of specimens of species (Gattungsmuster) of European lepidoptera in my collection, which I have figured during the last thirty years, have long called for an index of the names, which I have provisionally (einstweilen) given them, until such time as they can be *definitely named* (unfehlbar genannt) &c." He was a searcher for truth. He had, however, a "System," which upon the whole he preferred to any other, and it was not until he began to publish his *Verzeichniss bekannter Schmetterlinge* (1816-1827) and the plates of Vol. II of his *Sammlung exotischer Schmetterlinge,* that he finally fell into line with other systematists, and adopted the binomial nomenclature.

In the *Verzeichniss bekannter Schmettlinge* (1816-1827), which is an attempt to catalog *all* of the species, of which he had published figures, and is the "final layout" of his "system," he introduces an additional "*Stirps*" between the *Hypati* and the *Astyci,* calling it the *Telchines*, into which he puts such different genera as *Curetis* (*Lycænid*) and *Castnia!*

The *Anzeiger*, which cannot certainly have appeared earlier than 1827, completely ignores all the stirps-names given in the *Tentamen* in Tribus II. The title is "*Anzeiger/der im Verzeichniss bekannter Schmettlinge/angenommenen Benennungen ihrer Horden, Rotten/Stämme, Familien, Vereine, und Gattungen.*" Freely translated the title is: "Index of the Names adopted for the Lepidoptera in the *Verzeichniss bekannter Schmettlinge,* giving their *Phalanges* (Horden) *Tribus* (Rotten) *Stirpes* (Stämme), *Familiæ* (Familien) *coitus* (Vereine) and *genera* (Gattungen)".

A study of the *Anzeiger* makes sun-clear what Hübner had in mind. He never used the word "Stirps" to designate a genus (*coitus*). The names *Rusticus*, *Princeps*, *Mancipium*, *Consul* and *Urbanus* appear nowhere in his alphabetical list of the *Stirpes* given on pp. 1-2. They do not occur in his alphabetical list of the *Coitus Papilionum* pp. 4-7.

Urbanus suggested by Hübner in the *Tentamen* as the name of a *Stirps* and used as such in some of the plates in Vol. I of the *Sammlung exotischer Schmetterlinge*, in all his later writings was totally ignored, and never used to designate anything, *stirps*, *familia*, *coitus* (Verein), or *species* (Gattung). (*Cf. Systematisch-Alphabetisches Verzeichniss*, 1822; *Verzeichniss bekannter Schmettlinge*, 1816-1827; and *Anzeiger*, 1827.) Its resuscitation as a generic name by Barnes and Benjamin, following S. H. Scudder, is unwarranted. The species *malvae*, placed under *Urbanus* by Hübner in the *Tentamen*, as a suggestion of what might be included in the family (*Stirps*), belongs according to Hübner (*Verzeichniss bek. Schmett.*, p. 110) to the genus *Carcharodus*. *Urbanus* as a generic name in the diurnal lepidoptera has no standing whatever, and its use is due to a misconception.

At the conclusion of his critique Mr. Forbes says: "In bringing in the 'Verzeichniss' Dr. Holland does not mention that ten years [1806-1816] had intervened, and that in the meantime Hübner had used all the Tentamen names of butterflies as generic (as the first names of binomials), also many of the moths. This fact completely invalidates his argument." Wondering upon what Mr. Forbes could possibly have founded his sweeping statement, I wrote to him for information. He kindly informs me (to my utter astonishment) that it is based upon the legends of the plates in the first volume of the *Sammlung exotischer Schmetterlinge*. But everyone of these plates carries a *trinomial* (not a binomial) legend. On these plates Hübner gives 1st, the name of the *Stirps;* 2nd, the name of the *Familia;* 3rd, the name of the *Gattung* (species). It is absolutely *not true* that Hübner used "all the *Tentamen* names" as "the first names of binomials" on these plates. He does not use one of them "as generic," in *our* sense, or in *his* sense, of that word. It is pure sophistry to try to make two out of three. Mr. Forbes is wrong. He might as well tell us that $2 + 2 = 5$. Inasmuch as his premise is not correct, his conclusion is equally incorrect. Incidentally I may say that I was not making an "argument" in a matter, which in my judgment does not admit of argument. In what I wrote I was stating the plain facts. Mr. Forbes and those who hold with him make the mistake of reading into the writings of Jacob Hübner what he palpably never intended. The use of Hübner's *stirps*-names as the designation of genera, attributable to Hübner, is as amusing a procedure as it would be if a paleontologist were to undertake today to rechristen *Diplodocus carnegici*, and call it *Dinosaurus carnegici*, because the ordinal name *Dinosauria* Owen (1842) has priority in time over the genus *Diplodocus* Marsh (1878).

As to the case of the term *Apatela* (*sic*) *to which Mr.* Forbes calls attention, and which he apparently regards as most puzzling, which indeed it is, if the *Stirps*-names of Hübner are to be taken as *generic*, which they are not, an easy solution of the difficulty is to be found. *Apatele* Hübner was a *Stirps* under which Hübner classified a number of genera (*coitus*). He did not employ the word in a generic sense. The first use as generic of the word *Apatela* must be attributed to Harris (1841) type *americana* Harris. But *Apatela* (not *Apatele* Hübner) falls as a synonym before *Acronicta* Ochsenheimer. The solution of the apparent difficulty is quite easy.

All of the foregoing has no interest for politicians, bankers, and coal-dealers; but it is of importance to systematists engaged in naming and classifying the butterflies and moths of the world.

Fourth International Congress of Entomology.

Dr. Karl Jordan, Permanent Secretary of the Congresses, wrote from Tring, Dec. 21, 1927: "The preparations for the Ithaca Congress are proceeding favorably. The number of European members will be sufficiently large to make the gathering an international one, and I think we shall all enjoy the meeting and enlarge our views."

ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., FEBRUARY, 1928.

Entomology at the "Convocation Week" Meetings, December 26 to 31, 1927.

We present herewith our annual summary of the papers treating of insects, as listed on the general program of the eighty-fourth meeting of the American Association for the Advancement of Science and of the Associated Societies, held at Nashville Tennessee. Although not all of those enumerated were delivered, the titles give an idea of the topics occupying the entomological workers at this time. These papers were presented before the following societies:

Entomological Society of America	31
American Association of Economic Entomologists	111
American Society of Zoologists alone	8
Same, Joint Genetics Section	5
Same, with Ecological Society of America	1
Same, with American Society of Parasitologists	1
Ecological Society of America alone	2
American Society of Parasitologists alone	7
American Phytopathological Society	3
American Society of Naturalists	1
Section O, Agriculture, with Amer. Assn. Econ. Ent.	4
Potato Association of America	1
American Nature Study Society	3
Total	178

On the basis of the comparisons made in the NEWS for February, 1927, page 55, this total exceeds those of the meetings of the last five years.

The subjects treated in these 179 papers were as follows:

i

Teaching Entomology	2
Cytology	1
Anatomy	6
Physiology	21
Ecology	10
Geographical Distribution	1
Ontogeny	2
Genetics	6
Parasites of Insects	5
Arthropods Affecting Man and Animals	9
Evolution	2
Taxonomy	5
General Economic Entomology	8

General Entomology	3
Insecticides	29
Apiculture	11
Insects Affecting Cereal, Forage and Field Crops (including Cotton 6)	28
Do. Truck Crops	6
Do. Greenhouse Plants	6
Do. Fruit	28
Do. Household and Stored Products	8
Do. Forest and Shade Trees	6
Insects Carrying Plant Disease Germs	4

ii

Myriopoda	3
Pauropoda	1
Symphyla	1
Apterygota	2
Orthoptera	4
Isoptera	1
Odonata	1
Homoptera	15
Heteroptera	4
Coleoptera (excl. Japanese beetle and boll weevil)	9
Japanese beetle	7
Boll weevil	5
Hymenoptera (excl. *Apis*)	7
Lepidoptera (excl. codling moth and corn borer)	4
Codling moth	11
Corn borer	11
Diptera (excl. *Drosophila*)	12
Drosophila	5
Acarina	5

Many of these figures are duplicated both between sections i and ii and also within each section.

The Entomological Society of America met December 27 and 28, Dr. F. E. Lutz, American Museum of Natural History, New York, *President*; Prof. J. J. Davis, Purdue University, Lafayette, Indiana, *Secretary*. The announced annual public address was: "Insects, the People and the State," by Prof. H. T. Fernald, Massachusetts Agricultural College, Amherst. A symposium on the Physiology of Insects was held.

The American Association of Economic Entomologists met December 27-31, Prof. R. W. Harned, Agricultural and Mechanic College, Mississippi, *President*; C. W. Collins, Melrose Highlands, Massachusetts, *Secretary*. The entomologists' dinner was held Wednesday evening, December 28, at the Hermitage Hotel.

Dr. L. O. Howard wrote: "We had an excellent entomological meeting at Nashville. Both the Association of Economic Entomologists and the Entomological Society of America's sessions were well attended and excellently handled. I think there must have been at least 250 entomologists there."

Personals

An item in *Nature* for November 26, 1927, states that Dr. R. J. Tillyard has been appointed Chief Entomologist to the Commonwealth of Australia. A letter from Dr. Tillyard to the Editor of the News states that he will leave his present position at The Cáwthron Institute of Scientific Research, at Nelson, New Zealand, on March 1. He will organize a Central Entomological Research Station at Canberra, the new capital of Australia, with outlying stations in various States.

Prof. Henry A. Ballou, professor of entomology and head of the section of entomology and zoology in the Imperial College of Tropical Agriculture, Trinidad, has been appointed by the British government to the newly established office of commissioner of agriculture for the British West Indies. He will retain his connection with the college, but will be occupied largely in an attempt to coordinate the scientific and practical work of the institution and the departments of agriculture of the various islands.—*Science*, Dec. 23, 1927.

Concerning Earwigs (Dermaptera)

In Entomological News, (Vol. 38, pp. 272-273) Mr. B. B. Fulton takes exception to four points relating to the actions and habits of *Forficula auricularia* as stated by me in an article published in Vol. 36, pp. 234-238, of this journal. In this article I stated the results of a series of experiments and observations covering a period of eight months. During these experiments the earwigs did not eat either leaves or flowers placed in jars in which they were confined. Shortly after that article went to press I found by further experiments that they do eat vegetation but prefer animal matter, such as small insects, larvae, pupae and insect eggs. When testing them with vegetation during these experiments the jars contained fresh soil which was changed frequently, and they must have found food preferable to leaves and flowers.

As to Mr. Fulton's other criticisms I take issue and can see no reason for accepting his corrections. As to the use of the forceps, I was dealing with *Forficula auricularia* and have the best of reasons in believing that some of the earwigs in the southern states differ entirely in the use of their forceps.

Milton T. Goe, Portland, Oregon.

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

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SPECIAL NOTICES

Perhaps the two most recently published summaries of the embryonic and the postembryonic development of insects are those by Prof. Jan Hirschler, of the University of Lemberg, and Dr. Anton Handlirsch, of Vienna, respectively. Both are parts of Schröder's *Handbuch der Entomologie*. The former constitutes Chapter X, pages 570-824, of Vol. I, and appeared in two instalments, viz.: in the 13th and 14th (1924) and 27th and 28th (1927) Lieferungen. Although Prof. Hirschler says that the "noch immer bewegte Zeiten" have prevented him from reading many works in the original and possibly from seeing some of the newer publications, one can hardly excuse him from omitting such a careful piece of work as Nelson's *Embryology of the Honey Bee* of 1915. Dr. Handlirsch's Chapter 12, pages 1117-1184 of Vol. I, came out in Lieferung 33 (1927), and contains many suggestive statements of views which he has expressed in earlier papers.

The Life of The White Ant by Maurice Maeterlinck. Translated from the French by Alfred Sutro. 231 pp., Dodd Mead and Co., New York, 1927.

A short review of *La Vie des Termites* appeared in the June, 1927, issue of the *Journal of Economic Entomology*. This work is now generally available, by the present translation. Following are the chapter headings: The Termitary, The Problem of Nutrition, The Workers, The Soldiers, The Royal Pair, The Swarming, The Devastations, The Occult Power, The Morality of the Termitary, Their Destiny, Instinct and Intelligence. A brief bibliography follows.

This work will no doubt popularize the termites, as did the author's *The Life of The Bee*, but as Phillips states, it seems that Maeterlinck was less familiar with the termitary than he was with the hive. The Life of the White Ant is written in the same style as his work on the honeybee, charged with the same philosophy, such as this: " . . . the scheme of nature does not include happiness." He contrasts the "happiness" and "freedom" of the hive with the imprisonment and sordid surroundings of the termite nest numerous times. His evolutionary ideas are quite interesting, they give us much to think about. Much of the biological information is the same, but he has distorted, or at least, overstated his problem.

Maeterlinck speaks time after time of the intellect of the termite, making countless comparisons with *Homo*, yet in the closing chapter supports Fabre's conviction that insects probably do not possess a true intelligence. His ideas on the adaptability or plasticity of the termites, and of insects in general might be questioned. He apparently considers termites, ants and other arthropods as readily adaptable to certain situations. Several debatable statements occur, for instance: "In the hive we find working bees, eggs, males and a queen, the last merely a worker whose reproductive organs have been considerably developed."

It is quite significant to note that the name of T. E. Snyder does not appear in either text or bibliography. He has probably done more to disseminate knowledge in regard to termites than any other worker in America. Neither does the name of Nathan Banks or Alfred Emerson appear, though

Cleveland's comparatively recent work with the intestinal Protozoa is discussed in detail.

The book is without doubt very worth-while. It is extremely interesting, and will do much towards a wider dissemination of information on insects. It is much better than most of the recent popular accounts. Books written for the general reading public must necessarily be over-stated to attain their point. DeKruif's *Microbe Hunters* is a fine parallel case. Entomologists who frown upon attempts to simplify and popularize insects delay the progress of the science, which in a large measure accounts for the bizarre notions many people hold of entomologists.

PAUL KNIGHT, University of Maryland.

OBITUARY.

With the passing of the Rev. A. H. MANEE, of Southern Pines, North Carolina has lost its leading amateur entomologist. He died December 26, 1927, in his cottage on the hillside in the midst of nature that he loved so well. Born in New York City, March 30, 1858, he had spent the last 23 years in Southern Pines. He preached for many Baptist churches in the North and upon coming to North Carolina filled a summer pastorate in Southern Pines.

Mr. Manee was a skillful collector of insects in the Sandhills section of North Carolina. He was responsible for many unique and valuable insect records, some of which are listed in his six papers published in the ENTOMOLOGICAL NEWS from 1908 to 1924. All but one of these papers were devoted to Coleoptera. He was responsible for finding about 100 new species in this limited sandhill section, doing all of his collecting withing a radius of five miles of his home. The records of the insect list of North Carolina show that the species he collected and found to be new were, Wasps 14, Carabidae 21, Coccinellidae 11, Cerambycidae 13, other Coleoptera 12, Diptera 1, Caddis flies 1. He described four new species.

North Carolina entomologists will miss the almost boyish joy he showed when they came to look over his collection and talk about insects. The long leaf pines, scrub oaks, wild flowers and nesting birds near his cottage will miss a devoted friend. R. W. LEIBY.

MARCH, 1928

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CHARLES ROBERT OSTEN SACKEN,
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TO CONTRIBUTORS. All contributions will be considered and passed upon at our earliest convenience and, as far as may be, will be published according to date of reception. The receipt of all papers will be acknowledged. Owing to the limited size of each number of the News, articles longer than six printed pages will be published in two or more installments, unless the author be willing to pay for the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

Proof will be sent to authors. Twenty-five "extras" of an author's contribution, without change in form and without covers, will be given free when they are wanted; if more than twenty-five copies are desired *this should be stated on the MS.*

Owing to increased cost of labor and materials, no illustrations will be published in the News for the present, except where authors furnish the necessary blocks, or pay in advance the cost of making blocks and pay for the cost of printing plates. Information as to the cost will be furnished in each case on application to the Editor. Blocks furnished or paid for by authors will, of course, be returned to authors, after publication, if desired.

Stated Meetings of The American Entomological Society will be held at 7.30 o'clock P. M., on the fourth Thursday of each month, excepting June, July, August, November and December, and on the third Thursday of November and December.

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

The printer of the "News" will furnish reprints of articles over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 35 cents; three or four pages, twenty-five copies, 70 cents; five to eight pages, twenty-five copies, $1.40; nine to twelve pages, twenty-five copies, $2.00; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be the corresponding multiples of these rates.

ENTOMOLOGICAL NEWS

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The Biotic Factors in the Environmental Resistance of Anthophora occidentalis Cress. (Hym.: Apidae; Dip., Coleop.).*

By Clarence E. Mickel, University of Minnesota, St. Paul, Minn.

During the summer of 1925, Dr. Frances Long of the Alpine Laboratory, Manitou, Colorado, sent me specimens of both sexes of *Dasymutilla fulvohirta* Cresson which had been reared from the cells of the bee, *Anthophora occidentalis* Cresson. These specimens proved very interesting since they confirmed my decision regarding the identity of the two sexes of *D. fulvohirta.* The male was unquestionably this species, and the female was identical with those which had formerly been known as *D. californica* auct. and which I had assigned to *fulvohirta* on the basis of the data of geographical distribution. Since both had been reared from the same host, there could be little question as to their being the two sexes of the same species. I was interested, however, in rearing out additional specimens of this species from its host and in the fall of 1925, Mr. G. W. Goldsmith, of the Alpine Laboratory, was kind enough to send me a large number of the cells of *Anthophora occidentalis.* As far as rearing out additional specimens of the Mutillid was concerned the experiment was not a success for not a single Mutillid was secured from the entire lot; but the insects which eventually emerged from the cells of this bee revealed a more or less complex association, the components of which are held together by the species, *Anthophora occidentalis* Cresson. If the latter insect were removed from this relationship the whole association would break down and cease to exist; the integral parts of the association would then be either destroyed or dispersed to form

*Published with the approval of the Director as Paper No. 702, of the Journal Series of the Minnesota Agricultural Experiment Station.

new relationships with other organisms. The following notes are presented for the purpose of describing this association of insects and the relationships which exist within it.

Procedure.

The above mentioned shipment of *Anthophora* cells was received from Mr. G. W. Goldsmith early in the fall of 1925. In a letter dated September 3, 1925, Mr. Goldsmith says: "Large and interesting colonies are common about here—. Two weeks ago these colonies showed great activity and many of the nests contained very small larvae or eggs." On October 15th the cells were examined and 249 cells appeared to be inhabited. Each cell was placed in a shell vial, 20 x 80 mm., and the vial was stoppered with a plug of cotton. These vials were kept in the laboratory from October 15th until November 28th. The temperature of the room during this period varied between 72° and 78° F. On November 28th, the vials were placed in a refrigeration room for the winter. The temperature of this room varied between 30° and 40° F. during the time which the specimens remained there. On April 16, 1926, the vials were taken from the refrigeration room and placed in the laboratory and remained there from that time until the occupants emerged. The temperature of the laboratory during this period varied between 72° and 77° F. The first insect to emerge from the cells in this lot was a chalcid, *Monodontomerus montivagus* Ashmead, which emerged on May 12th. The first *Anthophora* emerged on June 10th.

A small number of cells were kept in the laboratory during the entire winter, and were not placed in the refrigeration room. The first *Anthophora* emerged from these on March 15th.

The Anthophora occidentalis Association.

Anthophora occidentalis Cress. is the key species to an association of insects which is composed of at least ten species. Nine of these are directly or indirectly dependent on the presence of *A. occidentalis* for their existence, either through the appropriation of the old cells of this bee for use as nests, or through the relationship of parasitism. Such an association does not necessarily imply that if the key species were removed the dependent or secondary species would be exterminated, but that in such an emergency the latter must form some sort of a new relationship, and that the survival of the secondary species is dependent on their ability to form such new relationships. If a secondary species is capable of forming a new relationship with ease the removal of the key species presents a very small problem, but if the relationship with the key species is close and new relationships are formed with difficulty, then it may easily happen that the secondary species will be exterminated.

From the 249 cells which appeared to be inhabited when the material was received I succeeded in rearing 85 adult specimens of *A. occidentalis;* of these 55 were males and 30 were females. The percentage of emergence of adult *Anthophora* bees was therefore approximatly 34; and the percentage of cells which produced females of this bee was 12. The percentage of emergence of adult bees was in reality probably considerably less than these figures, because a large number of cells, the occupants of which had perished, were discarded when the material was received. On June 10, 1926, the first *Anthophora occidentalis* emerged from its cell. From that time until July 19, 1926, these bees emerged daily at the rate of from one to five per day. On August 17, 1926, it appeared that no more would emerge from the remaining cells, so each was opened and examined. Eighteen of the remaining cells contained adult bees which apparently were unable to make their way out of the cells and had therefore died. Four cells contained dead *Anthophora* larvae; apparently these four were not parasitized.

The insects which play the part of secondary species in the association are noted below:

1. Osmia mandibularis. Cresson. A few of the cells contained in the original lot sent from Colorado differed from the others in the way in which the entrance to the cell was closed. The cells containing *Anthophora* larvae were all closed with the same sort of material of which the cell was constructed. These few cells, however, seemed to have the en-

trance plugged with a partition of greenish material. These were kept separate from the other cells and very late in the summer of 1926, two males and one female of *Osmia mandibularis* Cresson emerged from these cells. Hicks (1926) has given an account of the manner in which *O. mandibularis* uses the old *Anthophora* cells for its nests.

2. Holochrysis n. sp. near Chrysis tota Aaron. (Det. S. A. Rohwer). One of the cells of which the entrance was plugged with the green material produced a chrysidid wasp. Since the cell was plugged in exactly the same manner as those which contained *Osmia mandibularis,* I have drawn the conclusion that this species is a parasite of the *Osmia* bee. Hicks (1926) states that he found *Chrysis densa* Cresson to be a very common parasite of *Osmia mandibularis.*

3. Anthrenus sp. When the cells of *A. occidentalis* were received from Colorado they were heavily infested with the larvae of *Anthrenus sp.* Since the material was collected in the field and sent directly to the author it seems probable that these larvae were present in the bee colony in nature. This supposition is confirmed by the observations of Hicks (1926) who found Anthrenus larvae in large numbers in colonies of *Anthophora neomexicana* Ckll. Whether these larvae feed only on the old pollen and dead insects found around the colonies or whether cells containing living larvae of the bee are entered and plundered is unknown. Certain of the cells in the lot of 249 which appeared to be intact when the rearings were started produced neither host nor parasite. When these cells were finally broken open and examined they were found to be empty and many of them contained *Anthrenus* larvae. There were 59 such cells.

4. Monodontomerus montivagus Ashmead. (Det. A. B. Gahan). The first insects which emerged from any of the 249 cells proved to be specimens of this large green chalcid. On May 12, 1926, 26 days after the lot of cells was removed from cold storage, eleven specimens of this species emerged from a single *Anthophora* cell. On the following day this parasite had emerged from ten additional cells. Altogether twenty-one cells proved to be parasitized by this chalcid and a

total of approximately 415 specimens emerged from these twenty-one cells. About 94 per cent of this number were females.

5. PSEUDOMELECTA MIRANDA (Fox). This bee appears to be one of the minor members in the association with *A. occidentalis*. Only five specimens were reared from the 249 *Anthophora* cells. The first specimen of this bee emerged on July 2, 1926; two emerged on July 9, and the last two on July 19. All of these were females. Hicks (1926) has also reared this species from *A. neomexicana* Ckll. but did not find it at all common. In August, 1925, Dr. Frances Long sent me several specimens of this bee which she had reared from *A. occidentalis* taken near Colorado Springs, Colorado.

6. DASYMUTILLA FULVOHIRTA (Cresson). The *Anthophora* cells were originally obtained from Colorado with the idea of rearing out this species and obtaining further information regarding it, but no specimens were obtained from the 249 cells. In August, 1925, Dr. Frances Long sent me a male and female of this species which she had reared from cells of *A. occidentalis*, so that it is definitely known that *D. fulvohirta* is a member of the association.

7. SPOGOSTYLUM DAPHNE O. S. (Det. C. T. Greene). On July 3, 1926, a bombyliid fly belonging to this species emerged from one of the *Anthophora* cells. It is apparently not a common parasite of *A. occidentalis* since only one specimen was reared from the 249 cells. Frison (1922) records the rearing of *Spogostylum albofasciatum* Mac. from the cells of *A. abrupta* Say and states that it is a true parasite of the latter. Rau (1926) records the presence of the adults of *S. fur* around the colonies of *A. abrupta* but did not determine that it actually parasitized the latter.

8. LEONIDIA ANTHOPHORAE Mickel. Eight males and seven females of this species were reared from the cells of *A. occidentalis*. The first specimen of this species emerged on May 20, 1926. Others emerged at intervals until the last one on July 6. This species ranks next to *Monodontomerus montivagus* Ashmead in the number of host individuals destroyed.

9. Hornia minutipennis Riley. Four males and three females of this meloid beetle were reared from the *A. occidentalis* cells.

10. Nemognatha lurida Lec. A few cells of *A. occidentalis* were kept in the laboratory all winter. By May 13, 1926, it appeared that no more emergence might be expected from this material. At that time all the remaining cells in the lot were opened and examined. In one of these an adult specimen of *Nemognatha lurida* Lec. was found. It was dead and apparently had been unable to make its way out of the cell after reaching the adult stage. No specimens of this beetle emerged from any of the cells in the lot of 249.

Discussion.

Unfortunately the lack of exact data regarding the relationships existing between *Anthophora occidentalis* and the insects associated with it has not permitted any definite conclusions to be drawn concerning the effects resulting from these relationships. It is clear, however, that the relationships which exist here are of the same sort that exist between an injurious insect pest and its associated parasites. On account of the large number of insects which compose the *Anthophora* association and the ease with which it could be investigated in its native habitat it offers an opportunity to analyze a situation in which a host insect is present together with numerous biotic factors in its environmental resistance. This sort of a situation exists in every case where an effort is made to control an injurious insect pest by introducing several or numerous parasites from its native habitat. An analysis of the biotic factors in the environmental resistance of *Anthophora occidentalis* would undoubtedly indicate that certain of the factors taken by themselves are more effective in controlling the numbers of this bee, than when present in combination with other factors; that a combination of factors is sometimes less effective as environmental resistance, than the individual factors when taken alone. Fiske (1910) has already called attention to this in a discussion of superparasitism, and the case of the parasites of the Mediterranean Fruitfly in Hawaii, (Pemberton and Willard 1918) affords an example of an injurious insect pest in an association analagous to that of *Anthophora occidentalis.*

A. occidentalis offers an excellent opportunity for the investigation of the way in which biotic factors operate as environmental resistance. It is practically certain that in this case *Monodontomerus montivagus* Ashmead, *Pseudomelecta miranda* (Fox), *Dasymutilla fulvohirta* (Cress.), *Spogostylum daphne* O. S., *Hornia minutipennis* Riley, *Leonidia anthophorae* Mickel and *Nemognatha lurida* Lec. are all factors in reducing the numbers of *A. occidentalis.* To what extent they make up the environmental resistance, whether they operate independently or in competition with one another, the exact effect produced when any one of them is removed from the association, and the exact effect produced when additional factors are added to the association, are all problems which it is important to investigate. The solution of these problems would undoubtedly throw considerable light on similar problems involved in the biological control of injurious insect pests. The ways in which biotic factors operate as environmental resistance in the case of one insect would certainly indicate the ways in which these same factors operate in the cases of other insects. *A. occidentalis* is especially suitable for such a study because several biotic factors are known to be involved. It is certain that biotic factors operating as environmental resistance produce entirely different effects when several such factors are present than are produced when only a single one is acting. This bee is also especially adapted to such a study on account of its gregarious habits, large numbers being found within a very small area in the soil, and therefore great numbers of them may be amassed with comparative ease. They are easy to carry over winter in the laboratory and can be handled in such a way that exact data, which may be used in mathematical computations, may be collected readily.

Whether the number of *Anthophora* bees produced in a colony remains constant from one year to another, or whether there is a fluctuation in numbers cannot be definitely determined from the data available; but as a general rule the greater the number of factors which operate against the continued existence of a species, the more constant the number of that species will be from year to year. Or in other words, the greater the number of factors making up the environmental resistance of a species, the more constant in number will be the population of that species from year to year, and the lower the number of the population will be in relation to the biotic potential of the species. An environmental resistance composed of numerous factors tends to create an equilibrium in the population of the species against which it operates, while an environmental resistance composed of few factors tends to create great fluctuations in the population of a species from one year to another. (For a discussion of biotic potential and environmental resistance the reader is referred to Chapman, 1926, pp. 143-164.)

While the exact value which should be attributed to each of the biotic factors in the environmental resistance of *A. occidentalis* is not known, some idea of their relative value is to be had. For example the exact roles which *Osmia mandibularis* and *Holochrysis* n. sp. play as biotic factors cannot be demonstrated at present but it seems fairly evident that theirs is a very minor role. *Spogostylum daphne* and *Nemognatha lurida* are probably somewhat more important but are nevertheless apparently quite minor factors. The value of *Anthrenus sp.* as a biotic factor can only be determined when it is known whether it attacks *A. occidentalis* directly and destroys the larva, or whether it is a scavenger feeding only on old pollen and dead insects. *Dasymutilla fulvohirta* may be an important biotic factor although it was not reared from the 249 cells in question. *Hornia minutipennis* and *Leonidia anthophorae* are important biotic factors. The habits of the two species are probably very similar, so that one may properly assume that when both are present in the same environment they are in direct competition with one another. What the effect on one would be if the other were removed from the environment, and the ultimate effect on *A. occidentalis* would be very interesting problems to investigate. Are the combined efforts of *H. minutipennis* and *L. anthophorae* more effective in reducing the numbers of *A. occidentalis* than the efforts of either species by itself? *Monodontomerus montivagus* ranks very high as a biotic factor in this association while *Pseudomelecta miranda* apparently may have less value than *Hornia minutipennis.* The value assigned to *P. miranda*, however, would depend entirely on the relationship which may be found to exist between it and *M. montivagus* and *A. occidentalis,* the possibilities of which are suggested below.

The figures given above regarding the ratio of the sexes of *M. montivagus* agree very closely with the data cited by Rau (1922, 1926) for the same, or a very closely related species, in the nests of *A. abrupta* Say. On the other hand, Hicks (1926) found the proportion of the sexes almost reversed in the one cell which he examined, eleven males and three females having emerged from the cell. Whether *M. montivagus* is a primary parasite of *A. occidentalis*, a hyperparasite, or both, does not seem to be definitely settled. Rau (1912, 1926) states that it is parasitic on *A. abrupta;* Hicks (1926) states that he found it parasitic on *Pseudomelecta miranda* (Fox), which is itself a parasite of *A. occidentalis*, and that it was also parasitic on *A. occidentalis.* Practically nothing is known about the life history of *M. montivagus.* Rau (1926) states that there are two generations per year, but further than that the insect does not seem to have been investigated. How it gains entrance to the cells of the bees, how and where it lays its eggs, how the larva develops, the possibility of the insect being polyembryonic and parthenogenetic, whether it is restricted to *Anthophora* bees in its parasitic relations, or whether it may be both a primary parasite and a hyperparasite, and whether one species of *Monodontomerus* parasitizes several species of *Anthophora*, or whether each species of the latter has its own particular species of *Monodontomerus*, are all questions which would bear investigation and all of which would contribute important information regarding the function of this chalcid as a biotic factor in the environmental resistance of *A. occidentalis.*

As stated above Hicks (1926) thinks that *Monodontomerus* *montivagus* is a parasite of *P. miranda,* but in the rearings made by me there was no evidence to lead me to believe that any such relationship as this existed. If Hicks is correct, a question immediately arises as to the part played by this species in the environmental resistance of *A. occidentalis.* Is the scarcity of *P. miranda* due to the hyperparasitism of *M. montivagus?* If it is, what effect would be produced if the latter were removed from the environment? Would *P. miranda* then increase in numbers and be a more effective factor in the environmental resistance of *A. occidentalis* than *P. miranda* and *M. montivagus combined,* or would it remain constant and the numbers of *A. occidentalis* increase?

All of the questions which have been raised in the above paragraphs may seem to have only academic interest in the case under consideration, but they are certainly of the highest importance when taken in connection with the introduction of parasites from foreign countries for the control of injurious insect pests. All of these questions can be solved with mathematical certainty and the failure to investigate them when an important insect pest is concerned is nothing short of gross negligence.

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A New Corethrella from Panama (Diptera : Culicidae).

By Harrison G. Dyar, U. S. National Museum, Washington, D. C.

Corethrella blanda, new species.

Mesonotum light brown, abdomen blackish above. Legs pale brown, uniform in the female, a little more diversified in the male, the tibiae appearing paler at their tips. Wings pale brown, a broad smoky band across the middle, formed by the darkening of the hairs on the veins.

Male hypopygium. Side piece conical and furnished with several stout spines on the inner side; of these a strong central one arises from a large tubercle, and there are six other less strong ones, scattered over the inner surface and not arranged in a line. Clasper as long as the side piece, rather thick, simple. Mesosome very short, composed of two stout approximated cones. Male antennae 16-jointed, tori very large; joints 4 to 10 have the hairs very long, not arising in whorls, but throughout the slender joint, though the basal hairs are longest; hairs shorter on joint 11, and thence shorter and fewer to tip.

Bred by Dr. D. P. Curry from larvae in a shaded grassy pool at Las Sabañas, Panama, May 28, 1927. "The larvae are cannibals. When first put in the tube together, they seized and devoured each other; but the survivors of the first attack lived together peaceably for weeks afterward."

Larva with the head transverse, the front conically produced, but moderately so, the cone not as long as the length of the rest of the head and only about half as wide. Antennae inserted at the tip of the cone, folded backward in a groove when at rest, with three long spines at tip not of uniform lengths. Front margin of labium with ten stout teeth. Mandibles curved in a semicircle, with three stout teeth on apical aspect and four short ones at tip. Tube stout, flat, about twice as long as wide. Eighth segment with an encircling plate; laterally behind it on each side are four black hairs arranged in two groups. This plate reaches the middle of the sides and is supplemented by a small quadrate one ventrally. Sixth and seventh segments with round dorsal plates. Anal segment longer than wide, with six dorsal hairs, eight ventral, and a single lateral one, much smaller than the others. Anal gills small, pointed, not as long as the width of the segment.

Pupa with stout thorax and small tapering abdomen. An angularly trilobed structure on each side represents the air-trumpets; a solid flat plate, one angular lobe pointing forward, another laterally, and the largest one posteriorly. Abdominal segments produced laterally and posteriorly, granular, and with a long terminal hair directed backward; the two posterior horns end in a stout thorn, and have a small lateral hair.

Two males and one female (type male on a slide), Las Sabañas, Panama (D. P. Curry), type No. 40517 U. S. National Museum.

The Entomology of Central Siberia.

By T. D. A. Cockerell.

With headquarters at Irkutsk, in the hospitable rooms of the Geological Committee, my wife and I have explored the surrounding country in several directions. First we went to Ust Balei on the Angara, to search for fossil insects in the Jurassic beds; then to the Biological Station of the University of Irkutsk, on Lake Baikal; later to Archan, 105 versts west of the southwest corner of Lake Baikal, at an elevation of 900 meters. In the last week we have collected in localities near Irkutsk; Smolenschina and Kychtak. The insect fauna of this whole region is strictly Palaearctic. The extensive deserts to the south have prevented any migration thence of Chinese types. The fauna is an impoverished one compared with that of the Maritime Province, which we visited four years ago. Very few moths come to lights at night, and the butterflies are not especially numerous or striking.

The common species belong to *Aglais*, *Erebia*, *Melitaea*, *Colias*, *Leptidia* (these are the common whites instead of *Pieris*), *Lycaena*, with several other satyrids and a number of ordinary small skippers. *Papilio* and *Parnassius* are occasionally seen, and I have caught a very nice *Chrysophanus* at Smolenschina. A fine *Grapta* was found at Archan. The burnets (*Zygaena*) are common, apparently of two species. Among the Coleoptera the Cerambycidae are preeminent with very many species, but nearly all are small, principally of the *Leptura* type. Buprestids are occasional. *Mordella* sits on the flowers as in Colorado. I have two handsome species of Meloidae. Carabidae are not abundant. These are merely general impressions; no doubt intensive collecting over a longer period would reveal many species. *Cetonia* serves to remind us, like the burnet moths, that we are in the Palaearctic Region. The ants are very commonplace: *Formica rufa* with its characteristic nests, *F. fusca* under stones, *Camponotus* in the forest, and other circumpolar types. No Mutillidae have been seen. Ichneumonidae are not so numerous as in Colorado and Chalcidoidea are rarely met with. There are some extremely beautiful species of the Chrysididae. Diptera abound with many Tachinidae, Asilidae, etc., and more mosquitos than we desire. Orthoptera include some rather large and handsome forms. A common small grasshopper is *Gomphocerus sibericus,* looking just like our Colorado species. Mr. Ivan Rultsoff tells me that it is a very great pest; it recently appeared in vast numbers, causing a loss of about a million roubles. This is astonishing because in Colorado I have supposed *Gomphocerus* to be harmless. The Hemiptera, so far as seen, are very like those of the Rocky Mountains. Bees are abundant and I have made a fine collection. Except the *Bombus* which have been intensively studied by Skorikoff and others, the bees of this region are little known.* Thus I expect to find a good many novelties though I feel sure many of the species are identical with European ones. There is nothing in common with the desert fauna, and so far as I can see on casual inspection, few species are the same as those of the Maritime Province. As bees are found on flowers, it might be supposed that it would be easy to exhaust the fauna of a region, at least as represented during the season visited. Our experience shows that this is not at all the case. The poorest locality we found was Archan, the richest Smolenschina near Irkutsk. At Smolenschina, where we were kindly taken by Mr. Ivan Belikoff, secretary of the Geological Committee, we found a small flowery spot, a few hundred yards in each direction, extra-

*Long ago Radoszkoski recorded the following *Bombus from* Irkutsk: *B. terminalis* L., *B. distinguendus* Mor., *B. baicalensis* Red., *B. equestris* Fab., and var. *mucidus* Gerst. Friese makes *B. equestris* a subspecies of *B. silvarum* L. and *baicalensis* a synonym of *equestris.* Sladen shows that *B. distinguendus* is a good species, not a race of *B. subterraneus.*

ordinarily rich in bees, while few were to be found in other places nearby. But the remarkable thing is that after collecting one day, we returned after a few days, and from the same flowers (*Geranium*, *Tanacetum*, *Achillea*, *Campanula*, etc.) obtained a new set, in many ways different from the first. Thus on the first trip a neat little *Nomada* was very abundant; on the second we got none, but only a single specimen of another *Nomada*. On the first trip we got two specimens only of *Nomia*, on the second they were abundant. It was on the second trip that a strange looking bee was netted and as I took it out it stung viciously, and I thought had a peculiar feel. I was curious enough to inspect it with the lens as soon as it was quiet in the bottle, and was delighted to see a *Melecta diacantha* Eversman, which has a *Crocisa*-like scutellum. At Kychtak I was pleased to find a couple of specimens of *Dioxus*, another parasitic genus. Taking the bee fauna of the region as a whole, the following are general impressions. *Hylaeus* is not very common, far less so than in the Maritime Province where I got a long series of species, all new. *Colletes* is abundant at least in individuals. *Halictus* is surprisingly poor in species and even in individuals; we have more *Colletes* and many more *Andrena* than *Halictus*. One species of *Halictus* is of gigantic size. *Andrena* is well represented; a very large and handsome species was taken at Smolenschina. *Sphecodes* is about as usual. *Megachile* abounds and there are several species of *Anthopora*. I got only one Eucerine, one *Melecta* and one *Panurginus*. The *Panurginus*, is, I am nearly sure, *P. niger* Nylander, the type of the genus, described many years ago from Siberia and not seen since. *Osmia* is rare, all black. We have a few *Anthidium* and one fine little *Dianthidium*. Several other genera are represented each by one or a very few individuals. Several of the genera are certainly new to Siberia. To-day (Aug. 22) we start for Tashkent in Russian Turkestan.

Sugaring for Catocala Moths in New Hampshire, August-September, 1927 (Lepid. : Noctuidae).

By MARGARET M. CARY, Germantown, Philadelphia, Pa.

This summer a group of boys and girls and I had had such good luck catching Sphingidae over larkspur and phlox in the early evening that we decided to lengthen our collecting day by sugaring for Catocalas. Our cottage is located near Lake Sunapee and is about 1300 feet above sea level. The country is hilly and wooded; but we live in an open meadow stretching to the lake. Surrounding this meadow are a good many different kinds of trees and on two sides there are large tracts of woodland. We had read about sugaring, but had never been successful and we determined to get the right mixture for the bait and to do it for many nights in succession.

For the benefit of others who have tried different baits, I will give the exact formula which we used. We bought cheap beer, opened it into a large crock, putting in one yeast cake to two bottles of beer, covered it up tight and left it in a warm room. Then we took apples and crushed them, adding some brown sugar and setting them out in the sun to ferment. Early each morning we put the following ingredients together in a bucket: 1 cup of the yeast-beer, ½ cup brown molasses, 1 tablespoon rubbing alcohol, 2 lbs. brown sugar, 1 cup crushed and fermented apples and 1 yeast cake.

By evening this mixture had a very strong smell and at six o'clock (standard time) we began painting the trees around the meadow. We painted five white pines, two white birches, two shaking aspens, two ash trees and four apple trees and stumps. These trees were in three main groups, so that there was a strong odor in each locality. At seven we repainted and often again at nine o'clock. We lighted our lantern, making the rounds every half hour from seven-thirty to ten-thirty or eleven o'clock. Catocalas alight on the sugar in such a way that the bright under wings show. They are very nervous and if the slightest shadow crosses the tree where they are resting, they fly away immediately. It therefore takes great skill to hold the lantern in such a way that its light falls full and steadily on the sugar, and does not blind the person who is to do the catching. We went single file, I with the lantern in the lead, the boy with the net following, and the boys and girls with the cyanide jar and collecting case brought up the rear. Absolute quiet was observed.

Small Catocalas, like *crataegi*, *antinympha* and *ultronia*, we caught in the cyanide jar, placing it slightly beneath the insect, as Catocalas always dart down when starting to fly, and if the boy with the jar missed it, the boy with the net caught it in flight. For all the larger Catocalas, however, we found the net more satisfactory than the jar. My nephew, being very expert with the net, practically never missed one, and I, myself, caught two Cerogamas in the net at one swoop one night after the children were in bed. We began sugaring on August 2nd, keeping it up until September 12th every night except in the pouring rain or on nights when the wind blew furiously. Catocalas seemed to like spitting rain and dampness, preferring warm, dark nights to those when the moon was bright and the air cold. On three different nights we caught eleven Catocalas, on one other night we caught ten, and in all we got a hundred and sixteen, among which were at least sixteen species and varieties. We caught two forms of *unijuga,* two or three varieties of *briscis,* two varieties of *relicta, concumbens, parta, ultronia, praeclara, crataegi, ilia* form *conspicua, cerogama, paleogama* form *phalanga,* and *antinympha. Unijuga, briscis, relicta, cerogama,* and *concumbens* were very much more common than the others, and most of them were caught between eight and nine in the evening. As Holland says in his "Moth Book", "No sport could exceed this". It requires skill and patience and is full of a variety of excitements including skunks, who also delight in the sugar!

Two New Anthocorids and a New Microphysid from Florida (Heteroptera).

By W. S. Blatchley, Indianapolis, Indiana.

Since my work on the Heteroptera of Eastern North America appeared a new species of the family Anthocoridae, belonging to a genus not before known to be represented in this country, has been taken in Florida and another undescribed species of the same family was referred to the wrong genus in that work. A new species belonging to an apparently new genus of the family Microphysidae has also been taken. These have, through the kindness of Mr. W. E. China, all been compared with specimens in the British Museum. They are therefore characterized and named in this paper. The types of all three are in my private collection.

The genus *Asthenidea* Reuter (1884) is closely allied to *Cardiastethus* Fieber (1860), differing mainly in the less deeply emarginate base of pronotum, the more shallow transverse groove of scutellum, and by the absence of a hamus in the cell of the inner wings. It is not very strange, therefore, that, without specimens for comparison, I ascribed to the former genus, on page 631 of the Heteroptera of Eastern North America, a species which I called *Asthenidea pallescens* Reuter, but which, according to China, is an unnamed species of *Cardiastethus,* allied to *C. tropicalis* Champ., a Guatemalan species. I therefore give it the new name

Cardiastethus flaveolus sp. nov.

Elongate-ovate. Color above and beneath a nearly uniform pale brownish-yellow, the head and thorax shining, the elytra duller with numerous scattered inclined rather long yellowish hairs; inner half of cuneus usually in great part fuscous; membrane pale dusky hyaline, slighty iridescent. Beak scarcely reaching front coxae, its apical joint slender, acute. Eyes relatively large, subglobose, coarsely facetted, narrowly separated beneath. Antennae slightly longer than head and thorax united, thickly pilose; joint 1 reaching tip of tylus, 2 three times as long as 1, visibly thickened apically; 3 and 4 slender, tinged with fuscous, each about two-thirds the length of 2.

Pronotum subtrapezoidal, its base less than twice as wide as apex, very broadly and deeply concave; disk with a wide median transverse impression, the callus of front lobe almost smooth, transversely convex, the hind lobe depressed, finely transversely rugose-punctate; hind angles thickened, slightly prolonged, the side margins in front of them almost straight, finely carinate. Scutellum with base broadly exposed, very finely punctate, disk with a distinct postmedian transverse impression, its apical portion more coarsely and distinctly punctate. Elytra elongate-oval, passing tip of abdomen by one-third the length of membrane; clavus strongly declivent toward corium, beset with three irregular rows of very fine punctures; sides of elytra subparallel to base of cuneus, thence broadly curved into the rounded tips of membrane. Osteolar channel long and curved. Length 2.5—2.8 mm.

Described from seven specimens taken at Royal Palm Park, Florida, in December and April by sifting vegetation in low damp places and by beating the dead fallen leaves of royal palm in the dense hammock on Paradise Key. *Type* a male taken at the Park December 18, 1924. According to China my specimens "are very close to, if not identical with, three specimens in the British Museum from San Geromino, Guatemala, which were wrongly identified by Champion as a variety of *C. tropicalis* but which are specifically distinct from the typical form of that species." Champion, after his description of *tropicalis,* mentions these specimens very briefly as follows[1]:

"Var. Above and beneath testaceous, the elytra more sparsely punctured."

ELATOPHILUS Reuter, 1884, 56, 61.

This genus belongs to the subfamily Anthocorinae, as treated on page 633 of the Heteroptera, and differs from *Anthocoris* in having the head more prolonged with eyes much more distant from the front margin of pronotum, the base of pronotum feebly but distinctly punctate; hind coxae widely separated, with apex of metasternum truncate and extending between them. In *Anthocoris* the eyes are subcontiguous to apex of pronotum, and the hind coxae are narrowly separated

[1]Biol. Cent. Amer. (Hemip.—Heterop.) II, p. 331.

or contiguous, the apex of metasternum narrowly rounded between them.

Elatophilus pinophilus sp. nov.

Elongate-oval, almost glabrous. Head, pronotum and scutellum reddish-brown, shining, the tylus and occiput somewhat darker; elytra pale dull yellow, the cuneus and tip of clavus and a faint cloud near apex of corium fuscous; membrane a uniform whitish hyaline; sterna and legs pale brownish-yellow, ventrals fuscous-brown. Head porrect, longer than its width across eyes; tylus stout, cylindrical, its apex truncate. Antennae stout, as long as head and pronotum united; joint 1 and basal half of 2 yellow, 1 just reaching tip of tylus; 2 with apical half fuscous, two and a half times as long as 1, visibly but feebly thickened toward apex; 3 and 4 fuscous, oblong-fusiform, finely pubescent, 3 scarcely as long as 1, 4 one-fourth longer than 3, obtusely pointed. Pronotum subtrapezoidal, twice as wide at base as apex, hind angles somewhat prolonged, subacute; sides in front of them feebly sinuate and convergent from base to apical third, thence rounded to apex; disk with a deep, entire postmedian transverse impression, front lobe smooth, convex and with a faint median impressed line, hind one flattened, minutely shagreened. Mesoscutum broadly exposed. Elytra slightly surpassing abdomen, almost invisibly punctate, very finely pubescent. Abdomen of female broadly oval, narrowed at base. Length 2.8 mm.

Type a female, taken April 14, 1927, at Royal Palm Park, Florida, by beating the tops of a dead and fallen pine. It apparently belongs to the subgenus *Euhadrocerus* Reut., characterized by having joint 3 of antennae not longer than 1, with beak scarcely surpassing front coxae. This subgenus is represented by a single heretofore known species, *Elatophilus* (*Euhadrocerus*) *crassicornis* Reuter, described from Algeria. That is piceous-black, with membrane infuscate. No member of the genus *Elatophilus* has previously been taken in this country.

CHINAOLA gen. nov.

This genus differs from *Mallochiola*[2] Bergroth, as char-

[2] I was unable to borrow in time a specimen of *Mallochiola gagates* from its authors. The differential characters between the two genera are therefore deduced from their description and figures of *Mallochiola* (*Idiotropis*) *gagates* in Bull. Brooklyn Entom. Soc. XIX, 1924, p. 70 and fig. 2, pl. I.

acterized on page 658 of the Heteroptera, the only other genus of the family Microphysidae known from North America, in having the front margin of pronotum truncate not concave; elytra narrowly oval with sides subparallel from just behind humeri to base of cuneus, not broadly oval with sides rounded as in *Mallochiola*, and membrane with two veins projected backward from a ridge near base to the middle of disk, the outer one bent angularly at basal third. The genus is named in honor of W. E. China, the efficient Hemipterist of the British Museum, who has given me much aid in my studies of eastern American Heteroptera.

Genotype: *Chinaola quercicola* sp. nov.

Chinaola quercicola sp. nov.

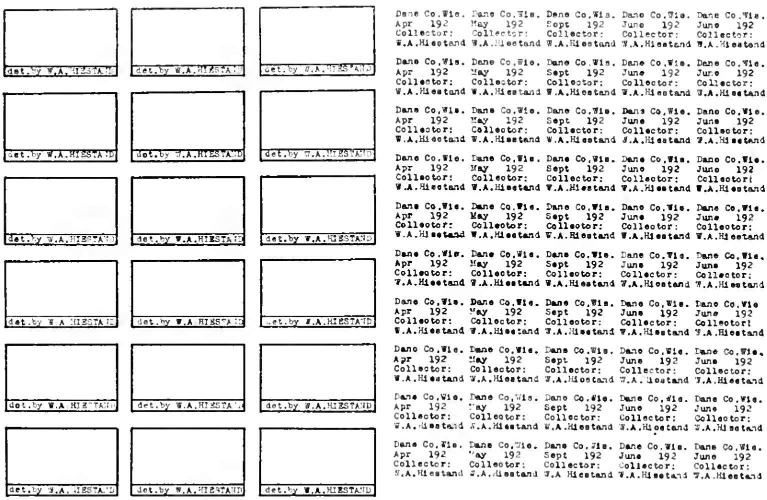
Oblong-oval. Head black, strongly shining, glabrous; pronotum and scutellum black, less shining; clavus and basal two-thirds of corium white; apical third of corium fuscous, cuneus and broad median bar of embolium black; base and apex of embolium white; membrane dusky translucent, strongly iridescent; legs and beak dark reddish-brown. Head porrect; clypeus stout, its apex obtuse; ocelli small, separated by four times their diameters; beak stout, apparently 3-jointed, reaching front coxae, its apical joint acute, decurved. Antennae black, about as long as head and thorax, bristly pubescent; joint 1 not reaching tip of tylus; 3 and 4 subequal, 3 two-thirds the length of 2. Pronotum with apex and base truncate; collar distinct, prominent; disk very finely transversely rugose, rather thickly pubescent with very fine suberect blackish hairs; scutellum feebly convex, glabrous, finely transversely rugose. Elytra conjointly narrowly oval, surpassing abdomen by three-fourths the length of membrane; sides straight and parallel to base of cuneus, thence gradually curved into the strongly rounded tips; disk very finely pubescent. Hind tibiae curved, one-half longer than femora; tarsi 2-jointed, joint 2 more than twice the length of 1. Length 1.5 mm.

Type a female, taken March 10, 1927, at Dunedin, Florida, by beating the foliage of water oak. The much narrower form of body, different relative length of antennal joints, different shape of pronotum, etc., distinguish this unique form from *Mallochiola gagates* M. & M.

Making Insect Labels with the Camera.

By W. A. Hiestand, University of Wisconsin,
Madison, Wisconsin.

Very satisfactory locality and ecology labels may be made by using a focusing camera and a typewriter. The illustrations below show examples of labels which were typed on white paper, photographed with a focusing camera and printed on Regular Azo paper. One desirable feature of making labels in this manner is the fact that their size may be regulated to suit the user. If smaller type is desired than that shown in the illustration it is only necessary to have the typewritten sheet farther from the camera and vice versa for larger type. Needless to say it is advantageous for the collector to be able to print out whatever number of labels he needs and to arrange their composition to suit his taste. Very often the situation arises when it is well to have labels



in small quantities from various localities and the expense of having them printed is high, due to the fact that it is often difficult to obtain them in quantities of less than five hundred of a kind.

The following directions should serve to explain the method of making the labels. First of all it is necessary to use a typewriter with a new black record ribbon as clearness in the copy sheet is desirable. Of course the clearer the typewritten sheet the clearer will be the negative made from it. Several sheets may be photographed at a single exposure depending upon the size of the plate of the camera. I have found that the best results were obtained by exposing the sheets to the camera by artificial light. I use two fifty watt mazda bulbs in two reading lamps and give the film an exposure of three minutes. It is necessary to use a focusing camera with a ground-glass plate in order that the lens may be put in sharp focus and also that the size of the labels may be regulated. I have met with best results when the iris diaphragm of the camera was set between stops 8 and 16. The sheet to be copied should be pinned onto a backing of some sort so that it will be in a plane parallel to the film or plate of the camera. I have found that it is desirable to have the background of white material like the sheet itself rather than darker as the light from the lamps will be more evenly diffused. I have often noticed that the labels in the center of the film were clearer than those at the edges and have traced this defect to the dark background. Since I have used a white background I have not had this trouble. It is necessary to use a "Process" film or plate in copying the labels in order to get the greatest contrast possible and hence the sharpest labels. Care should be taken in developing the film or plate to insure sufficient development for if either is not left long enough in the fixing bath the resulting labels will not be distinct. Personally, I leave the film in the developer until it becomes so dark that I can no longer make out any characters upon it. In this way I get best results. In printing, the orthodox rules may be followed with good results. I have found that Azo paper, grade number 2, works quite well. A longer exposure than usual is necessary in printing out the labels because of the greater degree of contrast desired. It is well to leave the prints in the fixing bath for some time to insure their permanent character.

There is no reason why a collector who has access to a focusing camera can not make satisfactory labels for his coltion at a considerable saving of expense. The greatest advantage of photographic labels lies in the fact that whatever number needed may be printed and their exact composition made to suit the collector. A great variety of ecological labels can be easily made for different occasions by this means.

Hesperia eos Edwards (Lep.: Hesperiidae).

By A. W. Lindsey, Denison University, Granville, Ohio.

The standing of *Hesperia eos* Edwards in our faunal lists has been open to question for many years. It was merely listed by Skinner (Syn. Cat. p. 91, 1898) and Dyar (List. N. A. Lep. 47, 1902) as a species of *Amblyscirtes*. McDunnough associated it with *celia* Skinner and *meridionalis* Dyar (Contributions iii, 137, 1916) but in the Barnes and McDunnough Check List of 1917 separated the three names. Finally McDunnough placed *eos* and *meridionalis* as synonyms of *alternata* G. & R., an arrangement which I retained in my generic revision of the family. This classification is continued by Barnes and Benjamin in their latest check list of the North American diurnals.

During my connection with the Barnes collection a careful perusal of the original description of *eos* led me to the belief that the species was really the same as *comus* Edw., with which it had never, to my knowledge, been associated. Until recently I have been unable to verify this conclusion, but an examination of the material in the Cambridge Museum shows that it was correct.

The museum collection, in which the type was said by Edwards to be located, now contains two specimens labelled as types of *eos*. One is a male of *alternata*, the other a female of *comus*. The original description mentions a male, but gives no exact information as to the number of specimens in the type series. According to Edwards' usual procedure, his statement would lead one to expect a single male type, but the appearance of the sexes in *Amblyscirtes* is such that they cannot readily be separated by superficial examination. The two specimens in the Cambridge Museum are not conclusive in accessory details, for both bear printed locality labels reading "Dallas Tex Boll".

In their work on the genitalia of the North American species of Hesperioidea Skinner and Williams indicate that they have examined these types, and say that they believe "*cos* falls to *alternata*." They refer the other type to *comus*, saying that it is a male, and thus unwittingly furnish evidence for my belief that Edwards himself made a mistake in the sex of this type.

We cannot fail to consider original descriptions in the ultimate fixation of species. In the present case a comparison of the specimen of *comus* with Edwards' description shows exact agreement in the distribution and number of spots. Needless to say, the other specimen labelled type contrasts strongly, for *comus* has well defined white spots on the under surface of the secondaries and well marked preapical spots on the primaries, while in *alternata* no spots are well defined and the under surface usually bears only the vaguest indication of spots, due to a slight concentration of the superficial gray vestiture. It seems incredible that such a practiced eye as Edwards' could have included the two specimens in the same series; it is certainly impossible for his description to apply to the specimen of *alternata*.

In discussing the disposition of the name, Mr. Banks has suggested a logical course if the two specimens must be regarded as types. *Alternata* was described before *cos*, hence when *cos* was described one specimen belonged to a described species, and in the absence of an absolute indication of the type, would automatically be dropped in favor of the remaining specimen. This would fix the specimen of *comus* in the Cambridge Museum as the type of *cos*. Fortunately all of the facts in the case favor this course.

The following bibliography shows the corrected synonymy and includes the chief references to the species concerned.

Amblyscirtes eos Edwards.

Hesperia eos Edw., Trans. Am. Ent. Soc. iii, 276, 1871.
Hesperia comus Edw., Trans. Am. Ent. Soc. v, 206, 1876.
Amblyscirtes nusl Edw., Field and Forest iii, 118, 1878.
Pamphila comus Skinner, Syn. Cat. 90, 1898.
Stomyles comus Godman & Salvin, Biol. Cent. Am., Rhop. ii, 502, pl. 95, fig. 25, 26, 1900.
Amblyscirtes eos Dyar, List N. A. Lep. 47, 1902.
Euphyes comus Dyar, op. cit. 53, 1902.
Pamphila quinquemacula Skinner, Ent. News xxii, 413, 1911.
Amblyscirtes comus Barnes & McDunnough, Check List 22, 1917.
Lindsey, Hesp. N. A. 101, 1921.
Skinner & Williams, Trans. Am. Ent. Soc. xlix, 141, fig. 23, 1923.
Barnes & Benjamin, List Diurn. Lep. 25, 1926.

Amblyscirtes alternata Grote & Robinson.

Hesperia alternata G. & R., Trans. Am. Ent. Soc. i, 3, 1867.
Amblyscirtes meridionalis Dyar, Jn. N. Y. Ent. Soc. xiii, 135, 1905.
Amblyscirtes alternata Barnes & McDunnough, Check List 22, 1917.
Lindsey, Hesp. N. A. 101, 1921.
Skinner & Williams, Trans. Am. Ent. Soc. xliv, 138, fig. 18, 1923.
Barnes & Benjamin, List Diurn. Lep. 25, 1926.

On Three Chilopods from the La Sal Mountains of Utah.

By Ralph V. Chamberlin, University of Utah, Salt Lake City, Utah.

The material upon which these notes are based was submitted to me for study by Dr. V. M. Tanner by whom the specimens were colleceted in July, 1927. All were taken in the faunistically little known La Sal Mountains of San Juan Co., Utah. In addition to the chilopods, there was in the material collected a male of the diplopod *Paraiulus venustus*

(Wood), a form not previously taken in Utah, although not uncommon in Colorado and New Mexico.

The types of the new species are in the author's collection.

Lophobius lasalanus sp. nov.

Dorsum light chestnut brown, the head scarcely deeper in color than the dorsal plates. Antennae usually concolorous with head, a little paler at tips. Legs a little lighter than antennae. Antennae short, composed of twenty articles. Ocelli few, mostly in two series; e. g., 1+4, 3. Prosternal teeth 2+2.

Third joint of all anterior legs excepting those of first pair with 2 ventral spines. Ventral spines of first legs 1, 3, 1. Penult legs with ventral spines 1, 3, 3, 2 or 1, 3, 3, 3. Anal legs with two claws; ventral spines 1, 3, 3, 1 or 1, 3, 3, 0. Last two pairs of coxae armed laterally, the last three pairs dorsally. Anal legs of male without lobes.

Claw of female gonopods tripartite; basal spines 2+2.

Length, up to 11 mm.

This species is differentiated from all others in the genus excepting *L. socius* in possessing 2 claws on the anal legs. It is readily distinguished from *socius* in having the ventral spines of the anal legs 1, 3, 3, 1 or 1, 3, 3, 0 instead of 1, 3, 2, 1, in not having the fourth joint of the anal legs modified in the male, in the fewer ocelli, and smaller size.

The species now known in the genus may be separated by means of the following key.

Key to Species of Lophobius.

a. All anterior legs, or all but first 1 or 2 pairs, with third joint bearing 2 ventral spines.
  b. Ventral spines of penult legs 0, 1, 3, 3, 2.
    c. Anal legs armed with 2 claws.
      d. Ventral spines of anal legs 1, 3, 3, 1(0); ocelli in 2 series........*lasalanus*, sp. nov.
      dd. Ventral spines of anal legs 1, 3, 2, 1; ocelli in from 3 to 5 series....*socius* Chamberlin
    cc. Anal legs with claw single.
      d. Dorsal spines of twelfth legs 1, 0, 3, 1, 1.
        e. Ventral spines of anal legs 1, 3, 2, 0; of the twelfth and thirteenth 0, 3, 3, 2 *collium* Chamberlin
        ee. Ventral spines of anal legs normally 1, 3, 2, 1.
          f. Last article of anal legs furrowed along mesal side; fourth joint in

male with a conspicuous distal lobe above......*franciscae* Chamberlin

ff. Anal legs unmodified in both sexes.......*pungonius* Chamberlin

dd. Dorsal spines of twelfth legs 1, 0, 3, 2, 2 or 1, 0, 3, 1, 2.

e. Ventral spines of anal legs 1, 3, 2, 1; head a little longer than wide *arizonae* Chamberlin

ee. Ventral spines of anal legs normally 1, 3, 2, 0; head wider than long. *helenae* Chamberlin

bb. Ventral spines of penult legs 0, 1, 3, 3, 1 (lobe at distal end of fourth joint in male conspicuous) *castellopes* (Chamberlin)

aa. First seven pairs of legs with the third joint bearing but a single ventral spine................*eremus* Chamberlin

Watophilus utus, sp. nov.

Cephalic plate long, widest anteriorly, the sides converging to the caudal end; anterior and posterior corners rounded; anterior margin forming a very obtuse angle at middle. Frontal suture not evident.

Cephalic plate overlapping the basal plate, covering about one third of its total length. Basal plate with a transverse row of setae behind middle of its exposed portion.

A single small clypeal area present on middle line a little caudad of level of insertion of antennae.

Labrum with lateral pieces separated by a district middle piece which bears on its caudal edge about ten long, slender, caudally directed teeth.

Claws of prehensors when closed equalling or a little surpassing the distal end of the first antennal article. Claw of prehensors with a small rounded tooth at base; the two preceding joints with inconspicuous or obsolete rounded nodules; femuroid also with one at distal end, excavated a little proximad of the tooth.

Spiracles all circular; the first large, the second abruptly smaller and the succeeding ones decreasing gradually caudad.

Anal legs clawless, the claw replaced by a minute membranous article; terminating in several stout setae.

Last ventral plate wider than long, the caudal margin convex. Coxopleural pores 3 or 4 along ventral plate, or partly covered by latter, and 2 or 3 above adjacent to last tergite.

Anal pores present.

Pairs of legs in female, 65.

Length, 21 mm.

The species of this genus have the number of pairs of legs usually invariable, or practically so, for each sex. The species are thus in most cases easily separated on this basis. The present species has a larger number of pairs than any species previously known, the nearest being *W. laetus* Chamberlin of California which has a maximum of 55 pairs.

GNATHOMERIUM XENOPORUS (Chamberlin) In the collection is one specimen of this species which is a common form under leaves along canyon streams in the Wahsatch Mountains, but which occurs as well in Colorado and New Mexico.

Insects made of Metal.

INSECTS made of metal, true to the originals in the last minute details of structure, are produced by a process discovered by Dr. N. D. Zelinsky, a German chemist. As a matter of fact, the insects themselves are metallized through a replacement of their original substance with the metal, just as the details of wood or leaf structure are replaced with stone in petrifactions. The process was discovered by a quasi-accident. Dr. Zelinsky had undertaken to make chemical analysis of some insects. The procedure involved covering them with finely powdered copper oxid and heating them in small platinum crucibles under an atmosphere of carbon dioxid. At the end of the treatment he found to his astonishment that he had a collection of perfect copper insects, for the outer parts of their body-shells had been penetrated by the metal and the original horny chitin, with all its fine markings, was replaced by a layer of copper. It is thought that this method may be of value in museums in the permanent preservation of rare and perishable insect specimens, and possibly plants as well.—Science Service in *Science* for Dec. 23, 1927.

The Monarch Butterfly Wintering in the Everglades (Lepid.: Danaidae).

The annual migrations of the Monarch Butterflies (*Danaus menippe* Hübner [*Anosia plexippus* Linn.]) have been the source of considerable scientific interest. The paths of migration have been definitely traced for part of their routes, but it has been a matter of some conjecture where the majority spend the winter.

In January, 1924, during the writer's trip through the Everglades, between West Palm Beach and Lake Okeechobee, great numbers of Monarch Butterflies were noted flying over the saw grass, alighting on flowers, etc. Mating was observed in several instances. The possibility that these great numbers of butterflies represented the local population must, of course, be considered, but it seems much more probable that these vast throngs of butterflies were the migrants in their winter quarters.—S. W. BROMLEY, New York.

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

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Apuntaciones para la Bibliografia entomologica argentina. [Physis, Buenos Aires] 8: 505-535. **McAtee, W. L.**—Bird nests as insect and arachnid hibernacula. [10] 29: 180-184. **McColloch, J. W.**—A list of the literature on Kansas Arthropoda. [Jour. Kansas Ent. Soc.] 1: 3-19. **Meissner, O.**—Kurze Bemerkungen über einige neuere naturwissenschaftliche Theorien. [20] 42: 45-46, ill. **Müller, L.**—Der Fundzettel. [18] 21: 279-281. **Schultz, V. G. M.**—Vögel auf der Falterjagd. [18] 21: 123-125.

ANATOMY, PHYSIOLOGY, ETC.—Cretschmar, M.—Pilzsymbiose und verwandte Erscheinungen bei Insekten. [18] 21: 241-244, cont. **Demoll, R.**—Untersuchungen über die Atmung der Insekten. [Zeit. f. Biologie] 87: 8-22, ill. **Fischer, E. et P.**—Observations et expériences sur les évolutions des mouches pendant le vol les réactions au mouvement. [78] 61: 397-427. **Koch, A.**—Methoden zur Behandlung der Atemphysiologie der Insekten. [Handb. Biol. Arbeitsm.] Lief. 199: 135-214, ill. **Kunze, G.**—Einige Versuche über den Geschmackssinn der Honigbienne. [89] (Zool. u. Phys.) 44: 287-314. **Lloyd, L.**—Salivary Secretions of Blood-sucking Insects in Relation to Blood Coagulation. [31] 121: 13. **Morita, J.**—Les chromosomes dans la deuxième cinèse spermatocytaire de "Mecostethus grossus". [78] 61: 428-432, ill. **Morrison, T. F.**—Animal light, with special reference to the synchronous flashing of fireflies. [Jour. Siam. Soc. N. H.] 7: 71-81. **Muir, F.**—The evidence for Hybrid Vigour in Insects. [31] 121: 56. **Pawlowsky, u. Stein.**—Experimentelle untersuchungen über die wirkung der gifthaare der überwinternden goldafterraupen (Euproctis chrysorrhoea) auf die menschenhaut. [46] 9: 615-637, ill. **Prochnow, O.**—Die Verfahren zur Erforschung des Tierfluges. [Handb. Biol. Arbeitsm.] Lief. 199: 215-294, ill. **Schuster von Forstner, W.**—Licht ohne Wärme! Die neuesten Forschungsergebnisse über die Lampyriden. [20] 42: 43-44. **Tirelli, M.**—Studi sulla Fisiologia del sistema nervoso degli Insetti. [Bol. Isst. Zool. Roma] 5: 84-114, ill. **Whiting, A. R.**—Genetic evidence for diploid males in Habrobracon. [90] 62: 55-58. **Whiting, P. W.**—The relation between gynandromorphism and mutation in Habrobracon. [90] 62: 59-62. **Wülker, G.**—Nahrungsaufnahme und Stoffwechsel bei blutsaugenden Insekten. [18] 21: 311-314, ill. **Zeleny, C.**—Non-inheritance of the temperature effect on bar eye in Drosophila m. [90] 62: 88-90.

ARACHNIDA AND MYRIOPODA.—*__Leitão, M.__—Generos novos de Gonyleptideos. (S) [Bol. Mus. Nac. R. d. Janeiro] 3: 13-22. **Taylor, R. L.**—Notes on the mite Pediculoides ventricosus Newport. [5] 34: 157-163, ill.

THE SMALLER ORDERS OF INSECTA.—*__Folsom, J. W.__—Insects of the subclass Apterygota from Central America and the West Indes. (S) [50] 72, Art. 6: 1-16, ill. **Heikertinger, F.**—Züchtung von Neuropteren Trichopteren und Panorpaten (Mecopteren). [Handb. Biol. Arbeitsm.] Lief. 204: 271-275. *__McDunnough, J.__—A new Heptagenia from the Yellowstone region. [4] 59: 261-265. **Rabaud, E.**—Etude biologique des larves de quelques Planipennes. [78] 61: 433-499, ill.

HEMIPTERA.—Börner, C.—Züchtung der Homopteren. [Handb. Biol. Arbeitsm.] 204: 215-270, ill. *__Hungerford, H. B.__—A report upon the aquatic and semi-aquatic hemiptera of the Mulford Biological expedition to Bolivia, South America, 1921-22. [10] 29: 187-190, ill. *__Jensen, H. A. C.__—Hemipterological notes and descriptions. IV. (S) [42] 16: 41-56. **Soliman, L. B.**—A comparative study of the structural characters used in the classification of the genus Macrosiphum of the family Aphididae with special reference to the species found in California. [67] 4: 89-158, ill. **Van Duzee, E. P.**—A Rare Aradid. [55] 4: 68

LEPIDOPTERA.—Barnes & Benjamin.—On the identity of Acidalia hepaticaria. (Geometridae). On the identity of "Cosmia" orina. Phalaenidae). [55] 4: 89; 89. **Blasche, P.**—Bequemer Nachtfang. [18] 21: 131-134. **Fischer, E.**—Züchtung der Lepidopteren. [Handb. Biol. Arbeitsm.] Lief. 204: 277-356, ill. **Johnson, C. W.**—Notes on the present distribution of two introduced moths. [5] 34: 176-177. **Learned, E. T.**—A study of the male abdominal appendages of the Nais-group of Apantesis-Walker. (Arctiidae) [5] 34: 135-145, ill. *__McDunnough, J.__—Contribution towards a knowledge of our Canadian plume moths. [Trans. R. Soc. Canada] Sect. 5, 21: 175-188, ill. *__McDunnough, J.__—The Lepidoptera of the Seton Lake region, British Columbia. [4] 59: 266-277. *__Meyrick, E.__—Exotic Microlepidoptera. (S) [52] 3: 321-384. **Michael, H.**—Die Zucht des chinesischen Seidenspinners Bombyx mori. [Handb. Biol. Arbeitsm.] Lief. 207: 537-

556, ill. ***Neustetter, H.**—Neue Heliconius-Formen. (S) [18] 21: 227-230. ***Niepelt, W.**—Neue exotische Rhopaloceren. (S) [18] 21: 180-182, ill. ***Niepelt, W.**—Neue Falter von Columbien. (S) [18] 21: 239-241. ***Niepelt, W.**—Neue Rassen von Morpho theseus Deyr. (S) [18] 21: 252-253, ill. ***Przegendza.**—Aberrationen von Callicore clymena Cr. und Catagramma hydaspes Drury. (S) [14] 41: 333-335, ill. ***Röber, J.**—Neue exotische Falter. (S) [18] 21: 140-142, ill. ***Röber, J.**—Neue exotische Falter. (S) [18] 21: 197-198. ***Röber, J.**—Neue exotische Falter. (S) [18] 21: 281-282. ***Schaus, W.**—New species of Heterocera from Central and South America. [10] 29: 185-186. ***Strand, E.**—Nordamerikanische, inbesondere californische Lepidoptera. [52] 1914, Abt. A, Hft. 11: 151-163. [n. sp. of Papaipema and Dysocnemis]. **Voukassovitch, P.**—Observations biologiques sur Vanessa io et ses parasites. [25] 1927: 277-278.

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SPECIAL NOTICES.—Opuscula braconologica.—Von Professor Dr. Josef Fahringer in Wien. Band I. Palaearktische Region. This monographic work may be of interest to American students.

ZOOLOGY OF COLORADO. By THEODORE D. A. COCKERELL, Professor of Zoology in the University of Colorado. Published by the University of Colorado, Boulder, Colorado, 1927. 12 mo., pp. viii, 262, illustrated.—A fly leaf reads: "University of Colorado Semicentennial Publications Authorized by the Board of Regents of the University of Colorado and prepared under the supervision of a committee of the Faculty . . . . these five volumes are issued as part of the celebration of the Semicentennial of the University, November, 1927. They will be of interest primarily to the people of this State and are appropriately Dedicated to The Citizens of Colorado."

Prof. Cockerell has divided this, the third volume of the series, into fourteen chapters, entitled, respectively: 1. The Past, 2. Mammals, 3. Birds, 4. Reptiles, 5. Amphibia, 6. Fossil Fishes, 7. Living Fishes, 8. Mollusca, 9. Insects, 10. Butterflies, 11. Moths, 12. Crustacea, 13. Worms, 14. Protozoa. The relations between the extinct and living faunas are pointed out in almost every chapter. Chapter 9 occupies pages 143-208, the Butterflies and the Moths receive 15 and 9 additional pages respectively. In each chapter the most common, or otherwise noteworthy, members of the group discussed that occur in Colorado are mentioned or briefly described, and many hitherto unpublished details and critical remarks will be found in the readable text. There is an alphabetical index of eight pages. The opportunities for discovery of new forms, habits and habitats offered by the rich fauna of this State are frequently brought to the attention of the reader. For the resident and the traveler in Colorado the book should be a great boon.—P. P. CALVERT.

OBITUARY.

FRANK R. MASON died on May 28, 1927, in his forty-sixth year, at his residence, 5533 Pulaski Avenue, Germantown, Philadelphia, Pennsylvania.

When about twelve years old he first showed signs of being interested in insects, especially moths attracted to the electric lights. Several years later he commenced his first collection consisting of butterflies and moths. Tiring of these he became more and more interested in beetles and finally disposed of all his Lepidoptera and settled down to the stupendous but pleasant task of making as complete a collection of the Coleoptera of the world as possible.

The first big addition to his cabinet came with the purchase of the Cerambycidae of the famous Vanderpole collection of Europe. The material was safely transported to Philadelphia and contained many types and thousands of interesting species from all parts of the world. Meanwhile he was steadily increasing his staff of collectors in every country. Much of the duplicate material he was able to exchange to advantage. He also purchased the collection of Mr. George Angell. This consisted of probably the finest collection of *Cychrus*, *Carabus*, and *Calosoma* of the world ever made by an American.

He took unusual pride in the neatness and appearance of his beetles. The specimens were kept in wooden boxes slightly larger than the regulation Schmitt box. Metal cases were constructed just to hold these boxes. A large room was set aside solely for the collection. All his mounting, packing, and other work was done in a separate building equipped for the purpose. He would not tolerate a locality or date label written by hand and had a printing press in order to enhance still further the appearance of each specimen.

Although interested primarily at first in the Longicorns, he also collected beetles of the other families. His favorites were the Buprestidae, Scarabaeidae, Carabidae and weevils or Rhynchophora. The last few years his collection had grown so rapidly that he decided to dispose of certain obscure, or to him uninteresting, groups such as Staphylinidae, water beetles, etc.

At the time of his death he had undoubtedly the best collection of beetles of the world in this country. His material is now in The Academy of Natural Sciences in Philadelphia. In accordance with his will and wishes it will be kept intact, but is open for the inspection of all students to whom it can not fail to be a great help and inspiration.

He never displayed much interest in writing on entomological topics. Neither was he interested in obtaining a library on the subject except where it would help him in arranging his beetles. Although very fond of being out in the field, he was not a diligent or hardworking collector and readily admitted it. The correspondence with his numerous scientific friends gave him untold pleasure and his premature and sudden passing brought sorrow to many.

Frank R. Mason, son of Henry and Emma Mason, was born February 23, 1882, at Germantown, Philadelphia. He was a delicate child and only attended Germantown Academy a short time, most of his education being obtained from a tutor. At the age of sixteen he entered the biological course at the University of Pennsylvania but on account of poor health did not complete the first year. Later he accepted a position in Mexico, but again his health interfered and he remained only six months, but long enough to do some collecting. He travelled quite extensively and besides making six trips to Europe also visited Northern Africa, South America and Hawaii, and had been in every state of the United States except two.

The writer regarded him as one of his best and dearest friends. Many pleasant collecting trips were enjoyed in his company. The mountains of Tennessee and Virginia were explored together. The White Mountains of New Hampshire were visited twice; also Fairfax County, Virginia, on many occasions, as well as innumerable localities in the states of New York and New Jersey. Even on the day of his sudden death, from a blood clot formed near the brain, he was to have been with a party of friends collecting at Point Pleasant, New Jersey. Word of his being taken was received upon the writer's return from this trip and the following day he sadly went to Philadelphia to the funeral of his good friend whose irreparable friendship he will never be able to replace.

ALAN S. NICOLAY.

Mr. Mason's collection is especially rich in the exotic species, but does not exhibit its value alike in all the families. This is, however, compensated for by the large series in the families in which he was especially interested. Among these may be mentioned the Cicindelidae with 372 species, Carabidae with 2,338, Meloidae with 238, Pselaphidae, 194, Cleridae, 100, Elateridae, 410, Buprestidae, 1,733, Tenebrionidae, 591, Scarabaeidae, 1,636, Lucanidae, 99, Cerambycidae, 4,660, Chrysomelidae, 1,593, Platystomidae, 259, Coccinellidae, 121, Curculionidae, 1,336.

In all the collection is represented by 53 families, 16,863 species and about 76,650 specimens, and is contained in over 1,100 boxes, in nine large pest-proof steel cabinets. The collection of the family Carabidae alone contains about 10,200 specimens and is, as regards the exotic species, considered to be one of the most important and complete in the country. The fine condition of the material, together with the excellent technique exhibited in the mounting and arrangement, gives it an exceptionally handsome appearance and great value.

E. T. CRESSON, JR.

APRIL, 1928

ENTOMOLOGICAL NEWS

Vol. XXXIX No. 4

CHARLES ROBERT OSTEN SACKEN,
1828–1906

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

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ENTOMOLOGICAL NEWS

Vol. XXXIX APRIL, 1928 No. 4

Evolution, Classification, Etc. (Lepid., Rhopalocera).

By J. D. Gunder, Pasadena, California.

(Plate II)

N. D. Riley of the British Museum has said in substance, "*Any scale of classification for Lepidoptera should be a scale of convenience and it should also be approximately natural.*"

To be convenient such a scale should consist of terms whose continuity of definitions each express for themselves, an individuality of rank or grade on the scale for the specimens to be described. For example, "var. nov.," "ab. nov.," etc., when used in formal description **do not** indicate a located status or give to the specimens described, a classified conception in the minds of systematic entomological readers. Such terms are "conversational words" and have too broad and general a meaning to be employed for specific purposes. These and some other vaguely used terms of classification (as subspecies is sometimes used) should feel the hand of synonymy as well as occasionally the insects for which they stand. The mixing-in or indiscreet use of one or several general terms within a single description is also and always a source of much confusion. I cite a quaint example or (cross-word puzzle)—

This VARIETY was bred at——in the woodshed near my barn and should prove to be a valid RACE, which I will call ——SUBSPECIES nov., though it has all the ear-marks of an ABERRATION; but I cannot place it among those FORMS, because the SPECIES already has some doubtful INDIVIDUAL FORMS which to me look like LOCAL RACES. I for one, deplore the naming of SPORTS, and especially FREAKS. Sorry I cannot figure the type as my barn burned down last weekend. I certainly lost a beautifully marked and valuable horse.

A scale of convenience can be arrived at if British and American lepidopterists can get together. We are not far apart. More discussion or impersonal treatises upon the subject should appear in American journals, however, like those being printed in the *Entomologist's Record* of London.

To be approximately NATURAL in classification means that nomenclature will eventually have to recognize the element of time in any scheme of its declension. To do this, the fact of a "beginning," as well as of an "end" has to be taken into consideration; in other words, the "start" of a species or "that evidence of a source of a species" is just as important as a matter of classified record on a scale, as is the constant or "finished" species itself. Also it is just as important and deserving of consideration as is any recognized middle subdivision thereof. Some zoologists consider any data relative to origin as of paramount importance. This article deals mostly with the inception, or the beginning, of a species as far as it concerns Rhopalocera.

In almost every constant group of butterflies, excepting those evidently long acclimated to some flat equatorial regions, there occasionally appear specimens whose wing designs or colors differ from the normal run of their kind and also from each other with persistent coextensive diversity. These are called transition forms (transient from near typical to definitely limited variation away from typical parental type) and for convenience of classification, they are divided into two main groups, those showing change of color and those having change of pattern. A further subdivision of the above is made based upon color sequence. (See ENT. NEWS, May, 1927, and Nov. 1927.) The biological value of these transition forms, which are somewhat rare in most collections, will be more generally understood when future lists and publications put them through taxonomic revision into eventual systematic order.

These interesting variations occur either plentifully or seldom in a species according to the amount of pressure nature is exerting for change upon their particular habitat. Should a butterfly colony exist under a long and more or less settled environment, it feels no immediate need of further development; but should the climatic or geographic area of its range or portions of its range be altered, then this change is gradually reflected upon the wing colors and patterns of the more susceptible individuals of that colony or those portions of it. In other words these particularly susceptible and conductive examples in a group have retained in their being a suppressed inertia, apparently latent and hereditarily deficient from a former cycle of deviation, which when liberated by timely external inducement, finds renewed expression by either expanding or contracting wing design or by alternating sequence of existing wing color. These primarily modified specimens then breed through the generations and, by the law of averages, increase the ratio of receptive progeny and eventually all of the affected group undergoing change, takes on and permanently adopts the salient traits of the specific character deviation of its original and most dominant transition form. If this transition be progressive or futuristic, then that style dominates; if the tendency is retrogressive or atavistic, then that influence takes the lead. To dominate of course, means that many more of one kind than of the other shall exist and propagate to force an average of their style upon their kind. In this manner, if time and surroundings allow, first the initiative local forms segregate and later the pure races are founded which digress laterally, for example, more and more from their original parental stock, existing either nearby or far-away according to the area of the geographically intrusive wedge or climatically modified intersection. With independent and virginal isolation may come structural variation probably forced primarily by a maximum density of previous development and evinced by venational or genitalic differences. As these attain constancy, the group can no longer be considered in the light of an atypical marked race only, but has advanced on the classification scale to the rank of species. Thus the cycle by consistent development in point of time is completed; beginning with the meager evidence of dominant TRANSITION FORMS (first); making, may I say, an associated plurality of contiguous local FORMS [1] (second); which eventually separate

[1] In America thus far, we have confined the term "Local Form" to mean a majority assemblage within a race or a species and occupying an altitudinal or confined desert area, the confines of which are NOT well marked. The confines of a "race" ARE well marked, being geographical and as a rule separate.

into geographical RACES (third); and then through attainment of some constant physical character become SPECIES (fourth).

The wings of variant-group butterflies and particularly those of transition form butterflies may be likened to delicate barometers and the interesting and unusual fact about them is that in the living species, they not only record their immediate PAST, but also forecast the patterns of their wings for the FUTURE. I believe in no other order of insects, or for that matter in no other animal organism, is it possible to find, SO OBVIOUSLY APPARENT, the equivalent of such dual evolutionary tendencies.

Regarding one of the many causes for the extinction of a species, I believe, though it is only a surmise, that if a species is over-long constant, it entirely loses susceptibility or loses those reactive individuals of quota necessary in its midst to rejuvenation under new conditions and therefore with no medium, there can be no survival.

Many species of butterflies have a complicated wing pattern. This should denote an older existence; however in most cases, I believe it is only the result of a more varied existence.

Rarely is there a long cycle poise in a temperate or variable zone species without the occurrence of transition form individuals which goes to prove that the order Lepidoptera is of fairly recent origin and compared to Coleoptera for example, which is an older order, has not achieved that equilibrium of maturity with immunity to the Earth's more commonly recurrent and somewhat adverse periods.

Many entomologists are continually raising or breeding various species of butterflies, subjecting their larvae to unusually cool or extra warm temperatures with the idea of producing quickly at home by artificial means what would take much time and energy in the field to find and collect under natural conditions. Many of these experimenters have thought that Nature's course could be altered by special breeding processes and that something new or of radically different design could be evolved; but this has never been found to be the case, as everything which is man-made invariably corresponds to those at sometime collected under natural conditions and *vice versa*. Breeders are often disappointed and discouraged when their batches of "treated" larvae fail to produce anything but typical examples. They should bear in mind that no amount of "treatment" will make well marked transition forms in a prime generation unless the inherited taint of receptivity happens to be present. If they are lucky enough to procure among their original outside stock some having this invisible strain, then their experiments will be just that successful in point of numbers and no more.

Plate II accompanying this article is labeled "Evolution: a discernible cause and effect," for the reason that ancient transition forms, similar to those shown on each side of the illustrated species, have been the apparent medium of producing the divergent races shown just below them. The pictures well portray what is meant by transition forms "forcing an average of their style (salient traits) upon their kind." Progressive tr. forms are, as a rule, larger specimens than their retrogressive brothers; this may indicate then, a slightly larger species in the future. The plate shows progressive tr. f. *fusimacula* Barnes on the left and retrogressive tr. f. *mariana* Barnes on the right. From a biological stand-point, the determination of the progressive trend has more significance, as it sets the pace for the future species. The reason I have chosen one of the *Nymphalinae* as a graphic example is because I have at hand more original photographic material to select from in this group, so far as transition specimens and related races are available; for that matter, one of the *Asciidae* or *Hesperioidea* would suit the purpose just as well, but a few "missing links" would have to be filled in until such time in the future when more material is found. The habitation of *Euphydryas chalcedona* D. & H. around the San Francisco Bay region and just to the south is considered very old, both botanically and geographically; also *chalcedona* happens to be the first named, though that is beside the question; so, I see no particular reason why this species cannot be considered, in the light of our present knowledge, as the parental root of this West Coast group. The point of prime species, versus closely related races now listed as species, will undoubtedly form the basis of some discussion in the future; however, constancy of genitalia, plus limited range of maculation variation within a congenial area obviously older botanically should establish a primitive species among any related butterflies.

Dr. Verity, of Florence, Italy, is at present concluding a survey of Rhopaloceran deviation in Europe. In a recent communication, he calls his work "a study of the geographical variations." I wish to compliment the Doctor upon his worthy and difficult undertaking. There may be some dissatisfaction regarding those of his new names which represent specimens whose type localities do not call for the rank of "race nov." If the data of his original descriptions cannot save his names, due to lack of details (and brevity in this regard is hardly an excuse), then comparative illustrations—showing species with race, holotype material only, is the best way to settle a temporary argument. Future or contemporary students, having collected impartially over areas representing names under dispute, will be better able to establish status or confirm whatever synonymy is involved. As a whole, the configuration of the surface of Europe and its relation to vast continents on the east and south have been conducive to more legitimate butterfly variation than ever our territories here will be able to show. However, this does not mean that conception of classification terms need to be strained. Should America work out "geographical variation" in the future, it will have several distinct advantages over Europe. I might mention several.

1st. Our systematists have been able to keep up to date by publishing fairly often, but for the most part privately, *synonymical* check lists. (Personally, I would like to see published yearly at Washington, complete check lists of all U. S. insects and in check list style only. The printed matter space would not be so great and new names could be designated as new for the year. Government paper and ink could be used for this purpose as well as for certain other purposes of which I doubt the good.)

2nd. Our authors have, as a rule, described the insects they are naming in a full and accurate manner at the time of the first proposal of their new names. Rarely do our workers "tell of a summer's trip and in the middle of a paragraph somewhere stick-in a name nov." Most of the editors of our journals paragraph a description, as a whole, separately. The old idea of "hiding out" a name, as if the author was bashful, uncertain or ashamed of it, is as old-fashioned as it is unethical.

3rd. By creating typical paratypes at time of original description and generally depositing these in different entomological centers, much material is available to all students.

4th. Original types are more accessible to American specialists in America than they are to European specialists in Europe. Sometimes it is necessary to have photographs of both upper and under sides of a specimen. Important details of a type cannot be gained by viewing it under glass. Institutions should record all their types by photograph and the negatives of these should be always available.

5th. Will not some Lepidopterist, using preferably the English language, work out the transition forms as listed in Europe? The study of "aberrations" systematically by series of grades will cut down an immense number of names.

To all Collectors of New York State Lepidoptera:

As sub-editor for the Lepidoptera of the New York State List of Insects, now coming off the press, I wish to express my regret that it has not been possible to give credit to collector or determiner for most of the records compiled before 1916. They have been recorded in all cases of any particular interest in our files, but the circumstances of the compilation, which was an alternation of frantic haste and of long delays, made it impossible to transfer them to the finished manuscript. For the same reason the order of species, which in the first draft followed "Dyar's List," is in some confusion, especially in the Noctuidae.

I also regret, though I cannot accept personal blame for them, the errors, and the obscurities in giving credit, resulting from innumerable changes made in the editorial office of the New York State College of Agriculture, which were made without my knowledge in violation of a definite agreement, and which they refused to rectify in proof. I may say that the proof of the "Lepidoptera of New York" had received similar treatment, and that the agreement was made in that connection.

Wm. T. M. Forbes.

The Economic Importance of Paratenodera sinensis (Orthop.: Mantidae).*

By Walter R. Thierolf, Glenside, Pennsylvania.

Paratenodera sinensis, the praying mantis, a comparatively recent arrival in this country from China, is gaining a rapid foothold in the vicinity of Philadelphia. Some normal spread is being noted annually and some successful efforts have been made to colonize it in new localities. Since no actual study of the economic relationship of this new-comer has been made, would it not be the part of wisdom to call a halt on further distribution until its economic status has been established upon a scientific basis?

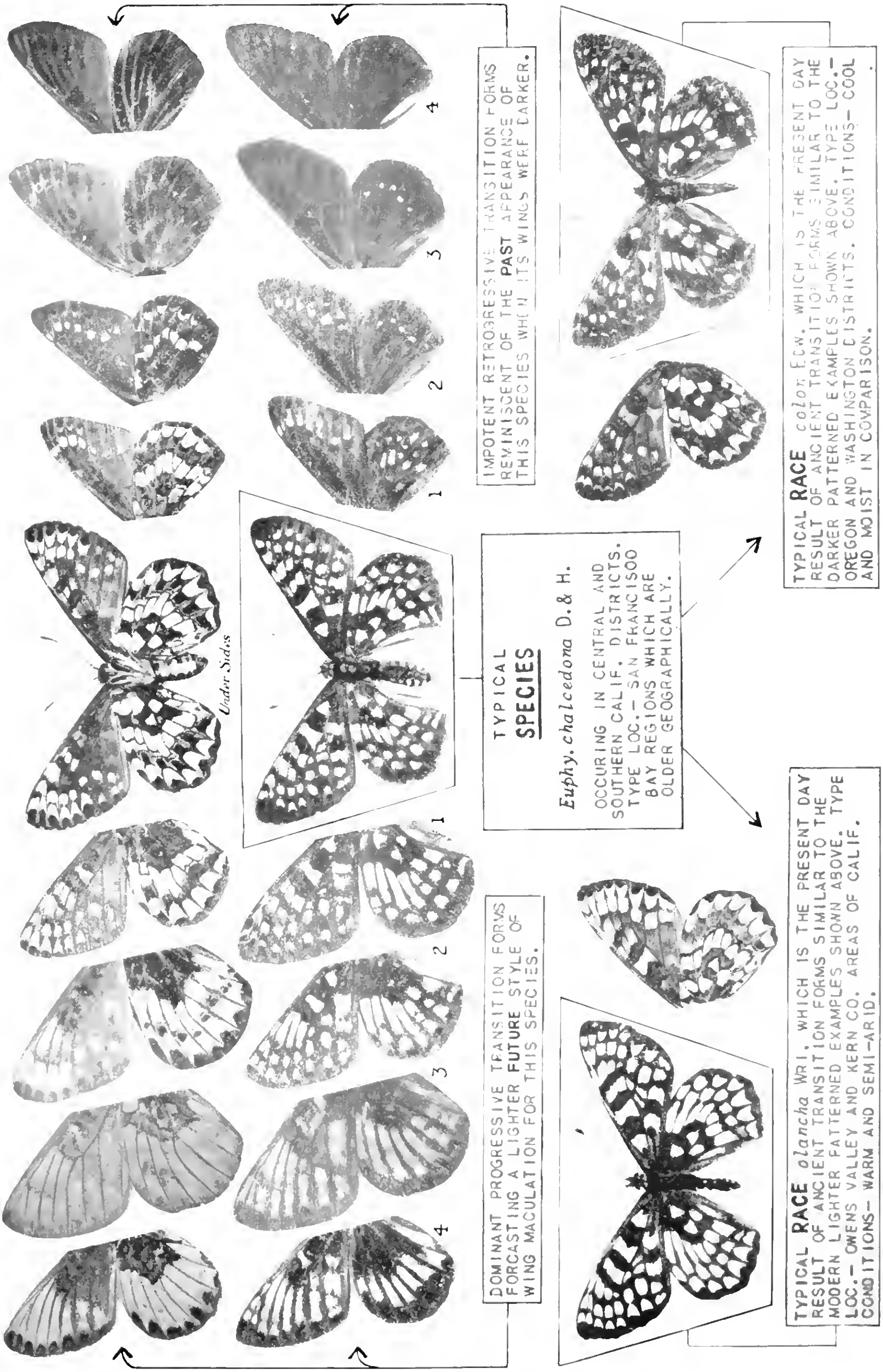
Beneficial Reputation

To this new arrival have been attributed predaceous, carnivorous, even cannibalistic tendencies, and because of these attributes, and possibly because of its religious nomenclature, the praying mantis has been hailed as a welcome combatant against the depredations of the countless hordes of harmful insects. These beneficent qualities have been attributed largely as the result of general observations of its feeding habits without any special effort to determine its relative standing as an economic factor (Rummel 1926).

The Need for Investigation.

While numerous instances have been reported, covering a wide range of insect victims of *Paratenodera sinensis*, most of these observations have been made during its captivity, when abnormal conditions of environment, degree of hunger, and limitation in the choice of food were determining factors in the selection of its food (Didlake 1926). Such observations have also been made with *Stagmomantis carolina*, a closely related species, and while different foods were offered the two

* A thesis submitted to the Department of Zoology, Graduate School, of the University of Pennsylvania, in partial fulfillment of the requirements for the degree of Master of Science, May, 1927.



EVOLUTION: A DISCERNIBLE CAUSE AND EFFECT —GUNDER.

species, a striking similarity has been noted in the insect food actually accepted by them (Rau and Rau 1913).

This brief study, which is an effort to record, from field observations of feeding habits and from laboratory analyses of stomach contents, the insects preyed upon under normal unconfined conditions, does not presume by any means to determine definitely this economic status. Before the life of any species is jeopardized by placing it upon the scale of economic benefit or harm it should be granted the justice of an intensive and extensive investigation. This report is presented, therefore, as an effort to stimulate such further study before even seriously considering the suggestion that *Paratenodera sinensis* may be a lion in a sheep's clothing. And if the results which are herein recorded appear to cast a shadow of economic suspicion upon the praying subject, it would seem that justice should be tempered with mercy by sounding a plea for extended economic sentence until some of the points in question shall have been further elucidated.

Incubation and Distribution of Specimens for Observation.

During the winter and early spring of 1926 about fifty egg cases of *Paratenodera sinensis* were gathered from open fields and hedges in the vicinity of Glenside, Pennsylvania. These cases were placed about the shrubbery of my home and neighboring lawns. Some cases were kept in the house at normal living room temperature (70 degrees) for early hatching. On May 15, the first indoor specimens were hatched. The earliest outdoor hatchings began June 1, and continued until early in July.

During this period, approximately 10,000 specimens were distributed over lawns, shrubbery, flowers and trees of the neighborhood. By far the largest part of this number disappeared, either having died or gone to the open fields not far away. Wandering specimens were brought back during the whole summer season, and at no time from early July to October frosts were specimens for observation unavailable. A number of individuals were released on a farm near Doylestown, about twenty miles from Glenside, and some of the observations of the accompanying tabulations were made from these specimens. All records apply to adults with the exception of a few specimens which were in the later stages of metamorphosis.

Methods of Observation.

Records of feeding habits are listed under the following heads: (1) Confined and artificially fed. (2) Unconfined and insect baited. (3) Unrestricted freedom. (4) Microscopic analysis of contents of alimentary tracts.

The first method, where specimens were placed in jars and boxes and supplied with various forms of insects, was not performed with a view to weighing economic worth by stimulating appetite and then offering victims which might not have been touched during freedom, but rather for the purpose of discovering existent possibilities of food taken during freedom.

In the second type of observations, individuals were given their freedom, and conditions were so arranged that while certain insects were placed within reach, their hunger was not controlled, and acceptance or rejection of the food was left optional.

The third method was the observation of groups in their own actual choice of environment and their own selection of food. This constituted the only truly scientific method of obtaining economic facts from the living specimen.

The fourth process, that of analysis of the contents of the alimentary tract, was an effort to identify parts of insects eaten. This was successful only to a limited degree because much of the food material was broken and digested to a stage beyond possibility of identification.

Following are the tabulations of the results obtained:

Confined and Artificially Fed.

Table 1.

Date	Mantids Observed	Mantids Which Ate	Insects Offered	Insects Eaten Harmful	Beneficial	Neutral
July 29-30	1	1	1 horse fly	1		
			1 bumblebee			
" 29-30	1	1	1 horse fly	1		
			1 grasshopper	1		
" 29-30	1	1	1 garden spider			
			1 daddy long legs			
			1 Jap. beetles			
			1 house fly	1		
" 29-30	1	0	1 house fly			
			1 grasshopper			
Aug. 14-16	1	1	3 blister btls.	2		
			3 house flies	3		
" 16	1	1	1 Jap. beetle	1		
" 19-21	1	1	15 house flies	9		
			1 garden spider			
			1 caterpillar			
			8 house flies	3		
			1 katydid			1
			2 garden spiders			
			1 wasp			
Aug. 24 to Sept. 4	1	0	2 katydids			
			2 grasshoppers			
			1 caterpillar			
			3 crickets			
			1 blister beetle			
Aug. 6-7	1	1	1 cricket			
Aug. 8	1	0	2 Jap. beetles			
			1 firefly			
Sept. 10 " 11	10	1	2 Jap. beetles			
			1 cricket			1
			1 firefly			
			1 lady beetle larva			
			1 aphis covered leaf			
			4 wasps			
			1 honey bee			
			3 blister beetles			
			1 grasshopper	1		
Sept. 10 " 13	17	1	1 Jap. beetle			
			50 blister beetles			
			1 hornet			
			6 wasps			
			1 honey bee		1	
Oct. 10	1	1	1 moth c'rplar	1		
Totals	38	10	134	24	1	2

In table 1 are listed the results of a series of observations covering the period from July 29 to October 10. The period of confinement for individual groups ranged from one to four days. Considering each day a mantid was observed as a mantid day there were one hundred eighteen mantid days. The fact that thirty-eight specimens during this time consumed only twenty-seven insects from a possible one hundred thirty-four offered (considering the aphis covered leaf as one specimen) reduces the reputed voracity of *Paratenodera sinensis* to the surprisingly low average of a very small fractional part of an insect per day for each specimen. Twenty-four of the insects eaten were harmful forms, one was beneficial and the remaining two were neutral.

In the boxes where larger numbers were confined the amount of food eaten was unaccountably small. At least one individual during this time was in the pre-molting condition, its cast exuvia being found in the box on the last day of confinement. Also the specimen under observation from August 24th to September 4th cast its exuvia on the last date.

(To be Continued)

The Tentamen versus the Tentamen Names.

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

In the February number of the Entomological News, Dr. Holland discusses my attitude toward Hübner's names proposed for Lepidoptera as expressed recently in *Science*. Perhaps a preliminary remark may clear some of the issues.

The question seems largely to be as to what is a scientific name, and how much may or must we extend our definition in applying it to early workers whose ideas on the matter were less well formulated than our own. As I see it, a scientific name of an animal has two essential parts: *first*, a name-word applying to a group of animals with some common characters, and not duplicated in the animal kingdom; *second*, a word for each species of this group, which shall not be duplicated within the group. It is also, I think, generally agreed that additional words may be added between these two, to indicate subordinate groups within the major group (subgenera within the genus), and others for the subdivision of the species (subspecies, variety, etc.). It is now customary to set off these subordinate parts of the name in some way, but many ancients whose names are universally accepted did not do so. For instance Linnaeus himself frequently abbreviated the subgenus name in exactly the same way as the genus, and no one ever thought he thereby invalidated his genus names, no matter how they may have viewed his subgenera.

The basis of my contention then, is that when Hübner in the period 1806-1816 issued a plate labelled *Limnas ferruginea Chrysippus* he established a perfectly valid scientific name, composed of genus (*Limnas*) and species (*Chrysippus*), with an intermediate adjective between, much as was done by Linnaeus himself (*Sphinx Adscita Phegea*) but further subordinating the second word by engraving it in smaller characters and without a capital.

Now as to Dr. Holland's particular points. The *Tentamen* to be sure speaks of *Stirpes*, a rather noncommittal word meaning in English "stocks" or "groups." He used many words in an unusual way: *Gattung* or "Genus" for *species*. *Schwingen* and *Senken* for fore and hind wings; but if we look at his *names*, we find he is making perfectly regular binomials. *Limnas Chrysippus* and a hundred others, so he uses a stirps *name* as a genus *name* is used today. Now that the Committee have ruled the *Tentamen* unpublished I suppose we fall back on the next oldest use (date uncertain, 1806-1814) and there we find *Limnas ferruginea Chrysippus*—the very same name attached to a perfectly good picture. I can now say, moreover, that in the index to his *Sammlung Europäische Schmetterlinge*, published in 1822, which gives the latest picture of his ideas, he is doing just the same. [1]

Besides Forbes, Scudder, etc., Ochsenheimer (1816) and Harris (1841), with others between, also "jumped" to the conclusion that Hübner's *stirps* names were *genera*. I seem to be in good company at least.

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[1] This index is now in our Cornell library. The alphabetic entry is "Chrystppus" [sic] L. 678. 679. Limnas ferruginea.

The *Anzeiger* of the *Verzeichniss*, as well as the *Verzeichniss* itself, uses a different system, which he adopted in 1816 and continued to use in the two works he started at that time. Evidently he viewed consistency in a single book more important than consistency in time! This second system is, as Dr. Holland says, binomial even in the strictest modern sense. As I see it there are two possible ways to reconcile them. One [2] is the obvious way by which we now clear all points of nomenclature when we can, namely by taking whichever name first gets valid publication. If we count out the *Tentamen* this will *in general* be the first volume of the *Sammlung Exotische Schmetterlinge* for the butterflies, the *Verzeichniss* for the moths, but there are many uncertainties of date, and a few embarrassing certainties. Thus the first *Diphthera* published was *hieroglyphica* (a South American Erebid of the genus *Noropsis*), which I think no one would like to accept. There was no other *Diphthera* published before 1816 when Ochsenheimer used it expressly on the basis of the *Tentamen*. There is no use in further analysis of the butterflies; two are preoccupied, as Holland and I have already said (and many others). The rest are just as obvious as Linnaeus's own butterfly names.

Perhaps I should say in parenthesis that the puzzle about *Apatela* (originally *Apatele*) as used by Harris, was merely where he got it. He uses it as a well known name, typically represented by *aceris*. If he did not get it from a Hübner *Strips* name, where on earth did he get it? Ochsenheimer had come in contact with the *Tentamen* too late to use it as he did *Diphthera* and several others.

As to Limnas, it should be noted that sometime after 1814,

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[2] The other way would be to make a hypothetical combination of his two systems, thus:

Now...........	Genus	(adjective)	Subgenus	Species
Hübner........	Stirps	familia	Coitus	Genus
Name.........	Limnas	ferruginea	Euploea	Chrysippus

using the names cited in the singular in the *Anzeiger* to the *Verzeichniss*. Linnaeus's scheme then makes a substantial parallel:

Genus	Subgenus	(adjective)	Species
Papilio	Danaus	festivus	Chrysippus

The result in nomenclature is as before.

the date of our prospectus, Hübner recognized his "Limnas" was heterogeneous, and published one Erycinid under the name "Napaea." In the Verzeichniss, as already said, the stirps names are supergeneric, but we can extract from it what Hübner had in mind—we find all of his *Erycinids* formerly in Limnas are now Napaeae. Finally in 1822, chrysippus, the original Tentamen species, is again in Limnas, while lucina, the only European Erycinid, is properly enough in Napaea. Also Boisduval does not *designate* pixe as type of Limnas; as I have already stated in *Science*, he merely *figures* it as an example. The corresponding text was never published, but I think we can be sure from Boisduval's custom that we would have there found Limnas credited to Hübner, and a species known to Hübner listed as type.

Mr. Benjamin has called my attention to the fact that Dryas, Najas, Hamadryas and Oreas (as subgenera) go even back of the Tentamen to the introduction to Borkhausen.

Finally, as to changes of name, such as Hübner's translations of the Latin names of the "Tentamen" into the Greek of the "Syst. Alph. Verz." I had supposed it was generally agreed: 1, that until the middle of the last century it was considered allowable for the author, and even for others, to change an unsuitable name, as we still have some right to do in morphology; and 2, that in our *present* codes such changes have been rejected, and we use the original names proposed.

The Entomology in the Bestiary of Philippe de Thaun.

By Harry B. Weiss, New Brunswick, New Jersey.

Regardless of the origin of the Physiologus stories, which circulated during the Middle Ages under the name Bestiaries, and for which various theories have been advanced, it is of interest to know just what kind of popular entomology flourished during the eleventh, twelfth and thirteenth centuries. Reference has been made[1] to the spiritual application of the peculiarities of the animals utilized in the stories, and it is

[1]Journ. N. Y. Ent. Soc. Dec. 1925, Vol. XXXIII, pp. 238-242.

usually assumed that theology controlled all thought during the Middle Ages and that natural science was used only as a carrier of religious doctrine. However, according to Thorndike[2] the people at that time studied nature out of curiosity and not in search of religious parallelization, and by the thirteenth century the scientific writers, when they utilized the Physiologus at all, discarded its religious content. Thorndike questions whether the characteristic elements of the Physiologus were ever religious and asks if they were not always scientific. According to Ahrens,[3] the title originated with Aristotle and the contents for the most part with Pliny, and the allegories do not appear in certain early texts. Thorndike calls attention to the fact that the allegories cannot do without the facts, or what passed for facts, about the animals while the pseudo-scientific facts do not need the allegories and often dispense with them.

Thomas Wright, in his "Popular Treatises on Science written during the Middle Ages in Anglo-Saxon, Anglo-Norman, and English" (London 1841), reproduces among other things the Bestiary of Philippe de Thaun, in Anglo-Norman, with a translation into English. Little is known about Philippe de Thaun, except that he was a poet, and according to his "Livre des Créatures," had an uncle, Humfrey de Thaun, "who was chaplain to Yhun and seneschal to the king." Wright states that Philippe was patronized by Adelaide of Louvaine, queen of Henry I, to whom his Bestiary, written within a few years after her marriage in 1121, was dedicated. Philippe's Bestiary was based on the Latin Bestiaria which were common in the manuscripts of the period. Various animals, mythological and otherwise, are mentioned in the poem, but only that portion of Wright's translation relating to insects is quoted below. It will be noted that Philippe, in his account, mentions only the ant and the ant-lion.

"Philippe de Thaun into the French language—has translated the Bestiary, a book of science,—for the honour of a jewel,

[2]A History of magic and experimental science. Vol. I. (New York, 1923).

[3]Zur Geschichte des sogenannten Physiologus, 1885.

who is a very handsome woman,—Aliz is she named, a queen she is crowned,—queen she is of England, may her soul never have trouble!—In Hebrew, in truth, Aliz means praise of God.—I will compose a book, may God be with its commencement."

"This saith Solomon of the ant rightly,—and of the idle man who waits for the fine weather;—be not slothful, look at the ant,—it carries much corn to its hole in summer,—in winter it sustains itself by the work it has performed.

"This say writings, that the ant has three natures;—it has such a nature, when it issues from its hole,—orderly in the morning right on its way,—and when it has found grain of all sorts of corn,—it knows well which is wheat, by the smell alone;—it does not care for grain of barley, such is its nature; —but if it is grain of wheat, it takes it with its mouth,—carries it to its nest, is supported with it in winter.

"And when it meets an ant, it does him no disgrace or shame,—nor takes from him his property, nor asks nor gives; the ant, which is cunning, puts itself in the track—from which the ant turned who brought the grain;—who brings the wheat, take, of its experience.—Since this little beast shows us the good condition,—man in the same manner ought to take of its experience.

"And hear without doubt another similitude of it;—for Scripture says, by figure, five virgins,—and five lamps full of oil and light,—went to a wedding, they carried them burning;—there were five foolish, their lamps were empty;—those entered who carried them full,—the bridegroom knew them, and received them joyfully;—the foolish ones entered not, who brought nothing there.—This is a great signification, have it in remembrance.

"By the five virgins are understood truly the five senses,—seeing, hearing, talking, touching and smelling—and virginity represents chastity,—and who has that, shall be welcome to the wedding,—that is, he shall come safely to the Judgment, —where will be the bridegroom who shall give the great gifts, —that is the Lord God, who will be in majesty.

"And the lamp signifies the soul in this life; the oil, Christianity; the fire, the Spirit of God.—We have this meaning by the ant;—hear the other nature, according to Holy Scripture;—the grain which it has it separates in two parts,—thus it does cunningly, that in winter it may take of it for support.

"Hear thou, man of God, this is authority,—as much seed as is written, as Isidore saith,—thou shouldest part it in two for support in winter,—that is, spiritually, and historically,—

that thou come safely at the Day of Judgment;—and therefore St. Paul says for truth in his writing.—'the law is spiritual, and not corporeal; the letter kills,' as he says, 'and the spirit lives.'—This is said for example, that you may have remembrance of it.—The traitrous Jew understands so much of Scripture,—not in allegory; he knows not what it signifies.

"But hear, thou man of God, understand authority,—and hear Scripture, and the third nature—of the ant, that it understands by its smell—which is grain of wheat, and similarly, which is of barley;—when it has found a grain of barley, and has smelt it,—then it stoops and goes to seek the wheat;—when it has found an ear, it mounts wisely upon it,—takes the flour of the grain, and puts it in its hole;—it collects rather the flower than the straw.

"O man of holy lfe, hear what it signifies;—by the letter, understand thou the straw of the wheat; know that the flower of it signifies the allegory;—and since the nature of this little animal show us—that what it does leads to all good,—man in the same manner ought to take experience.

'And what the writing says, that the ant does not care for barley,—has a great signification; listen to the allegory;—barley is food to a small creature;—by barley, we understand the doctrine of heretics.

"And Solomon says for truth in his discourse,—'For wheat they gave me barley, who hated me;'—otherwise do the triflers, may God give them trouble!—for barley, he takes wheat from his next kinsman,—whom he takes by surprise, he soon reduces him to seek his bread,—he was not his friend, since he has impoverished him,—then he conceives hatred for him, and looks upon him as a thing that is vile.

"Know that, by Solomon, we understand wise people,—and by the triflers, are understood covetous and bad people,—and by barley, vain-glory, sin, and heresy;—he who will please God, must desert the deceiver.—Photius, Sabellicus, Donatus, Arius,—these were heretics, and merited ill,—let us not believe in their folly, let us leave their heresy.

"Also Isidore speaks of the ant in his writing,—and shows the reason well why it is named *formica*;—It is *fortis* (strong), and carries *mica* (a particle), that is the meaning of the name; there is no creature of so small a shape,—which carries by its own force so great a burden;—it carries a burden of heavy lead of its own size,—this, a horse or a dromedary connot do.—Also, this beast is of so cunning a nature,—if it rain on its wheat, it throws it out to the wind,—and if it be sound within, then it saves it to the time,—which will come in winter, when it will eat it.

"Also Isidore speaks further of another ant:—In Ethiopia there are some who make a mystery of the grain;—there is a river there, the grain of gold is produced in it,—which they collect with their feet, and defend it from people,—people dare not approach there, to take or touch it;—whom these ants bite, they die immediately;—no one dares approach there, the ants are so fierce.—If any one will have some of that gold to make his treasure of,—by a stratagem they contrive they have great plenty of gold.—They keep without food mares which have newly colted,—then on the third day, as you will find, a little basket—on the backs of the mares they bind firmly,—they make them pass the river to bring the gold,—and draw them to a meadow which has great plenty of grass,—the ants are there where the mares go,—they make their cells in the basket and load the mares,—when they are satisfied, charged, and filled, they repair back behind them,—they run to the colts where they are neighing,—which the men have bound and attached by the river; thus truly that people get the gold.

"There is also a beast which is master of the ant,—it is the formicaleon, that is its name;—it is the lion of ants, whence it is thus named;—it is a very little beast, puts itself in the dust,—where the ant goes, and does it great outrage;—but of this matter I will make no more discourse,—because I will now begin to treat of another."

Parasites of Some Anthidiine Bees (Hym.: Megachilidae, Chrysididae; Dipt.: Bombyliidae).

By CLARENCE P. CUSTER, University of Colorado, Boulder, Colorado.

Various insects are parasitic on bees of the genera *Anthidium* and *Dianthidium*. In 1923 H. Friese reported that certain bees of the genus *Stelis*, two wasps, *Chrysis refulgens* and *Holopygia fervida*, and two beetles, *Zonitis mutica* and *Sitaris muralis* were parasitic on the European *Anthidia*. In 1926, C. H. Hicks reported a fly, which Mr. Green later determined as *Spogostylum daphne*, parasitic on *Dianthidium sayi*. In 1927 he showed that *Eusapyga proxima* Cresson was parasitic on *Dianthidium pudicum*. The same year I found a wasp, *Chrysis* (*Tetrachrysis*) *lauta* Cresson[1] to be parasitic on

[1]Determined by Miss Grace Sandhouse.

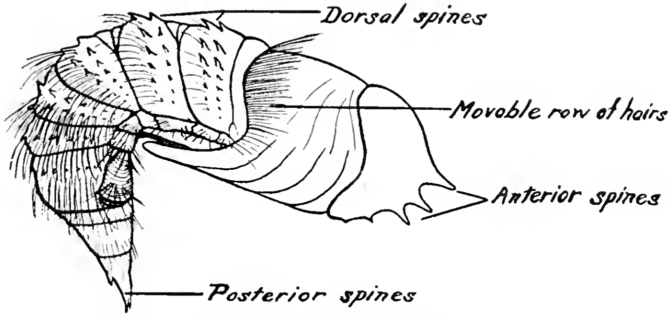
Anthidium porterae. I have found reference to no other American parasite of this genus.

Ordinarily about three months in an incubator at 27° C. are sufficient for the maturation of an insect which would require nine months in the out-of-doors. It is interesting to note that *Chrysis lauta* required over ten months of incubation. This may have been due to one of two factors: Either the larva was waiting over a season before maturing or it had been injured by being kept at 37° C. for the first week of its incubation. At any rate it postponed the eating of the host until the latter had consumed the pollen and spun a cocoon. After this it constructed its own cocoon inside that of the bee. The wall of the wasp's cocoon consisted of a hyaline membrane on which, towards the mammillary end of the bee's cocoon, there was a cream-colored, shield-shaped area which was more fibrous than the rest.

The larva remained without further development from September 26 to July 22 at which time the dark eyes were visible. Eight days later it had fully developed and on August 1 this bright green wasp emerged by slitting the wall along one side with its mandibles. Miss Sandhouse informs me that the male of this species is unknown.

There is some evidence that certain mutillid wasps are parasitic on bees of the genus *Anthidium.* Thus I have observed such a wasp near the nest of an *Anthidium* that was filling in the tunnel with pebbles. The bee was securing these from a distance of a meter or so away, and the wasp, which is wingless in the female sex, was between her and the nest. Every time the bee flew overhead the wasp followed until it found the nest. Then it entered by digging down through the pebbles. Approximately a minute was spent underneath, apparently while it was laying its egg in the host's cell. Neither host nor parasite could be reared from this cell and so the matter will bear further investigation.

During the winter of 1926, C. H. Hicks reared the parasitic fly, *Spogostylum daphne,* from the cell of the bee *Dianthidium sayi.* In 1927 we secured over a dozen such parasites from the resin cells of this bee. This fly is specially adapted to gain exit from the tough cocoon and hard, resin walled cell,— for it must emerge from this before shedding its pupal covering. From the anterior end, which is covered by smooth chitinous armor, eight spines project. It sways back and forth and thus batters its way, with the help of these spines, through the wall of the cell. The row of hairs, which arises from the junction of thorax and abdomen, as well as the dorsal spines catch on the edge of the opening and thus prevent a



The armor-plate of the pupa of *Spogostylum daphne* which enables it to gain exit from the bee's cocoon and resin cell. (× 7.5 diameters.)

slipping back into the cocoon. When the parasite is almost completely outside the latter, the cephalic armor-plate bursts and the adult is given its full freedom. The larva is undoubtedly carnivorous for in some cases I have opened parasitized cells and seen the parasite, hardly larger than the egg from which it had hatched, firmly attached to the back of the host which was almost full-grown. In such instances, as though irritated by the light, the anterior end of the parasite would lash rapidly back and forth, showing that it was alive.

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Id. 1927 Nesting habits and parasites of *Dianthidium pudicum* Cresson. Psyche.

A New Species of Batyle (Coleop.: Cerambycidae).

By J. N. Knull, Pennsylvania Bureau of Plant Industry.

The following *Batyle* differs so widely from *Batyle ignicollis* Say in color and sculpture of thorax that the writer believes it worthy of a name.

Batyle rufiventris n. sp.

Resembling a large specimen of *ignicollis* in shape; head, thorax, entire ventral surface, legs with the exception of the tibiae and tarsae, scutellum, small area around scutellum and humerus rubescent, antennae and elytra piceous. Head densely punctured, antennae, when laid back over the elytra, extending to about the middle of same, first joint clavate, second about as long as broad, third longer than first, fourth shorter than third, fifth longer than fourth, sixth shorter than fifth, joints gradually decreasing in length to eleventh, eleventh as long as tenth. Thorax wider than long, widest basally, dorsal area opaque, punctures small, widely separated, becoming more numerous laterally, entirely wanting on a median dorsal line, each puncture containing a bristling hair. Scutellum triangular, glabrous. Elytra nearly three times as long as wide, wider than thorax, sides parallel, obtusely rounded posteriorly to rounded apices, densely punctured, punctures becoming larger and less numerous anteriorly, each puncture containing a bristling hair. Ventral surface shining, abdomen with minute sparsely placed punctures, each puncture containing a long fine hair. Length 14 mm., width 3.5 mm.

Type a female labeled Sierra Ancha Mountains, Gila Co., Arizona, August, D. K. Duncan collector.

The writer is indebted to Mr. Duncan for the specimen and also to Mr. W. S. Fisher, who compared the insect with the material in the National Museum.

The First Insect Described from North America:

In the days of Queen Elizabeth, as stated in the letter of dedication, Thomas Moufetius (or Mouffet) wrote a book on insects, which he intended to dedicate to the Queen. He died unexpectedly and the book was not published till 1634, when it appeared in Latin, as "Insectorum sive Minorum Animalium Theatrum." On page 98 of that edition is figured the large southern form of the Tiger Swallowtail, *Papilio glaucus australis*. The figure has some fantastic details, but is unmistakable, and is credited to *P. glaucus* in Rothschild and Jordan's revision of Papilio. Unless some still unknown record is found from the Spanish explorations, I suspect that this will prove to be the first described North American insect, and at the same time the first insect collected in North America, as the original was no doubt taken in the sixteenth century exploration of Virginia.

In any case it is earlier than any of the species mentioned *as strictly North American*, in Rohwer's article in the December number of the *News*. WM. T. M. FORBES.

A Note on Tenodera sinensis Sauss. (Orthop.: Mantidae).

The Chinese mantis, *Tenodora sinensis* Sauss, was introduced into the United States about three decades ago. It was brought overseas on nursery stock to Mt. Airy, Pennsylvania, near Philadelphia, where it became acclimated and has now spread northward to New York and has been introduced into Connecticut and Massachusetts ([1] & [2]), but has not been reported as having established itself permanently that far north; southward it has now been found to occur in nature as far as northern Virginia. Its unusually large size and interesting appearance make it an object of general curiosity and specimens are often sent in for determination.

An apparently unrecorded variation in the biology of this large mantid is that the females, at least in captivity, sometimes produce egg-masses entirely unlike the sub-spherical and fluffy ones typical of this species; they are elongate and with little, or scarcely any, of the fluffy papery outer covering, in extreme cases resembling very much those of the Carolina Mantis, *Stagmomantis carolina* John. That such oothecae are produced by the females of *Tenodera* is certain, as they have been formed by caged specimens in some observed instances, one in Kent County, Maryland, and one in New Jersey. These elongate and more or less smooth oothecae are due perhaps to their producers being confined during oviposition, the oothecae produced being thereby rendered abnormal in structure and form. Miss Hart, of the Bureau of Entomology, reports, however, that she has found such oothecae formed by this species outdoors in Washington, D. C.

A. N. CAUDELL, Bureau of Entomology, U. S. Department of Agriculture

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[1]Britton, W. E., Bull. Div. Ent. U. S. Dept. Agric., No. 46, p. 107 (1904). Id., Guide Ins. Conn., Part II, p. 60, pl. vi, fig. 1, 2 (1911).

[2]Morse, A. P., Psyche, vol. xxvi, p. 25 (1919). Id., Man. N. Engl. Orth., p. 329, fig. 44 (1920).

Amendments to the International Rules of Zoological Nomenclature

Upon unanimous recommendation by the International Commission on Zoological Nomenclature, the International Zoological Congress, which met at Budapest, Hungary, September 4-9, 1927, adopted a very important amendment to Article 25 (Law of Priority) which makes this Article, as amended, read as follows (*italicized type represents the amendment;* Roman type represents the old wording):

Article 25.—The valid name of a genus or species can be only that name under which it was first designated on the condition:

(a) That (*prior to January 1, 1931*) this name was published and accompanied by an indication, or a definition, or a description; and

(b) That the author has applied the principles of binary nomenclature.

(c) *But no generic name nor specific name, published after December 31, 1930, shall have any status of availability (hence also of validity) under the Rules, unless and until it is published either*

(1) *with a summary of characters (seu diagnosis; seu definition; seu condensed description) which differentiate or distinguish the genus or the species from other genera or species;*

(2) *or with a definite bibliographic reference to such summary of characters (seu diagnosis; seu definition; seu condensed description). And further*

(3) *in the case of a generic name, with the definite unambiguous designation of the type species (seu genotype; seu autogenotype; seu orthotype).*

The purpose of this amendment is to inhibit two of the most important factors which heretofore have produced confusion in scientific names. The date, January 1, 1931, was selected (instead of making the amendment immediately effective) in order to give authors ample opportunity to accommodate themselves to the new rule.

The commission unanimously adopted the following resolution:

(a) It is requested that an author who publishes a name as new shall definitely state that it is new, that this be stated in only one (*i.e.*, in the first) publication, and that the date of publication be not added to the name in its first publication.

(b) It is requested that an author who *quotes* a generic name, or a specific name, or a subspecific name, shall add at least once the author and year of publication of the quoted name or a full bibliographic reference.

The foregoing resolution was adopted in order to inhibit the confusion which has frequently resulted from the fact that authors have occasionally published a given name as "new" in two to five or more different articles of different dates—up to five years in exceptional cases.

The three propositions submitted by Dr. Franz Poche, of Vienna, failed to receive the necessary number of votes in commission to permit of their being recommended to the Congress. Out of a possible 18 votes for each proposition, Poche's proposition I received 9 votes, II received 6 votes, and III received 7 votes.

Zoological, medical and veterinary journals throughout the world are requested to give to the foregoing the widest possible publicity in order to avoid confusion and misunderstanding.

C. W. STILES, *Secretary to Commission*

(Reprinted from *Science* for Jan. 6, 1928, pp. 17-18.)

Personals.

Mr. A. B. Gahan, of Bureau of Entomology, is in Europe studying the types of parasitic Hymenoptera.

According to the Journal of Economic Entomology for December, 1927, Mr. R. A. Cushman, United States National Museum, has been appointed Honorary Assistant Custodian of Hymenoptera and has been given charge of packing and shipping to the Museum, the 1450 or more Schmitt boxes containing the collection of the late C. F. Baker.

Professor R. A. Cooley, professor of Zoology at Montana Agricultural College, will leave on April 1 for a year's leave of absence. He will spend part of the time in the interior of Africa with the Chicago Zoological expedition and will study tick parasites. (*Science*, March 9, 1928). Professor Cooley has worked on the Rocky Mountain Spotted Fever Tick and its relation to human diseases for many years.

Dr. George N. Wolcott, formerly entomologist at the Insular Experiment Station, Porto Rico, and more recently with Service Technique, Haiti, has accepted a position with the sugar-cane and cotton experiment station in Peru. He is sailing from New York on April 12. (*Science*, March 9, 1928). Readers of the NEWS will recall Dr. Wolcott's article on the pierid butterfly *Kricogonia castalia*, in our issue for April, 1927.

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.

Papers published in the Entomological News are not listed.

GENERAL.—**Ball, E. D.**—Symposium: needed lines of investigation in American Entomology. (Introduction by E. D. Ball. Taxonomy by S. A. Rohwer. Insect physiology by P. S. Welch. Insect bionomics by R. W. Doane. Insect ecology by A. C. Allee. Needs in the study of beneficial insects by L. O. Howard. Economic entomology by E. O. Essig and W. P. Flint. Summary by E. F. Phillips.) [7] 20: 419-422. **Brown, F. W.**—Odors and insects. [40] No. 299: 1-9 pp. **Engelhardt, G. P.**—Collecting at Mobile, Alabama. [19] 22: 251-253. **Holland, W. J.**—"Exit the Tentamen, but ...." What? [68] 67: 161-162. **Kitt, M.**—Typen, Cotypen und Anderes. [64] 12:89-92, cont. **McColloch & Hayes & Bryson.**—Hibernation of certain scarabaeids and their Tiphia parasites. [84] 9: 34-42.

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The long-expected List of the Insects of New York, with a list of the Spiders and certain other allied groups [Opiliones, Eriophyidae, Diplopoda, Chilopoda and Protura] has appeared as Memoir 101, Cornell University Agricultural Experiment Station. Ithaca, New York, Date of publication, Jan., 1928. 1121 pp., a folding map in the back cover.—The history of this List is given by the editor, Mortimer Demarest Leonard, in the Introduction. The List was "initiated about twelve years ago by a committee of a number of the leading entomological specialists. . . . Dr. J. Chester Bradley, of Cornell University, was appointed Editor-in-Chief . . . . and a group of subeditors was selected. . . . . Pressure of other work prevented Dr. Bradley from continuing in charge, and the present editor was appointed in the spring of 1923, while he was Acting State Entomologist at Albany, New York. The Board of Editors was somewhat modified for various reasons, and in the fall of 1924, the work was transferred to Cornell University, where it was completed under special appropriation by the New York State College of Agriculture and the Heckscher Research Fund. To these funds the New York Academy of Science added $150 and the New York Entomological Society a like amount." Dr. W. T. M. Forbes gives a brief account of the Faunal Districts of the State (pp. 7-11) accompanied by an outline map in the text. The list of 31 orders, 430 families, 4,797 genera and

16,124 species follows to p. 1083. 15,449 of the species are insects. The different sections of the work were farmed out to more than 150 specialists and collectors, who have brought the data together. Under each species the known localities and dates of appearance are given. The character of the list is thus similar to that of Smith's *Insects of New Jersey*, the 1910 edition of which embraced 331 families, 3,486 genera and 10,385 species. At the end of the volume are alphabetical lists of the more important collecting stations not in the U. S. Official Postal Guide, of the cooperators and authorities and an index down to genera inclusive, which alone occupies 28½ pages in fine type. The University, the Editors, their assistants and collaborators have placed all naturalists under a great debt by this publication.—P. P. C.

OBITUARY.

Announcement has just come of the death, in Paris, on January 28, 1928, of FÉLIX HENNEGUY. This news is received with very deep regret, although it was not entirely unexpected. The writer saw Henneguy last July at the meeting of the Academy of Agriculture in Paris, and was much disturbed by his appearance. He looked like a man who had not long to live. He was operated upon for stone in the bladder last October, and never recovered. Henneguy was born in Paris, March 18, 1850, and was destined to a medical career. He was an assistant in physiology at Montpellier from 1871 to 1875, and took his doctorate in medicine there. He came to Paris in 1881 and was preparator in comparative embryology at the College of France. He studied under Balbiani and was given a doctorate in science in 1888. He became Professor of Comparative Embryology in 1900. He was made a member of the Academy of Medicine in 1907, and of the Academy of Sciences in 1908, succeeding Alfred Giard. Although his work covered a large field, he had an especial interest in entomology, and his great work, *Les Insectes*, a large, well illustrated volume of eight hundred pages, is well known and is often consulted all over the world. It was published in 1904. It is especially strong in questions of morphology and embryology, and is one of the great books. He also published some shorter entomological papers. A brief review of his life and work was given by the President of the Academy of Agriculture of France at the meeting of February 1st.

L. O. HOWARD.

MAY, 1928

ENTOMOLOGICAL NEWS

Vol. XXXIX No. 5

CHARLES ROBERT OSTEN SACKEN,
1828-1906

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TO CONTRIBUTORS. All contributions will be considered and passed upon at our earliest convenience and, as far as may be, will be published according to date of reception. The receipt of all papers will be acknowledged. Owing to the limited size of each number of the NEWS, articles longer than six printed pages will be published in two or more installments, unless the author be willing to pay for the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

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Stated Meetings of The American Entomological Society will be held at 7.30 o'clock P. M., on the fourth Thursday of each month, excepting June, July, August, November and December, and on the third Thursday of November and December.

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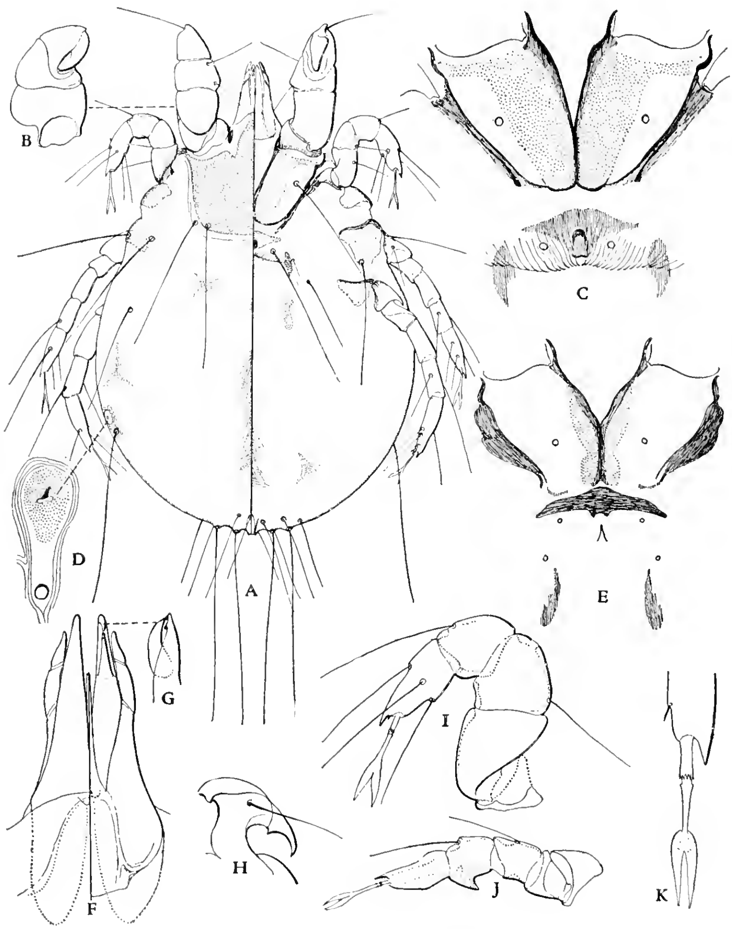

MYIALGES CAULOTOON, A-D, F, G, I, K. M. ANCHORA, E, H, J.—FERRIS.

ENTOMOLOGICAL NEWS

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The Genus Myialges (Acarina : Sarcoptidae).

By G. F. Ferris, Stanford University, California.

Plate III.

The members of the mite family Sarcoptidae are characteristically parasites of mammals. However, a single genus, *Myialges,* with two known species, occurs on flies of the family Hippoboscidae. The two named species were originally recorded from Africa in 1907, and as far as I have been able to determine there have been no additions to the knowledge of the genus since.

In the course of working over a rather large amount of material belonging to the Hippoboscidae, I have upon three occasions met with these mites. Two species are included in the material at hand. The existing descriptions omit reference to some structures of specific importance and it is possible that the forms at hand are new, but I am disposed to believe that this is not the case and to refer my material to these named species.

It is not possible to add anything to the knowledge of the biology of the species, but the descriptions may be considerably amplified and as the genus has not appeared in American literature I shall here review what is known of its biology.

Subfamily Myialgesinae Trouessart.

1907. Trouessart, Bull. Soc. Zool. France 31:128.

Type and only included genus, *Myialges* Sergent and Trouessart.

The following general notes apply to both species.

Thus far, except for the first stage of *M. anchora,* only the adult females are known. These are found attached by their beaks to the body of the fly host. In the case of the specimens which I have myself seen all but one were attached to the abdomen, this one being on the thorax. Sergent and Trouessart record them as occurring on both parts of the body. That there appears a very small chitinous spot which encloses a minute opening (fig. *D.*) that somewhat suggests a spiracle. The abdomen, as is common to the family, is marked with fine ridges. In the figure of *M. caulotoon* (fig. *A*) I have indicated merely what a student of finger prints would call the "deltas, loops and arches" of the pattern. It is evident, however, that these are variable in their arrangement.

Explanation of Plate III.

Myialges caulotoon Speiser. *A*, female; *B*, anterior leg; *C*, venter of cephalothorax; *D*, undetermined structure from lateral aspect of abdomen; *F*, rostrum; *G*, chela; *I*, second leg; *K*, caroncle.

Myialges anchora Sergent and Trouessart. *E*, ventral aspect of cephalothorax; *H*, claw of anterior leg. *J*, second leg.

The Economic Importance of Paratenodera sinensis (Orthop.: Mantidae).*

By Walter R. Thierolf, Glenside, Pennsylvania.

(Continued from page 116).

Unconfined and Insect Baited.

Table 2.

Date	Mantids Observed	Mantids Which Ate	Insects Offered	Insects Eaten Harmful	Beneficial	Neutral
July 18	6	1	aphids (many) ants (many)	1		
Aug. 19	1	1	house flies many	6		
Oct. 8	2	2	1 owlet moth caterpillar	2		
Oct. 10	5	4	5 tent caterpillars	4		
	16	4	15 tent caterpillars	4		
	1	1	1 meas. worm	1		
Oct. 12	1	1	2 garden spiders			1
	1	1	1 garden spider			1
	1	1	1 cricket			1
Totals	34	16		18	0	3

In the observations recorded in table 2 the freedom of the subjects was normal. While the matter of accepting food was optional the selection of such food can hardly be considered natural. Of the thirty-four specimens observed sixteen consumed twenty-one insects, eighteen of which were harmful and three neutral. It is natural to assume that the appetite of these free specimens was more nearly normal than in the case of the confined mantids. The periods of time involved in these feedings varied from a few minutes to several hours. On August 19th, one mantid consumed six house flies in one hour. On October 10th, twenty-two individuals required two hours to eat eight tent caterpillars and a measuring worm. In this particular instance the mantids were captured in an open field and carried to a tree on which the caterpillars were feeding. The excitement factor due to being handled must be taken into account as a possible cause affecting appetite, also possibly the presence of numbers of specimens, for at this time the mating instinct was at a high ebb and sex stimulation together with the antagonistic attitudes of the males toward one another may have had a negative influence upon feeding. It should be noted that during these observations one pair of mantids engaged in copulation and several combats ensued among the males.

The second table would undoubtedly indicate a high degree of efficiency of *Paratenodera sinensis* on the beneficial side of the balance. The same conclusion would be drawn from the first table of results. It now remains to be seen whether the same type of insect food is selected during non confinement and freedom of food selection.

UNRESTRICTED FREEDOM.

Table 3

Date	Mantids Observed	Mantids Which Ate	Insects Eaten Harmful	Insects Eaten Beneficial	Insects Eaten Neutral
Sept. 11	20	1		2 honey bees	
		1		1 honey bee	
		1	1 butterfly	1 honey bee	
Sept. 12	20	1		2 honey bees	1 wasp
		1		1 honey bee	
		1		1 honey bee	
		1		1 honey bee	
		1		1 honey bee	
		1		1 honey bee	
Sept. 16	1	1	1 grasshopper		
Oct. 9	1	1	2 caterpillars		
Totals	42	11	4	11	1

From an economic viewpoint the results of the third series of observations as recorded in table 3, are of importance. Of the forty-two mantids enjoying absolute freedom eleven ate sixteen insects, eleven of which were beneficial, four harmful, and one neutral. In the preceding table, where a decided capacity for harmful insects was noted, no insects of a beneficial type were offered. In this series of observations, which were made in an open field overgrown with flowering golden rod, evening primrose, and other weeds, bees were decidedly predominant in number, though other insects observed within the range of the mantids were ants, aphids, mosquitoes, fireflies, caterpillars, house flies, butterflies, moths, spiders, blister beetles, lady beetles, ground beetles, grasshoppers and wasps.

There seems to have been undoubted evidence of a preference for bees as well as a striking adaptation in the selection of an environment which was particularly attractive to bees. The time factor varied, the observation of September 11th covering one hour and fifteen minutes and that of September 12th two hours and fifteen minutes.

It would be unfair to reduce such meagre results to terms of bee destructive capacity for a season, yet it may be readily seen that a few mantids in the vicinity of an apiary would wreak destructive havoc in a short time.

Summary of Feeding Observations.

Table 4

Group	Number of Mantids Feeding	Insects Eaten Harmful	Beneficial	Neutral	Total
Confined and artificially fed	10	24	1	2	27
Unconfined and insect baited	16	18	0	3	21
Unrestricted freedom	11	4	11	1	16
Totals	37	46	12	6	64

While there has been no definite correlation of these three types of observations which are summarized in table 4, it may be interesting to note that the thirty-seven feeding mantids ate forty-six harmful, twelve beneficial and six neutral insects during the time they were under observation. The figures in connection with the group in unrestricted freedom naturally bear the most damaging evidence against *Paratenodera sinensis* as an economic factor.

Analysis of Alimentary Tracts.

With reference to food eaten, the preceding methods have been both qualitative and quantitative in nature. The stomach analysis method is entirely qualitative, since no effort was made to determine the number of any species of insect present.

Table 5

Number of Mantid	Food Identified
1	Lepidopter, sawfly*
2	grasshopper, honey, bee, Lepidopter
3	nothing identified
4	Lepidopter
5	grasshopper, Lepidopter, spiders*
6	nothing identified
7	honey bee, Lepidopter
8	honey bee, Lepidopter
9	honey bee, Lepidopter, spider*
10	honey bee, Lepidopter
11	honey bee, Lepidopter, wasp
12	honey bee, Lepidopter
13	grasshopper
14	honey bee, Lepidopter, wasp
15	honey bee, Lepidopter
16	honey bee, Lepidopter, wasp
17	honey bee, Lepidopter, wasp, Ichneumonoid*
18	honey bee, lady beetle, wasp
19	honey bee, wasp
20	caterpillar, honey bee
21	grasshopper, honey bee, Lepidopter, Heteropteron*
22	honey bee, Lepidopter,* sawfly*
23	caterpillar, grasshopper
24	nothing identified
25	caterpillar, grasshopper, honey bee
26	caterpillar, honey bee, hornet, Lepidoptera
27	grasshopper, honey bee
28	caterpillar
29	caterpillar, grasshopper, honey bee, Lepidopter, Ichneumonoid*
30	caterpillar
31	caterpillar, grasshopper, honey bee, Lepidopter
32	caterpillar, Lepidopter
33	caterpillar, grasshopper, honey bee, Lepidopter
34	grasshopper, spider*
35	fly, honey bee, wasp

* Identification of starred parts was accomplished through the courtesy of Dr. W. C. Henderson, Chief of the Bureau of Biological Survey, Washington, D. C., whose assistance was procured by Dr. Philip P. Calvert, of the Department of Zoology, University of Pennsylvania, under whose direction this thesis was prepared.

The results of this check-up which are listed in table 5, would seem to be the most summary evidence of feeding habits; however, they must not be considered exhaustive because of the large number of parts unidentifiable.

The alimentary tract was removed and divided into three sections, the oesophagus and gizzard, the stomach and the intestine. The contents of these sections were spread out on watch glasses and microscopically examined for such parts as mandibles, maxillae, tarsi, claws, sections of legs, antennae, stings, hairs, scales and various other bits of characteristic chitin that could be traced to their original possessors. Since very few parts were found in the oesophagus and because of the similarity of parts found in the stomach and intestine, the results tabulated are for the alimentary tract as a whole.

Expressed in summary form, of the thirty-five alimentary tracts examined twenty-three indicated bee food, twenty-one butterfly or moth as indicated by Lepidopter, ten caterpillar, one fly, two sawfly, two Ichneumonoid, one Heteropteron, eleven grasshopper, one hornet, one lady beetle, seven wasp, three spider. The first twenty-three specimens were taken from an open field on September 16th and the remaining twelve were taken from the same locality October 2nd. At the time the latter group was captured the blossom stage of golden rod and evening primrose was on the wane, and bees, wasps and butterflies were less in evidence, having been supplanted by larger numbers of caterpillars and grasshoppers. This change of food was decidedly noticeable in the alimentary tract examination.

Table 6

Number of Mantids	Insect Foods Indicated in Alimentary Tract	Percentage of Mantids Eating Indicated Food
23	honey bee	65.7
21	Lepidopter	60.0
10	caterpillar	28.5
1	fly	2.8
11	grasshopper	31.4
1	hornet	2.8
1	lady beetle	2.8
7	wasp	20.0
2	Ichneumonoid	5.7
1	Heteropteron	2.8
2	sawfly	5.7
3	spider	8.5

In table 6 are indicated the number of mantids whose alimentary tract contained the remains of insects specified, and also the percentage of mantids examined which ate that particular kind of insect.

The results of these observations show conclusively that large numbers of mantids are depredators among the bees and that they destroy beneficial Ichneumonoids. They show the mantis also to be extremely helpful to man by destroying butterflies and moths, caterpillars their direct descendants, grasshoppers and sawflies. The other types of insects eaten are representative of both beneficial and harmful sides of the economic scale. Whether they should be definitely classed as harmful or beneficial depends upon the relative numbers of each type of victim consumed and upon our evaluation of these respective victims.

As a result of a more or less quantitative observation, F. C. Hadden ('27) states that "theoretically mantids should be and probably are, more beneficial than harmful, for it is the common, harmful insects that they catch in greatest numbers." Among the insects eaten by the mantis he includes four species of Orthoptera, one species of Homoptera, three species of Lepidoptera, fifteen species of Diptera and six species of Hymenoptera, though he does not state whether these insects were fed to the mantids or whether they were taken freely in the wild.

The fact that the insect victims of mantids are so extremely varied would appear to make them worthy agents in nature's plan to retain a normal balance in insect life.

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Passing the Buck in Descriptions of Insects.

By W. S. Blatchley, Indianapolis, Indiana.

During the six years spent in the preparation of the manuscript of my work on the Heteroptera of Eastern North America I was obliged to borrow, or probably I should say "tried to borrow," examples of numerous species not represented in my collection in order that I might draw up from them in my own words descriptions suitable for the character of the work which I was preparing. That work, as well as my other manuals, was intended mainly for the use of tyros or beginning students, and also for busy economic entomologists who desire to find out as quickly as possible the name of some insect in hand. On a number of occasions I was asked by persons, who did not particularly care to lend me specimens, why I did not use descriptions already in print. As an example of these, and to make the purpose of this paper more clear, I will quote the following specific instance:

In 1925 there appeared in the Proceedings of the U. S. National Museum an excellent work *for specialists* entitled "Revision of American Bugs of the Reduviid Subfamily Ploiariinae," by Messrs. McAtee & Malloch. It is a difficult group, and there were a number of the species described from the eastern United States which were not in my collection. I therefore wrote to Mr. McAtee and asked for the loan of representatives of eleven of these. A few days later I had a reply from Mr. A. Wetmore, Assistant Secretary of the Museum, stating that examples of five of the species were being sent me (the others being represented in the museum by single specimens) and adding: "We are somewhat surprised to notice your request for the loan of this material, inasmuch as the Museum has recently published a paper by McAtee & Malloch treating all the Nearctic species of this subfamily. *Certain workers*[1] who use this paper find it very satisfactory and we had hoped it would be of service to all workers in the preparation of local lists and in obtaining definite characters for the identification of the various species."

[1]The Italics are mine.

I replied, stating to Mr. Wetmore the nature of the work which I was preparing and that I desired the specimens to draw up new descriptions which would show correctly and in detail both *color* and *structural* characters. I also cited him to certain features in the McAtee-Malloch paper which render it in some respects practically useless to beginners. A few of these, briefly stated, are as follows:

EMPICORIS ORTHONEURON n. sp., p. 18—"Similar to *errabundus* in color except that," etc.

EMPICORIS RETICULATIS n. sp., p. 20—"Similar to *errabundus* in color, the spots at apices of hind wings very distinct."

EMPICORIS CULICIFORMIS (DeGeer), p. 25—"In color it agrees very closely with *errabundus* but it is distinguished structurally as indicated in the key."

EMPICORIS ERRABUNDUS[2] (Say), p. 24—In neither the description nor the key is any reference made to the color of this species except that the "hind wings are spotted with black apically." In other words, the authors presuppose that every person using their paper has at hand correctly named examples of the insect they call *Empicoris errabundus* Say. If he does not have these, and not one beginning student in one hundred will have them, the descriptions of the first three species above named are entirely worthless as far as color goes. This kind of a description is what I term, to use a slang expression now very much in vogue, "passing the buck," not only from one species to another, but passing it also to the innocent student.

There are numerous other instances of the kind in the McAtee-Malloch paper, but the most flagrant examples of this "buck passing," which I happened upon during my studies of the Heteroptera, are in a paper by H. H. Knight in Bulletin Brooklyn Entomological Society, XV, 1920, pp. 49-66, entitled "New and Little Known Species of Phytocoris from the Eastern United States." A few words of explanation in regard to this:

In 1876 O. M. Reuter, a noted European Hemipterist and

[2]The *E. tuberculatus* Banks, p. 518 of the "Heteroptera of E. N. Amer."

afterward world authority on the family Miridae, described[3] from *Texas,* a species of Mirid under the name *Phytocoris eximius.* In 1909 Reuter sent to the U. S. National Museum a specimen under the name of *P. eximius* which he had compared with the type in the Stockholm Museum. In the same year he redescribed[4] *P. eximius* from specimens which Knight states "were apparently a different species, being a form with irrorate membrane." Knight, in the paper above cited, used specimens from the eastern United States which he had compared with the paratype of a Texas species in the U. S. Nat. Museum, and which he says does not agree with Reuter's second description, to draw up a two-page description of what he (Knight) calls *P. eximius,* but which he admits in the notes which follow, may not be that species. On the subsequent pages Knight describes ten new species, viz., *P. brevifurcatus, salicis, neglectus, spicatus, cortitectus, buenoi, penipectus, pectinatus, obtectus* and *conspurcatus,* beginning the description of each of them with the words "Resembles *eximius,*" or "Very similar to *eximius,*" and giving otherwise only a few characters pertaining to the color or male genitalia, in which it differs from his detailed description of his supposed *eximius.* There are no keys to separate the species and unless a student *knows* that he has at hand for comparison specimens of the supposed *eximius* described by Knight, the descriptions given are wholly worthless, except to validate the new species for Knight and other specialists who have paratypes at hand. On pages 634 and 638-640 of the "Hemiptera of Connecticut," these deficient descriptions are copied verbatim from Knight's 1920 paper, but in this work they are accompanied by a key which will help the student to pass on them. On page 639 he describes another new species, *P. husseyi.* In the description of this he gives the color of pronotum and elytra as "nearly as in *erectus,*" and when we turn to *erectus* on the next page, we find, "very similar to *husseyi* in size and coloration," thus giving the "buck" plenty of exercise.

[3]Capsinae ex America boreali in Museo Holmiensi asservatæ. Ofv. sv. Vet.-Ak. Forh. XXXII, p. 67.

[4]Bemerkungen ueber Nearctische Capsiden. Acta Soc. Sci. Fennicae, XXXVI, No. 2, p. 23.

In a number of other instances Knight has indulged in this pastime of "passing the buck" in his descriptions, notably in his treatment of the species of *Lopidea, Plagiognathus* and *Deraeocoris* in his various isolated papers on these genera, and in the treatment of these same genera in the Hemiptera of Connecticut. In my work on Heteroptera I was obliged to copy verbatim some of these deficient descriptions, as I was unable to borrow specimens, but wished to include the species in my book.

Mr. E. P. Van Duzee, in his "Monograph of the North American Species of *Orthotylus*," has also "passed the buck" in a number of his descriptions, using the older species *O. dorsalis* (Prov.), *O. flavosparus* (Sahlb.), and others, as a basis for his "Very similar to". He even goes farther, as he describes as new *Orthotylus angulatus brunneus* as a "subspecies" and then uses that form as the basis of comparison for *O. cuneatus, O. pullatus* and *O. lateralis,* three new species which he also describes and then again uses *lateralis* as a basis for two others. Probably no one on earth except Van Duzee has at hand for comparison, determined specimens of his var. *brunneus* and species *lateralis*. Of what benefit therefore are his "very similar to" descriptions of the other species?

It is not only among Hemipterists that this "buck passing" is in vogue, but among other entomologists as well. I have recently prepared an "Annotated List of the Scarabaeidae of Florida," and in its preparation ran across numerous examples. Casey, in his "Review of the American Species of Rutelinæ, Dynastinæ and Cetoninæ[5]," almost equals Knight in the festive game. A single example from his work will suffice. In the genus *Ligyrodes* the variations of the claws of the front tarsi of the males are used in classification. In his description of his new species *L. quadripennis* on p. 182, he states: "the larger claw of the male as in *relictus*." The next species he mentions is *L. relictus* (Say), and in the description he says "the larger claw of the male as in the preceding." How much knowledge is available to the student in these two statements?

[5]Memoirs VI, 1915.

Many other instances of this "buck passing" could be cited. Perhaps all systematists, myself included, have indulged in it at times. However, its commonness and cussedness is never forcibly brought to mind until one has to use extensively and intensively the descriptions of others in which it occurs. In my later years I have come to believe, and have tried to practice the belief, that the description of every species, new or old, should "stand on its own bottom," i. e., should be complete within itself, without reference to another species, unless the other be one well known and of wide distribution as, for instance, *Passalus cornutus* Fabr. or *Papilio ajax* L. Then, in the notes following the description, the author can make his comparisons and draw his deductions *ad libitum* without fear of being accused of "passing the buck."

On the Structure, Host Habit, Affinity and Geographic Range of Beskia (Dipt. : Tachinidae).

By Charles H. T. Townsend

The sexes of *Beskia* were not certainly distinguished by Brauer & Bergenstamm when they described *B. cornuta.* Neither sex has proclinate frontoorbitals, but both have one reclinate frontoorbital. Other head characters are very similar in the two sexes, but the male has the third antennal joint much elongated and widened, produced heavily on front apical angle in form of the blade of a pruning knife. The external genitalia are usually retracted in dried specimens so that their true character is not readily evident. The female has a sharp piercer of the ordinary short type, the base of which is overlapped by an emarginate, hairy, scale-like structure that usually stands out in profile. This structure is the larvipositor guide, borne dorsally, the vagina opening between its base and the base of the piercer. It functions during larviposition to direct the ejected maggot through the puncture made by the piercer.

Nothing is so far certainly known as to the host, but in 1908 Mr. E. O. G Kelly found on wheat in Pawnee, Oklahoma, a larva or pupa from which a specimen of *Beskia aelops* issued later. The following extracts from correspondence refer to this specimen:

"The pupa was collected on wheat and the adult reared. The supposition is that the larva was feeding upon aphids" (F. M. Webster, February 8, 1909).

Reared from a larva found "in the act of actually feeding on a grain aphid on wheat, probably *Macrosiphum granaria*" (F. M. Webster, February 13, 1909).

Mr. Kelly's notice was attracted to this larva "from the fact that it seemed quite different from syrphid larvae which are common among aphids on grains" (F. M. Webster, February 18, 1909).

Since the *Beskia* female has a sharp piercer, it is quite out of the question that the *Beskia* larva should feed externally on aphids. The indications are that the female of *Beskia* injects a living first-stage maggot within the body of syrphid larvae which feed on aphids.

On September 23, 1911, Mr. E. S. Tucker found in axils of rice leaves at Crowley, Louisiana, two puparia of *Beskia aelops.* One was empty, but the fly issued five days later from the other. In each case the puparium was pressed as deeply as possible into the axil with the anal end lowermost.

The anal stigmata of the last-stage maggot and puparium of *Beskia* are borne on a pair of stout, elongate, divergent tubercles, approximated at base and rugose on their external surfaces. The respiratory area is rather reniform and shows three more or less distinct divisions, the whole area of one tubercle bearing from twelve to twenty-eight microscopic geminate warts irregularly disposed.

Beskia evidently belongs in the family Phasiidae, subfamily Phaniinae, tribe Cylindromyiini, forming a well-marked subtribe with *Hemyda, Evibrissa, Epigrimyia* and certain other genera.

Beskia aelops ranges as far north as Virginia and *B. cornuta* as far south as Rio Grande do Sul. Both reach Mexico and *aelops* may continue farther south.

Schistocercophaga, New Genus of Locust Parasites (Larvaevoridae) (Dipt.: Tachinidae).

By Charles H. T. Townsend

Schistocercophaga n. gen.

Differs from *Hypophorinia* as follows: Facial profile receding, bulged; facialia nearly on edge, sharp; male third antennal joint four times the second; face and front nearly equilateral; frontals stopping at base of antennae; two reclinate fronto-orbitals in male; frontalia width in middle equal to parafrontalia width at same point; parafacialia narrow; one preacrostichal and two postacrostichals; median discals on intermediate abdominal segments; discal row on anal segment.

Genotype, *Oedematocera dampfi* Aldrich, Proc. Ent. Soc. Wash., XXIX, 17, Southern Mexico and Guatemala.

Schistocercophaga dampfi is a parasite of *Schistocerca paranensis,* the migratory locust of tropical America. It evidently belongs in the tribe Phoriniini and is far removed from *Oedematocera.*

Practical Hint for Breeding Lepidoptera.

Many butterflies have the habit of emerging from their cocoons at night, so that breeders have had to sit up with their charges until all hours in order to prevent them from fluttering about their cages and damaging their delicate wings. Herr Julius Stephan, a German naturalist, avoids this nocturnal labor by artificially hastening nightfall. At two or three in the afternoon he transfers the cocoons to a dark cool place, and the insects soon begin to display their normal night-reaction. By 7 o'clock all that are due to emerge that day will have put in their appearance. Science News in *Science,* April 6, 1928.

Invitation from Prof. E. O. Essig.

Beginning May 14th and continuing until June 24, 1928, E. O. Essig will conduct a University of California course in field entomology in the Yosemite National Park, with headquarters at the new Yosemite Park Museum. From July 1st to August 1st of the same season he will be at his permanent summer camp at Echo Lake, in the High Sierras, 7,500 feet altitude, eleven miles from Lake Tahoe. Entomologists visiting California are cordially invited to call on Prof. Essig at either of the above places and he will be very glad to assist them in the various types of entomological work in those regions.

Some Chilopods and Diplopods from Missouri.

By Ralph V. Chamberlin

The notes of the present paper are based upon a small collection of chilopods and diplopods transmitted to me for identification by Miss Mary J. Brown. It seems desirable to publish them both because few species of these groups have been recorded from the state and because the collection includes several previously undescribed species. All of the material was collected by Miss Brown at St. Charles during 1926 and 1927. All type specimens of the new forms are in the author's personal collection.

CHILOPODA

Cryptopidae

Theatops spinicaudus (Wood). One specimen April 16, 1927.

Otocryptops sexspinosus (Say). Two specimens, in 1926 and one in 1927

Linotaeniidae

Linotaenia branneri Bollman. Two specimens, 1927.

Linotaenia bidens (Wood). One specimen, 1927.

Chilenophilidae

Gnathomerium umbraticum (McNeill).

Geophilidae

Geophilus missouriensis, sp. nov.

The general color of the holotype as preserved in alcohol is reddish yellow above, with legs yellow. In life the color may have been distinctly red as usual in *G. mordax*. Cephalic plate broad, the caudal margin truncate, the anterior margin obtusely angular; frontal plate set off behind by a distinct pale line. Basal plate overlapped anteriorly by cephalic plate, the exposed portion at base about four times as wide as median length, but exposed along sides of rounded corners of cephalic plate. Prehensors when closed surpassing anterior end of head, attaining distal end of first antennal joint; joints unarmed excepting for a minute denticle at base of each claw; all joints very short. Anterior ventral plates deeply depressed or pitted at middle. Spiracles all circular, very gradually decreasing in size from the first caudad. Last ventral plate very wide, sides nearly parallel, the caudal margin a little convex. Pleural pores about six along each edge of ventral plate and partly covered by the latter, the most caudal pore a little largest, and in addition a single pore above, adjacent to tergite. Anal pores distinct. Anal legs with claws long and slender. Pairs of legs in the holotype, a female, 75. Length, 38 mm.

The *holotype,* the only specimen taken, was collected in 1926, at St. Charles, Missouri.

Lithobiidae

NADABIUS IOWENSIS (Meinert). Three specimens, 1927

DIPLOPODA

Craspedosomidae

TIGANOGONA, gen. nov.

Agreeing with *Cleidogona* in general characteristics: the body consisting of 30 segments, with carinae and setigerous tubercles obsolete; ocelli numerous and well-developed, forming a triangular patch on each side of the head; antennae long and filiform, the third joint longest, the seventh shorter than the sixth; gonopods of male consisting of two pairs of processes; first two pairs of legs in male small and slender, the next five pairs moderately crassate. Differing from *Cleidogona* in not having the ninth legs of male with basal joints enlarged and the last three reduced and hamate, all joints being of normal proportions and the first one with a process at distal end beneath. Tenth legs of male also with joints of normal proportions, the second joint with a protuberance at proximal end beneath. Eleventh and twelfth legs and their pedigerous laminae not specially modified.

Genotype *Tiganogona brownae* sp. nov.

Tiganogona brownae sp. nov.

The body in general form much as usual in *Cleidogona,* subfusiform. Brownish black above with an interrupted yellowish stripe along middle line of dorsum and one on each side of dorsum; lower part of sides and venter yellow; antennae blackish; the head between bases of antennae brown, areolate over vertex, light colored over and just above clypeal region; legs proximally yellow or whitish, the distal joints blackish. The ninth legs of male with joints of normal proportions, the process at distal end of second joint subcylindrical, of moderate length. The basal process of second joint of tenth legs of male short, nearly tuberculiform. Posterior processes of male gonopods uncate, bending forward between anterior pair, smooth. Anterior pair of processes bent caudad, the superior branch of each distally vertically laminate, bifid at end and a little bent mesad. A short cylindrical process, acutely pointed at tip, extends ventrad just outside (laterad) of each of these processes. Length, about 12 mm.

Holotype, a male. In addition to the holotype, the *paratypes* include two females, all taken at St. Charles in 1926.

Polydesmidae

POLYDESMUS SERRATUS Say. Five specimens, mostly immature, 1927.

SCYTONOTUS GRANULATUS (Say). One specimen, 1927.

Xystodesmidae

MIMULORIA, gen. nov.

Embracing forms smaller than typical *Fontaria* as in the case of *Apheloria.* Characterized especially by the structure of the male gonopods in which the blade is not coiled as in *Apheloria,* extending cephalad, a little bent or curved toward or beyond middle of length and expanded into a small laminate plate at distal end; with a short, typically laminate spur toward base of telopodite.

Genotype *Mimuloria missouriensis,* sp. nov. *Fontaria castanea* (McNeill) of Indiana also belongs in this genus.

Mimuloria missouriensis, sp. nov.

In most specimens the general color is yellow, becoming tinged with orange cephalad, the orange color densest on anterior segments and head, the carinae usually paler than middorsal region of tergites. Only one specimen, the female allotype, appears to be in full color. In this specimen the tergites are brown with the keels yellow. Posterior angles of seventeenth, eighteenth and nineteenth tergites produced and distally rounded, those of the three preceding tergites only slightly extended, the others with caudal margins straight. Last tergite narrowly truncate at caudal end, scarcely curved ventrad. Anal valves mesally strongly margined. Anal scale triangular, the sides convex. Second joint of legs with the usual long spine at distal end, but first joint and sternum unspined. The gonopods of the male have basal spur of telopodite laminate and acutely pointed. The expanded distal plate with a thin, slender, acutely pointed process at right angles to general surface. Length, 19 mm.

The types embrace eight specimens of which one, the *holotype,* is an adult male. All were collected at St. Charles in 1926 and 1927.

Aquatic Hemiptera from New Mexico and Georgia, Including a New Species of Corixidae.

H. B. HUNGERFORD, Dept. of Entomology, University of Kansas, Lawrence, Kansas.

On two or three occasions Mr. Charles H. Martin, a former student at Kansas University, has sent us noteworthy collections obtained by him on occasional holiday trips. Since some of the records are new, and some of the species represented by very long series it seems worth while to record them—

In Torrence County, New Mexico during the summer of 1925 Mr. Martin secured the following species and specimens:

ARCTOCORIXA LAEVIGATA (Uhler). 180.
A. utahensis Hungerford. This species is described from Utah. 119.
A. TUMIDA (Uhler). A new record. 191.
A. EDULIS (Champ.). A new record. 16.
A. ALTERNATA (Say). A new record. 46.
RAMPHOCORIXA ACUMINATA (Uhler). A new record. 1
NEOCORIXA SNOWI Hungerford. 13.
NOTONECTA KIRBYI Hungerford. A beautiful series showing all color phases of this variable species. 650.
N. INDICA Linnaeus. A new record. 112.
N. UNDULATA (Say). 210.

Not long ago he sent me the following insects which represented one vacation day's trip in Baker County, Georgia (Oct. 23, 1927). In this lot we find more new records and a new species:

NOTONECTA UHLERI Kirkaldy. A new record. 2
N. IRRORATA Uhler. A new record. 1.
N. HOWARDII Bueno. A new record. 131.
ARCTOCORIXA NITIDA (Fieber). 54.
A. BRIMLEYI Kirkaldy. A new record. 1.
A. LUCIDA Abbott. new record. 9.
A. INTERRUPTA (Say). A new record. 15.
A. sp. nov. Described below. 47.
GERRIS CANALICULATUS Say. 1.
TENAGOGONUS HESIONE Kirkaldy. 16.
TREPOBATES PICTUS Uhler. 12.
MESOVELIA BISIGNATA Uhler. 9.
HYDROMETRA MARTINI Kirkaldy. 8.

Arctocorixa martini sp. n.

10 mm. in length; width of head 3.5 mm. in male, a little wider in the female.

General color effect dark. Pronotum crossed by nine or ten pale, quite obscure bands that are slightly narrower than the darker bands. Pale lineations of hemelytra, transverse, slender and wavy, those at base of clavus broader and more conspicuous than elsewhere but not as wide as the black bands. Elsewhere the pale bands are not more than half as wide as the intervening black bands. Pattern of membrane continuous with that of corium.

Middle of anterior margin of vertex as seen from above slightly produced in the middle of both sexes. Interocular space: width of eye ::10:13. Frontal depression of face of male large ovate and deeply concave, attaining the eyes laterally. Thorax rather elevated as seen in lateral view. Pronotum and hemelytra strongly rastrate, membrane shiny. Metaxyphus longer than broad. Strigil elongate of 10 rows. length: breadth ::22:8. The pala of male elongate, sides nearly parallel but slightly wider in distal third, row of pegs about 30, larger at base and smaller and more crowded at tip, the distal end of the row making a neat curve following the upper distal margin of the pala. On some males there is a curious excrescense on the distal margin of the pala, in others this is entirely lacking and in one specimen is present on the tip of one pala and absent on the other.

Described from 47 specimens taken by C. H. Martin in Baker County, Georgia, October 23, 1927. *Holotype, allotype* and *paratypes* in University of Kansas Entomological collection. Some paratypes in U. S. N. Museum.

This species is of the same size as *Arctocorixa interrupta* (Say). It can be distinguished from all other species of this series by its rough surface, deeply depressed face of the male and the shape of the male pala. The right clasper of male is stout, curiously formed and turns transversely across the genital capsule.

Dr. Felt Retires as State Entomologist.

Dr. Ephraim P. Felt, New York State Entomologist, retired on March 31 to become adviser on shade trees and forest insect problems with the Bartlett Research Laboratories at Stamford, Connecticut. *Science*, April 6, 1928.

A New Type of Moth Trap.

By W. A. Hiestand, University of Wisconsin.

During the spring and summer of 1923 the author working in collaboration with Mr. C. H. Hicks had such unprecedented success with four moth traps of their own design that it seems quite fitting to describe the construction and use of these traps to all who have occasion to collect moths in this way. Every lepidopterist who has used moth traps is aware of the feasibility of taking moths in this way and probably also of the difficulties encountered.

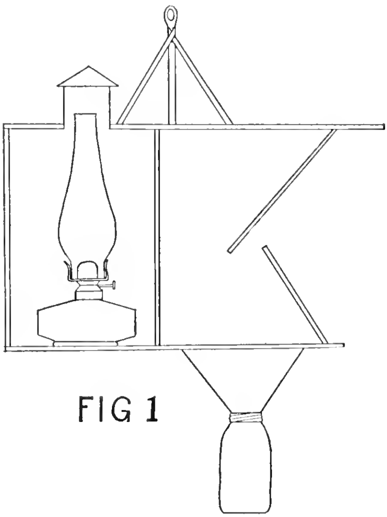

FIG 1

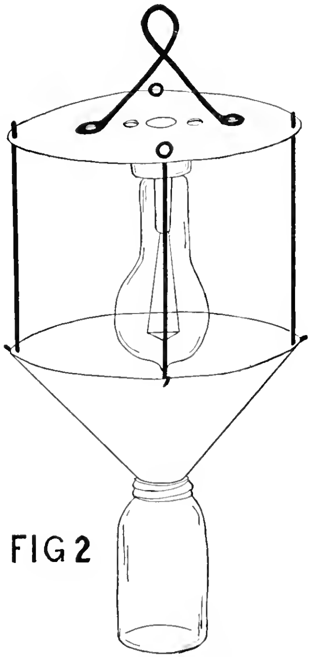

FIG 2

The conventional type of trap appears to be the age-old box trap with plates of glass placed in such positions as to keep the moths from entering the light chamber as well as to prevent their escape from the trap having once entered it. The trap of this type (fig. 1) ordinarly consists of a light chamber containing either an incandescent electric bulb or an oil lamp, the latter making it possible to hang the trap far from the source of electric current. The light chamber is separated from the killing chamber by a plate of glass and this latter chamber confined from the outside by one or more panes of glass placed at angles to make the entrance of the moth as easy as possible and to prevent as far as possible its escape. The bottom of the killing chamber usually consists of a funnel with a screw top jar attached to it containing the killing agent, potassium cyanide. Such traps as these are offered for sale by various entomological supply houses. The chief objection to this form of trap, it was found, lay in the fact that only one side of the box was open to let the light shine out. The success of such a trap largely depends upon the location of it and the direction in which the light projects. After several trials of a wooden box trap of this type which finally resulted in the explosion of the kerosene lamp and of course burning of the trap it was decided that an improved type of trap could be constructed which gave rise to the trap described here. This trap must be used near a building or where electric current is available but it was soon found that the returns were so favorable that it was unnecessary to place the traps at any distance from the buildings, providing of course the buildings were located in regions where moths were found. Four of these traps were used outside the Biology Building of the University of Wisconsin and very good results were obtained. The best results were had when the traps were placed at the height of the third story windows. The chief advantages of this trap are its simplicity, its low cost of construction, its ease of operating and cleaning, its convenience in setting up and taking down, and most important of all its efficiency due to the great radius of light emitted.

Figure 2 illustrates the trap. It consists simply of a funnel ten inches in diameter with the spout removed and instead a screw cap of a Mason jar with a circular hole cut in it soldered to it. The funnel is hung by three or four wire rods with one end bent to form hooks so that the trap may be readily taken apart, to a circular galvanized iron disc, also ten inches in diameter. To this metal disc is bolted a porcelain socket to receive a Mazda bulb. The distance of the disc to the funnel depends upon the size of the bulb used. Best results were obtained when the tip of the bulb projected about one and one-half inches below the top of the funnel. An eyelet or other means of support may be soldered to the top of the disc for hanging the trap. The conduits from the socket should be brought through an opening in the center of the metal disc in order not to interfere with the open sides of the trap. The cyanide used was placed in a bag of cheese cloth so that the jar could be washed out frequently. Powdered cyanide gave better results then lump cyanide. When not in use the jars can be unscrewed from the traps and regular Mason jar caps placed on them to keep the cyanide from deteriorating. Fresh dry cyanide never works as well as that which has been used a few times and has become moist so that it is advisable to place a few drops of a weak acid such as tartaric or citric acid on it for the first time it is used. Of course, cyanide may be imbedded in cotton or plaster of Paris as well as tied up in sacks but the jar may be kept clean more easily if the cyanide is not fastened to it. The above traps may be fastened to poles and placed outside of windows and so easily taken in, or suspended from limbs, etc. The collector will indeed be surprised by the effectiveness of this type of trap. In fact on warm sultry nights it was found necessary to place jars of a two quart capacity on the funnels to accommodate all of the insects caught. The manner in which the insects are caught is as follows: The brightness of the light attracts them and upon striking the bulb they drop into the jar where they are soon killed by the fumes of the cyanide. It is no exaggeration to say that as many as two hundred or more moths may be caught in a single trap on a favorable night as well as myriads of other insects such as Diptera, Coleoptera, Hymenoptera, Homoptera, Heteroptera, Trichoptera, Neuroptera, and even cockroaches.

It is the intention of the author to construct such a trap that can be used with the ordinary six volt automobile bulb to be used on camping trips in the woods. If the reader has been disillusioned with the conventional types of light traps it will be well worth his effort to try out one of this type and see how effectively it will work under favorable collecting conditions.

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

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OBITUARY.

Charles Walter Howard, long a member of the American Association of Economic Entomologists, died at Wheaton, Illinois, on March 1st, 1928, from injuries received when he was struck by an interurban train.

Professor Howard was an entomologist of wide experience. Graduating from Cornell in 1904, he went to the Transvaal in 1905 as Assistant Entomologist and on the death of C. B. Simpson, in 1906, was appointed Entomologist. In 1908, he was made Chief of the Entomological Section of the Department of Agriculture of Moçambique, Portuguese East Africa.

Returning to this country in 1911, he became a special Assistant in the Rockefeller Institute for Medical Research, engaged in the search for insect vectors of poliomyelitis. In 1912 he was appointed to the entomological staff of the University of Minnesota, but in 1917 resigned his associate professorship to become Professor of Biology and soon Head of the Department in the Canton Christian College (Lingnan University).

In China his attention was quickly attracted to the needs of the silk industry in the Canton region and with remarkable success he began to apply the Pasteur methods to the control of the diseases which were rapidly wiping out silk growing in that section. Entering upon the work with an utter unselfishness and self-effacement, he won the confidence of the Chinese themselves and in 1923 he became Director of the Government Bureau for the Improvement of Sericulture of the Kwongtung Province, a position which he held at the time of his death.

In September, last, he returned to this country as Head of the Department of Zoology of Wheaton College, with the agreement that he was to return to Canton for the summer vacation and keep in close touch with the Bureau.

He was a fellow of the Entomological Society of London, a member of the American Association for the Advancement of Science, the Entomological Society of America, the South African Association for the Advancement of Science, the Royal Society of South Africa and other scientific societies. He was a member of the Pan-African Trypanosomiasis Commission and of the First International Congress of Entomology, held in Brussels in 1909. He was to have been chairman of the sericultural section of the Fifth Congress, meeting in August of this year in Ithaca.

To Professor Howard science offered first of all a field for service. Wherever he worked his interest in the human element was paramount. The result was that as a teacher and administrator he had the love and loyalty of his students and his associates. But, withal, he had a very genuine ability for research of a high order and in spite of his manifold duties in public service he had published numerous papers dealing with ticks, tsetse flies, mosquitoes and other blood-sucking arthropods. His studies on the chiggers of Minnesota constituted the first detailed work on these forms in this country.

He leaves a widow and four children, who are making their home at Wheaton, Illinois. For the present Mrs. Howard, whose work on the light organs of Photinus (as Anne B. Townsend) is well known to entomologists, is continuing his class work in Wheaton College. WM. A. RILEY.

JUNE, 1928

ENTOMOLOGICAL NEWS

Vol. XXXIX No. 6

CHARLES ROBERT OSTEN SACKEN,
1828-1906

CONTENTS

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

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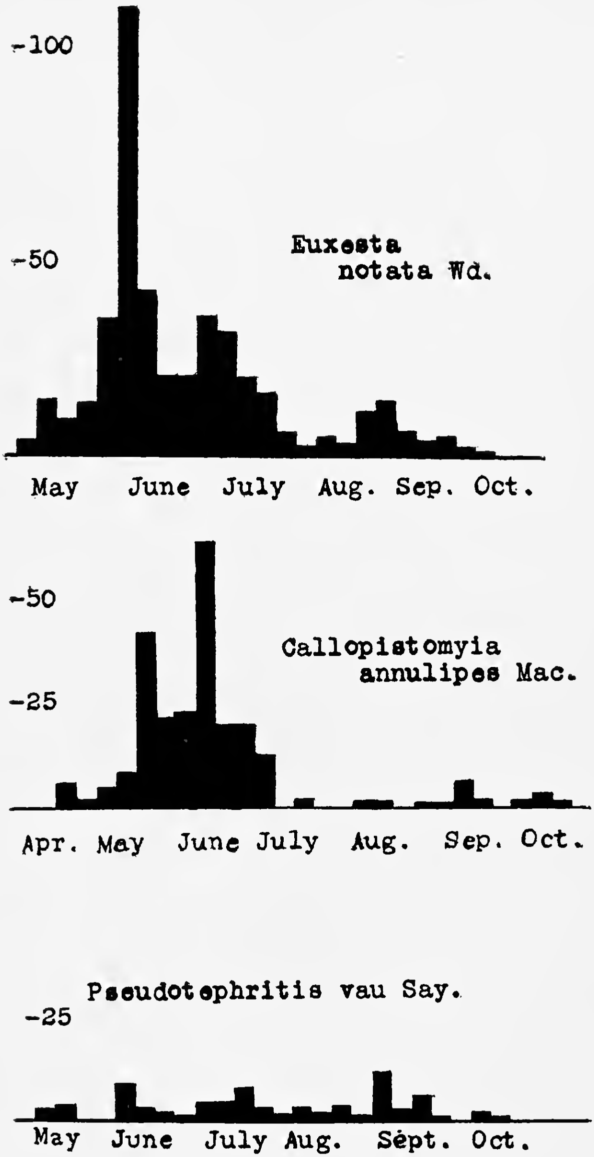

ORTALIDAE—FROST.

ENTOMOLOGICAL NEWS

Vol. XXXIX JUNE, 1928 No. 6

Notes on Ortalidae (Dipt.).

By S. W. Frost, Pennsylvania State College *

Plate IV.

Comparatively little has been published in American literature dealing with the habits of the Ortalidae. Williston ('08) remarks, "the flies are usually found about meadows or among luxuriantly growing grass." Hendel ('08-'14) has dealt with their taxonomy in considerable detail and Cresson ('20-'24) has given additional notes on their habits, distribution and descriptions of new species. Numerous papers, chiefly of an economic character have discussed the species of the genera *Euxesta, Pseudotephiritis* and *Seioptera.* The habits of the other genera are little or not at all known. The accompanying records add further information on the abundance and seasonal occurence of several species.

All of the material under discussion was taken from liquid, sugar or molasses baits used as traps for the oriental fruit moth during the summer of 1927 in the vicinity of Arendtsville, Pa. These traps were in operation from March 12th until October 18th. The determinations of the species of Ortalidae were made by Mr. E. T. Cresson of the Academy of Natural Sciences, Philadelphia, Pa. The subdivisions of this family raised to family rank by some authors have not been considered in this paper. *Pyrgota* no doubt according to Hendel ('08-'14, '22) and other authors belongs in a separate family Pyrgotidae. It is structurally and biologically different and comes closer to the Conopidae and Oestridae.

It is well known that the Diptera are one of the first orders to make their appearance in considerable numbers in Spring. Johnson ('04) makes a statement to this effect but at that time records no Ortalids flying during April or May. His later

* Published by permission of the Director of the Agricultural Experiment Station of The Pennsylvania State College as a part of project No. 697. Technical paper No. 446.

paper ('25) shows that several species have been taken during these months. The writer found that the Anisopidae were the first of the Diptera to visit the baits. On March 10th, 110 specimens were taken from a single bait-pail in the vicinity of woods. A few days later Muscids and Drosophilids came in great abundance and an occasional Syrphid or Tipulid visited the pails. The most interesting of all the catches were the Ortalidae.

A few of the species as *Euxesta notata* (Wied), *Pseudotephritis vau* Say, and *Callopistomyia annulipes* Macq., were taken almost continually from April or May until October. *Callopistomyia annulipes* Macq., was the first to make its appearance. A single specimen was taken from a pail in the vicinity of woods on April 12th. Other species were taken only for short periods during the summer. The abundance of some of the species in the baits would indicate rather clearly that they visit the baits to feed. Certain types as *Pyrgota* were no doubt accidental catches.

RIVELLIA VIRIDULANS R-D. Although this species is considered somewhat common, only five specimens were taken from June 3rd to July 19th. It was previously recorded from Eastern Pennsylvania by Cresson ('24). Judging from the writer's notes and earlier records, this species does not fly early or late in the season.

CAMPTONEURA PICTA Fab. A single specimen was taken at Arendtsville June 10th, from a bait pail that was hung on a cherry tree. This species has not previously been recorded from Pennsylvania.

IDANA MARGINATA Say. Five specimens of this striking species was taken from baits, from June 15th until July 5th.

TEPHORONOTA RUFICEPS V. d. W. One specimen on July 12th, and another on August 2nd.

CALLOPISTOMIA ANNULIPES Macq. 208 specimens of this common species, from April 12th until October 18th. The males frequented the baits slightly in excess of the females.

PSEUDOTEPHRITIS CORTICALIS Loew, taken in small numbers from June 2nd until July 23rd. It is interesting to note that Johnson ('25) gives an early record, May 3rd, for this species in Connecticut. Greene ('17) also reared adults from April 16 to 18 in 1913 at Falls Church, Va. He gives excellent life history notes and figures.

PSEUDOTEPHRITIS VAU Say, frequented the baits from May 10th until October 11th. Seventy-six specimens were taken and the males and females appeared in about equal numbers.

EUXESTA NOTATA (Wied). The adults of this common species were often seen at rest on the foliage of peach trees in the orchard. Four hundred and seventeen specimens were taken in bait pails from May 10th until October 11th. The males and females came in about equal numbers. Hutchinson ('16) who has some excellent notes on the life history of this species records it as early as April 30th. He remarks that the species was abundant during May, June and July but rare during August and September.

SEIOPTERA VIBRANS Linn. Only four specimens were taken in baits from June 15th until June 28th. Johnson ('25) notes that the species was taken as late as August 8th in Connecticut.

PYRGOTA UNDATA Wied. A single specimen on June 15 from a bait pail hung on a willow tree. This was no doubt an accidental catch. The adults were, however, taken in rather large numbers during June and July at light traps. Other observers have noticed their affinity for lights although the writer believes no record has been made to this effect.

Cuscianna ('22) has some notes on chemotropic tests with Diptera in Italy that are worth mentioning here. Numerous aromatic, ethereal, balsamic and nauseous odors were used. The attraction was almost exclusively confined to the Diptera, chiefly the Anthomyiids, Tachiniids and Ortalids. Among the Ortalids the genus *Platysoma* responded most readily. The species of this genus are not sensitive to balsamic and ethereal odors but are attracted by the aromatic and nauseous odors. Hundreds of the introduced North American species *Euxesta nitidiventris* were taken with a vinegar solution.

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"Heteropod-Zoology" and "Entomological "Complexes".*

By Dr. Walther Horn, Berlin-Dahlem.†

I hope that my reader will not be too impatient with the unusual ideas that follow, and that accepting my sincerity, he will pardon me for presenting them.

Three things are very unfortunate for a prosperous development of the science of systematic entomology ("taxonomy" or "theoretical entomo-museology"):

1.) The fact that too many people do not know what a so-called "entomologist" is.

2.) The co-existence of the words "entomology" and "zoology".

3.) The existence of the word "insect-species".

If it were not for these considerations, the outlook for the future of "hexapod-zoology" *i. e.*, entomology, would be almost ideal.

I.

What is an "entomologist"? The common people of many countries of the world have no idea at all; often even the educated man must look into an encyclopedia or dictionary to find the significance of the word, of which even many zoologists are ignorant. How often I have been asked the self-same question by a member of the latter profession! I have always answered that even a zoologist who is studying insects during his entire life is not necessarily an entomologist; the purpose

*Editor, Entomological News: At the forthcoming Entomological Congress at Ithaca, Dr. Walther Horn is to give an address before the section of Taxonomy on some problems confronting the scientific workers of to-day, and this address is to be preliminary to a forum devoted to the discussion of certain special phases thereof. In accepting the invitation to deliver this address, Dr. Horn sent to Dr. Johannsen and myself a paper in English entitled "Heteropod-Zoology and Entomological Complexes," with the request that we forward it to you to publish in the News in order that it might set people thinking along the lines to be discussed at the meeting.—J. Chester Bradley.

†I have not at all the intention to say in my lecture at Ithaca that the ideas of *this* paper are identical with those I may propose as the only and best solution of the question. All these papers contain *only heuristic ideas*, and I think it may be some time before one sees what may be the best final solution—if there be one.—W. H.

actuating his work determines his status. For many years R. Goldschmidt has been studying moths, in order to discover the laws of genetics, but he is not on that account an entomologist nor has he ever claimed to be. He uses insects incidentally whether perchance occasionally, or for a long continued time, as the basic material for his research, never with the interests of "hexapod zoology" at heart, but entirely from the standpoint of genetics, a division of general zoology (biology). On the other hand a real entomologist can study other branches, as for example, chemistry, for long years without thereby losing his status as an entomologist, if he does so in order to acquire knowledge having a direct bearing upon his own field of entomology. All this, my dear reader, is of course only *my* point of view.

II.

"Entomology and Zoology"! What sense is there to the title of a professorship, or of a journal, or of a section of an institution or congress "of entomology and zoology"? I have always thought that it would be much better if we might say "hexapod-" and "heteropod-zoology." I have nothing at all against such a word as "entomo-zoology", the former expression seems to me to give perhaps a better contrast. More than one zoological museum has long since been divided into several autonomous branches: The British Museum into "Hexapod-" and "Heteropod-Zoology", the Paris Museum into five divisions, the Stockholm Museum into three, or even four, counting paleozoology. The missing link is a technical term for the whole zoological field other than insects. Does this contrast not resemble just a little the relation between a cat and a dog? These, too, recognize that they are related but by protesting!

III.

"Insect-species"! I can hardly imagine how happy an entomologist would be if there were no species! How many zoologists have raised this question? How many have tried to find a solution? How many recognize or even have a foreboding that the old significance of the word "species" is nowadays rapidly breaking down, since long decades ago the ideas of evolution first shook its pillars? How does a geneticist interpret the Linnaean species? How a physiologist? How a zoogeographer? How the palaeozoologist? How the ecologist? If we compare the membracid systematist with a student of Carabidae and a braconid specialist with an aphidologist, the standpoint of a Casey with that of an L. Bedel, how they disagree! But in spite of it the word "species" still stand as the ultimate foundation of the system! And what is the result? We have reached nearly the million mark of "species" and we shall continue into millions and millions more until we negative the real meaning of the word "system". We are forgetting that our system has not only an ultimate ideal—the explanation of relationships, but also a prior practical aim—the orientation of the actual state of knowledge. By trying to settle both aims at the same time, are we not, in a measure, like a man who is trying to catch two hares at once? Are we not attempting the impossible? As I have said at the Zweite Wanderversammlung Deutscher Entomologen at Stettin in 1927 (Entomologische Mitteilungen, 1927. 16: 368-375) we have for a long time been neglecting the questions of chief importance, by reason of our zeal in completing the subsidiary ones.

The most important point of all is the manner of handling "species", for that is, so to speak, the horizon from which we reckon, or if one prefers, the bricks with which we build.

Some nights ago I was sitting, as I often do in the library of my institute. The light was turned off, for the sake of economy. The books around me were closed, for I was reading *between the lines.* Suddenly somebody knocked on the door: Karl von Linné came in to see me.

"Take a seat" I said. Now my dear reader, please do not misunderstand me, since Karl von Linné, from your viewpoint, died long ago! Why, I am very sure that Karl von Linné has never died, and perhaps in some respects he was never more alive, as far as entomo-systematics are concerned, than today.

"You seem to be sad", he said.

"Yes", I answered, "and you are the cause".

"What have I done? How have I erred"?

"You created a system based upon species. How could you do that, when elsewhere you displayed such keen insight into the far distant future? You, who for example, ignorant of *Ornithodorus moubata,* nevertheless divined the role that the Acarina would same day be found to play in entomo-medicine"!*

"I built a modest house, using small bricks. Have I ever forbidden others the use of larger stones when building a greater edifice? No, it is *you,* not *I* who have been wrong. A modern factory does not use the tools of my time. The pots in the kitchen of Mrs. Horn do not entirely resemble those of my wife. Instead of using, as you have been doing, even smaller stones than mine, take the large ones which your edifice requires. See how the chemists are working. They do not try to realize all theoretically possible combinations of elements *ad infinitum,* but they study in particular those in which they stand in want, and which have a greater degree of importance; otherwise, they, too, might lose themselves, as you have perhaps done".

He then left me.

Perhaps you will understand, my dear reader? We systematists of hexapod-zoology, have always begun by dividing everything down to the smallest element. If we were working with whales, or starfish, or some such group, it would have perhaps made no difference, but our work is with insects.

As a solution, I propose the division of our taxonomy into two branches, considering each one independently in accordance with the following plan:

1.) We should endeavor to find out those characters which are *identical* for all very closely allied insect species—the smallest "groups" of species of many modern systematists, so as to give a good description of all their resulting *identical* features. Such a group would form a new systematic link

*Amoenitates Naturae, 1756, v. 3, p. 342.

for which I propose the term "complex". The size of an individual complex will vary more or less according to the individual author, but that is not a matter of importance.

2.) By such a plan we would reduce the appalling number of Linnaean species to a tolerable number of complexes in each genus. One hundred species of one genus might be reduced to twenty complexes, one thousand of another to one hundred complexes, and so on.

3.) The primary system should terminate with the complex; at which point the secondary system begins, continuing downwards as far as did the old system, that is to subspecies, aberrations, synonyms, etc. The technical term species would keep its old sense (however dubious that sense may have become); but it would not complicate as heretofore the problems of the primary system. To the makers of the primary system (I should call them primary systematists) it would be a matter of indifference whether one treats different forms as species, variations, or synonyms. How much time of the primary systematist has been lost in the past in clearing up inexplicable descriptions of doubtful forms? How much in finding out old bibliographical dates often only of historical value? How much for all those annoying questions that paralyze even the best powers of the primary taxonomist? Such questions, as for example, what species some one *would* have described 120 years ago if he had really described it instead of giving an adequate combination of words,* would lose a good deal of their pathological interest to the primary systematist, because they would be relegated to the province of the secondary systematist, who might treat them more in the manner of simple matters of history than of natural history.

4.) In regard to the relation of primary and secondary taxonomist, we must remember that each has an important function, otherwise the whole matter would go astray. The secondary taxonomist in no sense implies a second-rate classi-

*This is in reality a more complex matter than appears at first glance: the original description may have been in every way adequate for its day, but have long since become absolutely insufficient by reason of the increase of our knowledge.

fication, and there must never be the slightest suspicion of degradation in connection with the role. Detail and "en gros" are always of co-ordinate importance. Nevertheless we must not forget that in a measure the primary taxonomists must play the role of the leaders of an army, the secondary taxonomists that of a battalion. Such a comparison shows exactly the intimate relation between the two; the one can become, or replace the other. The whole question becomes a matter of organization: both of the workmen have to go hand in hand.

5.) The work of the future for by far the greater number of entomologists must be the detail of the secondary taxonomist, for whom the smaller collections and libraries will suffice. The natural course of development would be that the taxonomists of the larger museums would have better opportunities and fitness for the problems of primary taxonomy, those of the smaller or private collections for the problems of secondary taxonomy; but in no instance must the mere position of the systematist determine the matter without regard to his personal qualifications.

6.) For practical and theoretical purposes the term species will remain the same as heretofore. The rules of nomenclature will not be changed. As a name for the individual complex, I would propose a combining of the oldest name by a hyphen with the best known species of the complex. In this way a fair mnemo-technical name might result. A solution of the question of the taxonomy of hexapod-zoology by cancelling the existence of the species, seems to me to be, at least for our time, an impossibility.

7.) The interpolation of the complex is in no sense a warrant for a less precise handling of the matter of species than heretofore.

8.) The citation of literature under each complex might give only the names of species, adding perhaps large races and doubtful species, and the *leading* literature, reserving all details for the work of the secondary systematist.

9.) If the time comes, as eventually it will, when the primary system is sufficiently advanced, it will be easy to combine the two branches, as one is in all essential points a continuation of the other. Therefore no work done will be fruitless; the complexes will stand as very useful divisions. In many groups of insects this stage of development has already been long attained, or in others soon will be.

10.) My proposal destroys nothing of the Linnaean system, but adds just a little. In the future the settling of dubious species will appear of higher value to science than the describing of innumerable new ones. Let us digest more thoroughly what we have eaten, before we again overload our stomachs!

In conclusion, dear reader, please do not forget that not alone is Nature guilty of the destruction of our modern so-called system of Hexapod-Zoology by the creation of too many species, but that the systematists themselves have perhaps, to some extent, lost their own way.

Remarks on Photographic Labels for Insects.

By Harry H. Knight, Ames, Iowa.

In the March number of Entomological News (1928), Mr. W. A. Hiestand has called attention to the convenience of using photographic labels for giving desired data on pinned insects. Since the writer has for some years been making labels by the photographic method he might be pardoned for offering two or three additional points which he believes worth while.

Photographic labels as I have seen them coming in on specimens are usually very poor, frequently darkened and nearly illegible. Unless good labels are made I would suggest not using them. One of the most important items in the whole process is to make use of the best photographic printing paper for the purpose. Regular Azo paper is too thin to set well on a pin, and at the same time tends to curl badly, especially in a dry climate, or in winter when zero air is warmed to room temperatures. Any non-curling paper is an improvement but not all brands are of the proper thickness. After considerable testing, the best photographic paper tried up to the present time is the Eastman Vitava Alba A4, which is a smooth white, semi-matte, single weight, non-curling paper of proper contrast to give clear black and white labels. This paper also takes ink very well which is a great advantage when one wishes to fill in dates.

The locality labels shown by Mr. Hiestand are good but I would suggest deleting the line with "collector" and save space, since the name appearing on the third line is generally understood among entomologists as representing the name of the collector. Where small insects are labeled, it is a great convenience for those doing the determination work, if the labels are kept small so that a view may be had of the ventral surface of the specimen without removing the label. For this practical reason I always try to get all the data on a three line label, and employ four lines only when adding host plant or similar information.

Another important use to which the photographic method may be put is in making determination labels to go on the pin. I refer to those where the name is printed in full and can be quickly applied to the determined specimen. I would especially recommend this practice for those who are doing monographic work, naming large numbers of specimens to be returned to various institutions or collectors. Because of the time consumed it rarely occurs that the worker will take the trouble to write out by hand more than one or two labels for each species. Thus many specimens may be labored over under the microscope, never to receive an individual label after the determination is worked out. There is a distinct loss in the value of such specimens. To overcome this difficulty I would recommend the use of photographic name labels to go on the pin beneath the locality label.

For the winning of those who may be inclined to try this method I will describe the type of name label used by Dr. C. E. Mickel, Dr. H. M. Harris and myself. It is a three line label which is only a little wider than the usual locality label. The genus name appears on the first line, species name and author on the second line, while the third line has the name of the person who makes the determination, prefaced by "Det." The desired name labels may be run off on the typewriter in the usual manner, always single spacing to be rid of surplus width in labels. From a negative taken from three or four sheets of such labels, arranged to save space, 25 or more prints are made. These prints are cut up, the species sorted into envelopes, and, for filing, a sample label is pasted on the left hand corner of the envelope flap. Small envelopes are preferable and can be alphabetically arranged in a box. It takes only a few seconds to find the correct label and remove one or more with forceps for placing on the determined material. To prevent mistakes the label should be checked by reading as it is placed on the specimen.

I believe that individual determination labels enhance the value of carefully determined specimens, and the photographic label offers a feasible solution of the time saving desired. For those who may wish to try making such labels, I will be glad to send samples on request.

Undescribed Species of Crane-Flies from Chile (Dipt.: Tipulidae).

By Charles P. Alexander, Amherst, Massachusetts.

The species herein described as new were included in extensive series of these flies taken in the vicinity of Concepcion and in the Valley of Marga-marga by Fathers Jaffuel and Pirion, who have added greatly to our knowledge of the fauna and flora of Chile. The types of the novelties are preserved in my collection through the generosity of the collectors. Their detailed study of the Valley of Marga-marga (*See* Jaffuel and Pirion, Plantas fanerogamas del Valle de Marga-marga, *Revista Chilena de Historia Natural*, 25:350-405; 1921) has shown that the South Chilean or Antarctic element of the fauna and flora extends much further to the north than has been generally appreciated, presumably occurring in favored localities or "islands," in a manner quite similar to that of the Canadian "islands" in New York and New England.

Cryptolabis (Baeoura) advena sp. n.

General coloration gray, the praescutum with four ill-defined brown stripes; halteres pale; wings with *Rs* elongate; cell

1st M_2 closed; male hypopygium with the dististyle subterminal in position.

♂. Length about 4.2 mm.; wing 4.5-4.6 mm. ♀. Length about 4.4 mm.; wing 5.3 mm.

Rostrum and palpi black. Antennae black throughout, of moderate length, if bent backward extending about to the wing-root; flagellar segments elongate-oval, with long verticils. Head light gray.

Pronotum brownish gray, with a yellow spot on either side behind. Anterior lateral pretergites conspicuous, pale yellow. Mesonotum gray, the praescutum with four ill-defined brown stripes, the lateral pair broader, tending to become obsolete; posterior lateral angles of the scutal lobes yellow; scutellum dark brownish gray, more reddish brown posteriorly. Pleura dark gray, the dorso-pleural region obscure yellow, clearer posteriorly. Halteres pale. Legs with the fore coxae dark brown, the middle and hind coxae. and the trochanters, paler brown; remainder of legs dark brown.

Wings with a yellowish gray suffusion, brighter basally; stigmal region infuscated; veins brown, those before the cord somewhat paler. Venation: Sc_1 ending just before the fork of *Rs*, Sc_2 slightly removed from its tip, Sc_1 alone subequal to *m-cu; Rs* very long, approximately three times *R* alone; R_{2+3+4} relatively short, a little longer than *r-m;* R_{2+3} a little longer, gently arcuated; R_2 a little shorter; veins R_3 and R_4 somewhat divergent, cell R_3 being nearly parallel or even slightly narrowed at margin; cell *1st* M_2 closed; *m-cu* at near midlength of the cell; vein *2nd A* nearly straight to very gently sinuous.

Abdomen dark brown, the hypopygium a little brighter. Male hypopygium with the basistyle elongate, produced beyond the point of insertion of the dististyle, the apical lobe approximately two-thirds the more enlarged main portion of the style; on mesal face a long, pale blade; in slide mounts directed mesad. Dististyle appearing as a flattened blade, more expanded at tip, the mesal face just beyond midlength bearing a slender, black rod, its tip obtuse; surface of style set with long conspicuous setae. Phallosome a broadly expanded plate, the apex more narrowed, produced into two blackened points on either side of the aedeagus.

Holotype: ♂, Perales de Marga-marga, January 1927 (*A. Pirion*). *Allotopotype*: ♀, February, 1927. *Paratopotypes*: 2 ♂♂, with the holotype.

This is the first species of the subgenus *Bacoura* to be described from the New World.

Molophilus monostylus sp. n.

General coloration dark brown; antennae relatively short, black throughout; halteres pale yellow; wings with a yellowish gray suffusion; petiole of cell M_3 relatively short; male hypopygium with a single dististyle, this subterminal in position, tridentate.

♂. Length about 4.6 mm.; wing 5.6 mm.

Rostrum and palpi black. Antennae black throughout, relatively short, if bent backward scarcely attaining the wing-root; flagellar segments cylindrical, with a short dense white pubescence. Head dark gray.

Pronotum dark brown, the scutellum buffy with brown setiferous punctures. Anterior lateral pretergites yellow. Mesonotum dark brown, very slightly pruinose, the humeral region of the praescutum obscure yellow; pseudosutural foveae elongate, pale brown; scutellum brownish yellow posteriorly. Pleura dark brownish gray, the anterior portion of the dorso-pleural region obscure yellow. Halteres pale yellow. Legs with the coxae dark brown, the remaining coxae and trochanters more testaceous; remainder of legs brown, the tips of the femora broadly dark brown, the tips of the tibiae more narrowly so; terminal tarsal segments brownish black; fore legs broken.

Wings with a pale yellowish gray suffusion, the costal region brighter yellow, the axillary region more dusky; veins darker than the ground-color; macrotrichiae dark brown. Venation: R_{2+3} gently arcuated, about twice R_{4+5}; petiole of cell M_3 relatively short, only about one-fourth longer than *m-cu;* vein *2nd A* of moderate length, ending about opposite one-fourth the length of the petiole of cell M_3.

Abdomen dark brown, the hypopygium a little brighter. Male hypopygium with the basistyle produced apically into a small, slender lobe. A single dististyle, subterminal in position, conspicuously trifid, the base broad; outer arm a long black spine, middle arm longest, slender, ending obtusely; inner arm shortest, appearing as a short black spine. Aedeagus very long and slender.

Holotype: ♂, Concepcion, October 13, 1927 (*Jaffuel and Pirion*).

Molophilus monostylus is a very distinct species that must be considered as representing a separate group of the genus, distinguished by the single subterminal dististyle, which gives to the hypopygium a strong superficial resemblance to *Erioptera*.

Molophilus gymnocladus sp. n.

Belongs to the *plagiatus* group; general coloration brown; antennae dark brown throughout; knobs of the halteres yellow; male hypopygium with the basal dististyle deeply bifid, the stem a little longer than wide, the branches acutely pointed, smooth or approximately so.

♂. Length about 3.5-3.7 mm.; wing 4.3-4.8 mm.

Rostrum and palpi dark brown. Antennae (♂) relatively long, dark brown throughout, if bent backward extending to shortly beyond the wing-root; flagellar segments oval with a conspicuous erect white pubescence. Head dark brown.

Pronotum dark brown, the posterior notum obscure yellow. Anterior lateral pretergites light yellow. Mesonotum rather light brown, the scutellum more testaceous brown. Pleura a little darker brown than the notum. Halteres yellow, the stem a little more dusky, the knobs light yellow. Legs with the coxae brownish testaceous; trochanters obscure yellow; remainder of legs brown, the femoral bases more yellowish; fore tibiae (♂) with a relatively long, slightly dilated, subbasal, blackened ring.

Wings with a grayish suffusion, the base and costal region more yellowish, the axillary region a trifle darker; veins brown; macrotrichiae dark brown. Venation: R_{2+3} only slightly arcuated, nearly twice R_{4+5}; vein *2nd A* ending about opposite one-third the length of the petiole of cell M_3.

Abdomen dark brown, including the hypopygium. Male hypopygium with the basal dististyle deeply bifid but not so profoundly so as in *flavidus* and allies, the stem being longer than wide; outer branch longest, nearly glabrous, on outer margin before apex with one or two small, appressed denticles; inner arm about four-fifths the length of the outer and more slender, narrowed gradually to the long acute point, the surface smooth.

Holotype: ♂, Concepcion, October 13, 1927 (*Jaffuel and Pirion*). *Paratopotype*, ♂.

Molophilus gymnocladus is allied to *M. flavidus* Alexander and allied species but differs in the much longer stem of the basal dististyle, which is here longer than wide instead of the reverse.

A Synopsis of the Species of Pachycysta (Hemip.: Tingitidae).

By Carl J. Drake, Ames, Iowa.

The genus *Pachycysta* was erected by Champion, Trans. Ent. Soc. Lond., 1898, p. 59, for a new species which he describes on the same page. Since that time only one other species has been described and a third is characterized herein.

This genus is most closely allied to *Megalocysta* Champion, but differs from it in having the third antennal segment practically truncate at the apex and the pronotum strongly tricarinate, the lateral carinae being strongly incurved. The nervures of hood, carinae, paranota and elytra are stout and thickly pilose. The bucculae are either open or closed in front. Nothing is known regarding the food plants or biology of the species.

Key to the species of Pachycysta.

1. Paranota strongly narrowed towards outer margin (largely along the anterior margin), the outer margin very narrow and jointly rounded with both anterior and posterior margins 2
   Paranota not strongly narrowed, the outer margin broad ....*P. diaphana* Champ.
2. Elytra considerably constricted beyond the middle; discoidal area uniformly elevated, very broad beyond the middle to apex and there broadly rounded......*P. championi* Drake
   Elytra not constricted; discoidal area strongly elevated along the discoidal area, broadest beyond the middle, angulate at apex ....*P. schildi*, n. sp.

Pachycysta diaphana Champion.

Pachycysta diaphana Champion, Trans. Ent. Soc. Lond., 1898, p. 59, Pl. II, fig. 6.

The type of this insect, a female from Brazil, has been beautifully figured by Champion. The paranota, discoidal area and shorter antennae distinguish it at first sight from its congeners.

Pachycysta championi Drake.

Pachycysta championi Drake, Bul. Mus. Nat. Hist., Vol. XXVII, 1921, p. 344, fig. I.

This species resembles *P. schildi*, n. sp., from which it may be distinguished by the characters given in the key, the longer third segment of the antennae, shorter legs and darker color. Known only from the type locality, Chochabamba, Bolivia, South America.

Pachycysta schildi, n. sp.

Elongate, broad, very dark brown, the legs and antennae much darker, the areolae hyaline. Antennae long, stout, clothed with numerous short hairs; segment I a little stouter and twice as long as II, the latter smaller at its base; III very long, slightly curved; IV with its terminal half broken off. Rostral channel widening posteriorly, open behind, the sides testaceous; rostrum very long and stout, contiguous with the median line of head, enlarged toward the tip, the tip distinctly knobbed, antero-lateral spines much shorter, testaceous, enlarged distally, contiguous with head, extending as far forward as median spine. Pronotum strongly swollen thru disc, coarsely pitted, the triangular portion reticulate, tricarinate, the lateral carinae curved as in other species of the genus; lateral carinae very long, each composed of a single row of rather large areolae; median carina yellowish brown, more foliaceous, the areolae much larger. Hood large, the sides flattened, highest a little behind the middle, rounded above, slightly longer than high. Paranota strongly reflexed, strongly dilated, widely reticulated, wide at the base but becoming much narrower towards lateral margin and there narrowly rounded, the anterior and posterior margins slightly recurved.

Elytra broad, widely reticulated, narrow at the base; costal area broad, mostly triseriate, quadriseriate at widest point, the areolae large and not very irregularly arranged; subcostal area biseriate, its surface almost in a vertical plane; discoidal area large, bounded by a prominent costate nervure, the outer portion jointly raised with subcostal area and more strongly raised along the middle and at apex, widest just beyond the middle, gradually narrowed towards base but abruptly narrowed at apex, not extending to middle of elytra. Nervures of hood, paranota, carinae and elytra thick and rather densely clothed with very fine pile. Wings a little longer than abdomen. Male claspers very large, strongly curved, hairy at base. Length, 4.43 mm.; width, 2.11 mm.

Holotype, male, Costa Rica (Suize Tur'lba) [Turrialba], collected by Mr. P. Schild, in author's collection. Aside from the characters given in the key, the darker color, longer legs and antennae, and nonconstricted elytra set off this species from *P. championi* Drake.

Chironomus quadripunctatus Malloch (Dipt.: Chironomidae).

By F. F. Carpenter, Roosevelt High School, Dayton, Ohio.

Plates V and VI.

While observing a large bed of yellow pond lilies, *Nymphaea advena Ait.*, in Eagle Lake, Kosciusko County, Indiana, I noticed that a number of leaves and stems had wrinkled, turned yellow and were apparently dead. Since the growing season was not over it occurred to me that there must be some specific reason for this condition. Stems in various stages of decay were examined and all of them were found to be infested by small "blood worms". These "blood worms" were also found to be inhabiting green stems.

Repeated observations proved that these organisms burrowed into the stems from without, cutting a round hole through the epidermis, then pushing their way, usually upward, through the porous stem. After a period of time other holes were cut through the outer surface near which these larvae attached themselves to pupate. After the pupating period the adult emerged through one of these openings in the stem, rested on a nearby object and flew away. Emergence was found to occur late in the afternoon or at night.

These larvae were blood red in color with stout bodies and well developed mouth parts, and measured from 15 to 17mm. in length. A microscopic examination of the digestive tract which revealed particles of stem fibers, suggested that the larva had been feeding on the lily stems.

The following method was employed in order to determine the average number of larvae inhabiting a stem. A heavy wire, enclosing a quadrat one meter square, was lowered over the top of the lily stems and all stems in this area were cut and examined for larvae.

Station	No. lily stems	No. infested	No. Larvae
1	100	50	138
2	92	40	103
3	88	44	136

The total of stems examined was 280, of which 134 were infested. The total number of larvae taken from these stems was 377, an average of 2.8 larvae in each infested stem, or an average of 1.3 in all stems examined in representative stations.

It is not contended that the larvae caused the death of all the yellow water lily stems, yet it is a fact that their burrowing and feeding affect these stems both directly and indirectly. Directly, in that the tissue is destroyed by feeding, and indirectly, by breaking the epidermis, opening the path for decomposition.

The technique used in associating this larva with the adult was simple. A cylinder made of wire screen about four inches in diameter and eighteen inches long was covered with mosquito netting which extended about six inches above and below the ends of the screen. This covered cylinder was placed over the stem and tied at each end to the stem, thus preventing the escape of the imago.

A check was made by bringing infested parts of stems to the laboratory and placing them in covered counting pans where the larvae were observed to feed, pupate and emerge. Other larvae were placed in a small aquarium, fed with juice and shreds of the lily stems, and were also observed to pupate and emerge. Specimens of various stages in the life history were thus obtained.

My own efforts at classification assured me that I had the midge, *Chironomus quadripunctatus,* the male of which has been originally described by Malloch. But to verify my classification I sent a male specimen to Dr. O. A. Johannsen, who kindly confirmed my conclusion. Later I compared my specimen with the type specimen which is in the Illinois State Laboratory of Natural History, Urbana, Illinois.

The exact length of time the larva lives was not determined because artificial conditions of the laboratory seemed to affect their development in such a way as to hinder natural growth, causing them to immediately start pupating. The average length of time in the pupa stage, under conditions observed, was from five to seven days. The adult was never observed to feed but was kept alive as long as seven days.

Specimens of all stages were collected in the following lakes of Northern Indiana during the summers of 1925, '26, '27:

Cellars, Cedar, Chapman, Huffman, Barbee, Palestine, Wawasee and Webster. They were also observed in other lakes where yellow pond lilies were growing.

After collecting the original descriptions of the American species of *Chironomus*, I find no mention of any midge found associated with lily stems as discussed in this paper. However, Dr. Johannsen informs me that a species with similar habits is found in Europe.

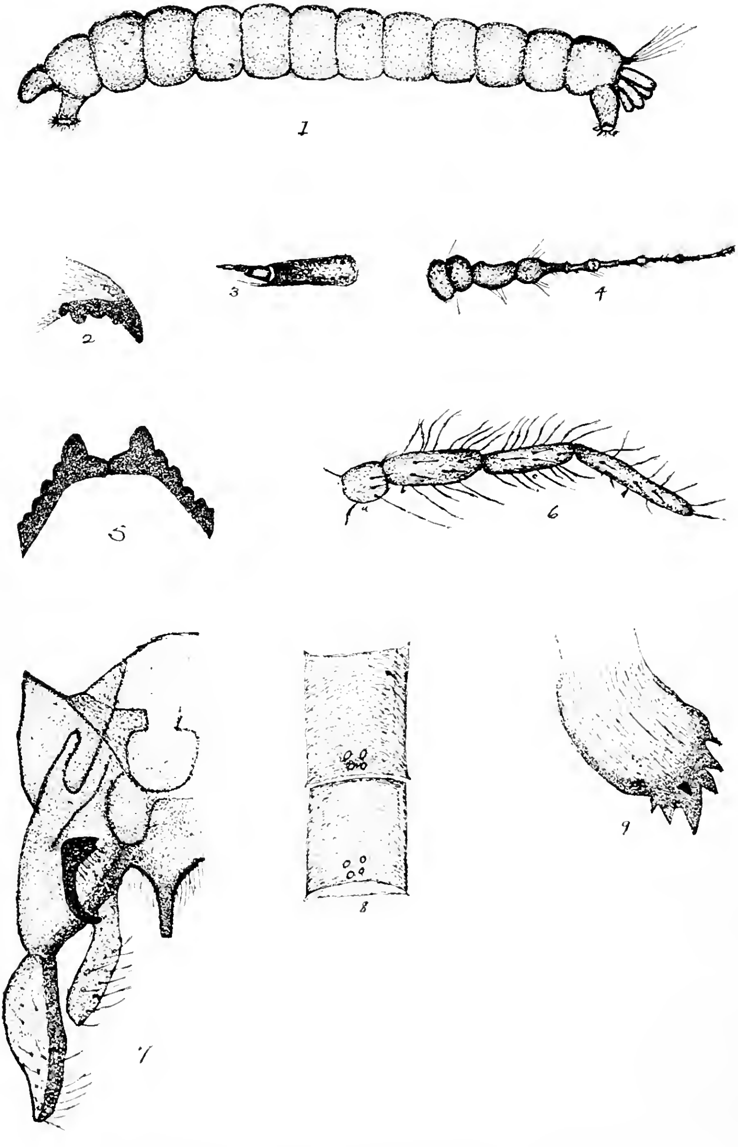
CHIRONOMUS QUADRIPUNCTATUS. Malloch.

Chironomus quadripunctatus. Malloch. Bull. Ill. Lab. 10:437.

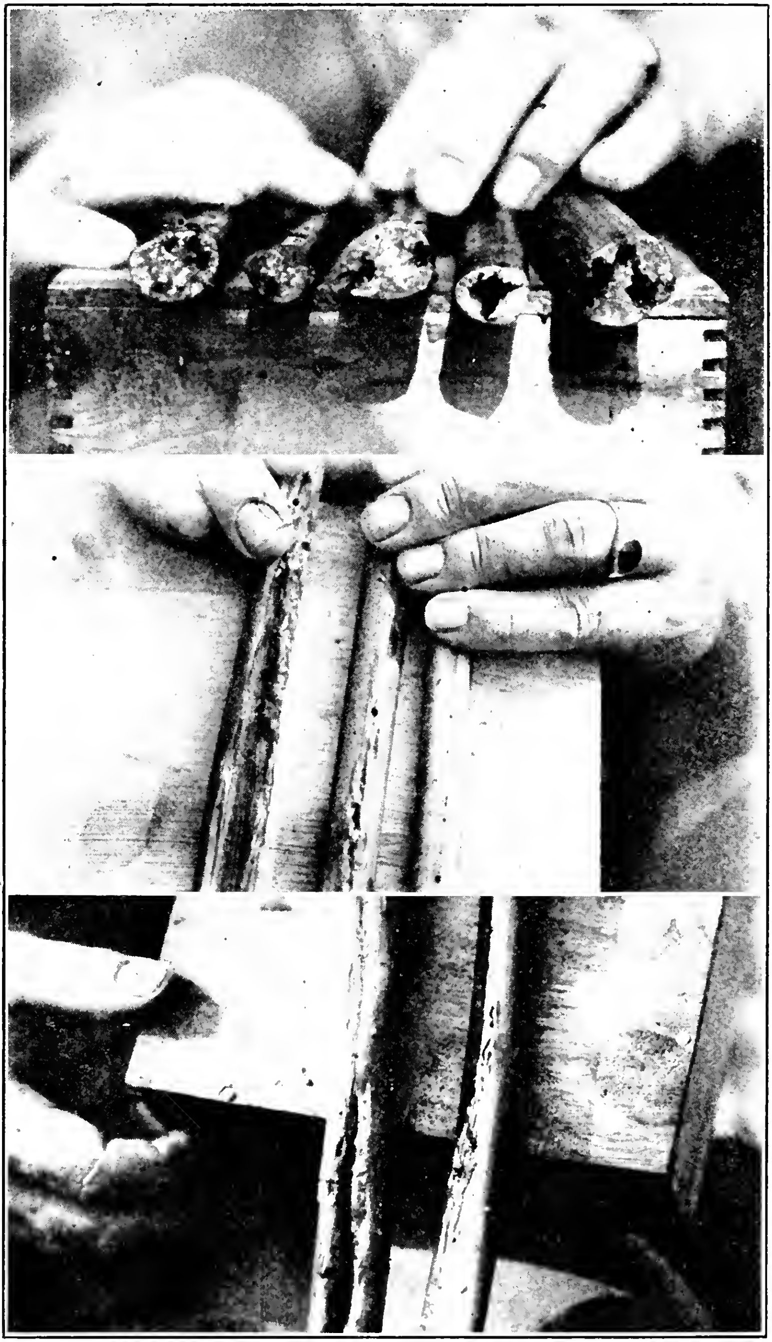
Larva. Blood-red, length 15 to 17 mm., general appearance as in pl. V, fig. 1. Head brown, slightly longer than broad, a few long hairs scattered over dorsal surface of head. Antenna short and stout with five joints, basal joint as long as the remaining four, third joint longer than second. Labium broad, teeth as in pl. V, fig. 5, distinctly darkened, six on each side. Mandibles stout, with five teeth counting apical one, fourth from apex longer and larger than second, third or fifth, all distinctly blackened. Anterior pseudopods with numerous hairs on apices. Posterior pairs of prolegs armed with apical claws. Abdominal segments with scattered setae, eleventh segment without ventral blood-gills, four anal blood-gills covered with numerous soft hairs, dorsal tufts consisting of about twelve hairs, basal papillae short.

Pupa. Reddish brown, frontal tubercles not prominent, thoracic respiratory organs present, white and greatly branched, the larger branches made up of bundles of whitish threads. On posterior margin of abdominal segment is a transverse row of rather conspicious, blackish spines. Dorsal abdominal segment covered with microscopic setae. Eighth abdominal segment with lateral fin as in pl. V, fig. 9. Caudal fin with white mat of hairs. Caudal hairs longer than those lateral. Length, about 13 mm.

♀. Antennal hairs yellowish, basal joint of antenna amber color, head reddish brown, segments of palpus as in pl. V, fig. 6. Segment (a) distinctly thicker and about three times shorter than segment (d), segment (c) about twice as long as (a) and about the same length as (b). Mesonotum brownish, divided by a median line which is slightly raised making a space between lateral vittae and median line appear as a strip slightly lighter in color than vittae. Metanotum chocolate brown. Vittae slightly darker. Halteres yellow,



CHIRONOMUS QUADRIPUNCTATUS.—CARPENTER.



LILY STEMS PARTLY DESTROYED BY CHIRONOMUS QUADRIPUNCTATUS.—CARPENTER.

Abdomen stout, tapering very little posteriorly. Body segments dark brown, body hairs yellowish, posterior marginal segment bands pale yellow and narrow. Abdominal segments 2-6 near posterior margin bearing four glassy spot-like dots, usually arranged in a quadrilateral figure as in pl. V, fig. 8. Legs light brown, coxae and sternoplurae brownish. Fore tarsi with hairs and slightly longer than fore tibiae. Tibia joint in midpair slightly darkened. Mid and hind tibiae with hairs longer than diameter of leg. Wings iridescent in strong light. Cubitus fork near the middle, crossvein slightly before. Wings rather widely spread at tips when at rest. Length, 8-9 mm.

Eggs. Never were found.

Male. The male was originally described by Mr. J. R. Malloch. Type locality was given as Lake Delavan, Wisconsin, collected by Mr. C. A. Hart, September 7, 1892.

I have seen the specimen originally described by Malloch and found it to be in a very poor condition, however, I am convinced that the species compared are the same and that Malloch's description is adequate.

I have greatly appreciated advice and criticism of Dr. W. Scott and Dr. A. C. Kinsey, both of the Department of Zoology, Indiana University.

PLATE V.

Structural Details of *Chironomus quadripunctatus.*

Fig. 1. General outline of larva.
Fig. 2. Mandible of larva.
Fig. 3. Antenna of larva.
Fig. 4. Antenna of female.
Fig. 5. Labium.
Fig. 6. Palpus of female.
Fig. 7. Hypopygium.
Fig. 8. Body segments, dorsal view, showing four oval glassy spots found on segments 2-6.
Fig. 9. Apical lateral process found on segment 8 of pupa.

PLATE VI.

Photographs Showing Yellow Lily Stems Party Destroyed by *Chironomus quadripunctatus.*

Fig. 1. Cross section of stems cut about four inches from root stalk.
Figs. 2 and 3. Longitudinal sections showing stages of attack by larva.

Some Entomology of Bartholomew's De Proprietatibus Rerum.

By Harry B. Weiss, New Brunswick, N. J.

During medieval times entomology as we now understand that term was practically non-existant. However, those who laid claim to any erudition at all had a slight general knowledge of some insects, gained, probably for the most part, from Bartholomew's *De proprietatibus rerum*, or On the Properties of Things. This is an encyclopedic, elementary work of nineteen "books" which circulated in manuscript form in the latter part of the thirteenth and early fourteenth century and later in printed form up to the sixteenth century, having been translated into English, Spanish, French and Dutch. It was written, according to the author, to explain the references to natural objects in the Scriptures, but Bartholomew did more than simply compile his material, and frequently incorporated information on contemporary affairs. The nineteen books deal with various apparently unconnected subjects such as God, angels, demons, the soul, family life, medicine, the heavens, time, "form and matter," the air and its animals, weather, water and fish, the earth, geography, minerals, the properties of animals, color, odor, etc., and numerous authorities are cited. Part of its value at present consists of the conception it gives one of the medieval state of mind and of the status of science, natural history, geography, etc., in the Middle Ages.

Insects such as bees, flies, crickets, locusts, come in for some attention, and as an example of Bartholomew's treatment there is quoted below, some passages on bees from Trevisa's translation (1397) of Bartholomew's work. These have been extracted from Robert Steele's "Mediaeval Lore from Bartholomew Anglicus" (London 1924) in which obsolete grammatical forms have been replaced by modern ones and the spelling modernized.

"The properties of bees are wonderful, noble and worthy. For bees have one common kind as children, and dwell in one habitation, and are closed within one gate; one travail is common to them all, one meat is common to them all, one common working, one common use, one fruit and flight is common to them all, and one generation is common to them all. Also maidenhood of body without wem is common to them all, and so is birth also. For they are not medlied with service of Venus, nother resolved with lechery, nother bruised with sorrow of birth of children. And yet they bring forth most swarms of children.

"Bees make among them a king, and ordain among them common people. And though they be put and set under a king, yet they are free and love their king that they make, by kind love, and defend him with full great defence, and hold [it] honour and worship to perish and be spilt for their king, and do their king so great worship that none of them dare go out of their house, nor to get meat, but if the king pass out and take the principality of flight. And bees chose to their king him that is most worthy and noble in highness and fairness, and most clear in mildness, for that is chief virtue in a king. For though their king have a sting yet he useth it not in wreck. And also bees that are unobedient to the king, they deem themselves by their own doom for to die by the wound of their own sting. And of a swarm of bees is none idle. Some fight, as it were in battle, in the field against other bees, some are busy about meat, and some watch the coming of showers. And some behold concourse and meting of dues, and some make wax of flowers, and some make cells now round, now square with wonder binding and joining, and evenness. And yet nevertheless, among so diverse works none of them doth espy nor wait to take out of other's travail, neither taketh wrongfully, neither stealeth meat, but each seeketh and gathereth by his own flight and travail among herbs and flowers that are good and convenable.

"Bees sit not on fruit but on flowers, not withered but fresh and new, and gather matter of the which they make both honey and wax. And when the flowers that are nigh unto them be spent, then they send spies for to espy meat in further places. And if the night falleth upon them in their journey, then they lie upright to defend their wings from rain, and from dew, that they may in the morrow tide fly the more swifter to their work with their wings dry and able to fly. And they ordain watches after the manner of castles, and rest all night until it be day, till one bee wake them all with twice buzzing or thrice, or with some manner trumping; then they fly all, if the day be fair on the morrow. And the bees that bring and bear what is needful, dread blasts of wind, and fly therefore low by the ground when they be charged, lest they be letted with some manner of blasts, and charge themselves sometimes with gravel or with small stones, that they may be the more stedfast against blasts of wind by heaviness of the stones.

"The obedience of bees is wonderful about the king, for when he passeth forth, all the swarm in one cluster passeth with him. And he is beclipped about with the swarm, as it were with an host of knights. And is then unneth seen that time for the multitude that followeth and serveth him, and when the people of bees are in travail, he is within, and as it were governor, and goeth about to comfort others for to work. And only he is not bound to travail. And all about him are certain bees with stings, as it were champions, and continual wardens of the king's body. And he passeth selde out, but when all the swarm shall go out. His outgoing is known certain days tofore by voice of the host, as it were arraying itself to pass out with the king."

For most of his natural history, Bartholomew depended upon Aristotle and this is quite apparent when comparisons are made. For instance, in Historia Animalium (Book V), Aristotle says:

"Of the king bees there are, as has been stated, two kinds. In every hive there are more kings than one; and a hive goes to ruin if there be too few kings, not because of anarchy thereby ensuing, but, as we are told, because these creatures contribute in some way to the generation of the common bees. A hive will go also to ruin if there be too large a number of kings in it; for the members of the hives are thereby subdivided into too many separate factions."

Again in Book IX, he writes: "At early dawn they make no noise until some one particular bee makes a buzzing noise two or three times and thereby awakes the rest; hereupon they all fly in a body to work. By and by they return and at first are noisy; then the noise gradually decreases, until at last some one bee flies around, making a buzzing noise, and apparently calling on the others to go to sleep; then all of a sudden there is a dead silence."

Little is known of Bartholomew's life. In 1230 the General of the Franciscan Order wrote to the provincial of France asking him to send Brother Bartholomaeus Anglicus and another friar to Magdeburg in Saxony to assist him. In 1231, according to a manuscript chronicle, this was done and Bartholomew was made a teacher of theology. One gathers also, from Salimbene (Histoire Littéraire de la France, 1284) that Bartholomew lectured on the Bible at the University of Paris. The exact date of the first appearance of the *De proprietatibus rerum* is uncertain. Some authorities place it at about 1230, and others about 1248.

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STEELE, ROBERT. Mediaeval Lore from Bartholomew Anglicus. London, 1924.

THOMPSON, D'ARCY WENTWORTH. Historia Animalium. (Works of Aristotle trans. into English). Oxford, 1910.

Personals

According to *Science* for April 20, 1928, Prof. and Mrs. T. D. A. Cockerell have left Siam for Australia, after conference with Dr. Kerr on the Siamese flora and with Dr. Hugh M. Smith on Siamese fishes.

Dr. H. B. Hungerford, of the University of Kansas, left on April 27 for eight months of research work in the museums of Europe. He will take with him specimens from the collections of the University of Kansas and the Smithsonian Institution, Washington, with which he is collaborating on the trip. Dr. Hungerford will spend most of the month of May in British Museums, going later to Paris, Brussels, Amsterdam, Berlin, Halle, Copenhagen, Uppsala, Prague, Vienna and Budapest.—*Science*, May 4, 1928.

Some Quantitative Results in Collecting Hemiptera.

While stopping at Wilson's Camp on Indian Lake in the Adirondacks in August, 1921, and again last August, I collected many interesting Hemiptera. Most of my time was spent collecting on a neighboring hillside facing the lake. Just back of this cleared area was dense timber. The vegetation was rather low and scanty consisting of clumps of grass, interspersed with moss and various low growing weeds common to such a semi-xerophytic environment. Dead leaves swept in from above filled in the interspaces. As my method of collecting was rather unusual, it deserves a bit of explanation. My operation was very like a busy hen, scratching and searching for her juicy morsels among the dead leaves. Spreading my sifting cloth and lying down flat beside it with my nose close to the ground, I would begin the operation of pulling grass and weeds, scratching and searching, occasionally throwing the debris on the cloth for further search. Thus I gradually worked down the hill leaving the area behind me practically denuded and my bottles well filled. Why this particular hillside has such a rich hemipterous fauna I am unable to explain. One day while collecting it occurred to me that I might secure some quantitative results which would be worth recording. Measuring off an area 12 x 3 ft., and collecting there in this intensive manner for three hours resulted in 108 specimens of Hemiptera representing 21 species. Other forms of life such as many spiders, ants, a few beetles and myriapods were neglected. The complete list of Hemiptera is as follows:

Nysius thymi Wollf.	2
Zeridoneus costalis Van Duz.	4
Ligyrocoris diffusus Uhl..	2
Sphaerobius insignis Uhl.	1
Ptochiomera ferruginea Stal.	12
Stygnocoris rusticus Fall.	8
S. pedestris Fall.	13
Plinthisus contractus Uhl.	1
Kolonetrus plenus Dist...	2
Trapezonotus arenarius Linn.	9
Drymus unus Say.	1
Scolopostethus thomsoni Reut.	23
Pagasa fusca Stein.	1
Xylocoris cursitans Fall..	3
X. sp.?	15
Lygus vanduzeei Knight.	1
Philaenus spumarius Linn.	1
Acucephalus nervosus Schr.	3
A. flavostrigatus Donov..	4
Euscelis sp.?	1
Agallia 4—punctata Prov.	1

H. G. Barber, Roselle, New Jersey.

The Fight Against Insect-Borne Diseases.

During 1927 the Rockefeller Foundation, in disbursing from income and capital $11,223,124, *inter alia*, helped Brazil to maintain precautionary measures against yellow fever; continued studies of that disease in West Africa on the Gold Coast and in Nigeria; and had a part in malaria control demonstrations or surveys in eight states of the Southern United States and in eleven foreign countries.

List of the Titles of Periodicals and Serials Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annals of the Carnegie Museum. Pittsburgh, Pa.
4. Canadian Entomologist. London, Canada.
5. Pysche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology. Concord, N. H.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Entomologische Zeitschrift. Frankfurt a. M., Germany.
15. Natural History, American Museum of Natural History. New York.
16. American Journal of Science. New Haven, Conn.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Internationale entomologische Zeitschrift. Guben, Germany.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
20. Societas entomologica. Stuttgart, Germany.
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Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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.

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Papers published in the Entomological News are not listed.

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Unnamable Butterflies (Lepid.: Rhopalocera).

By J. D. Gunder, Pasadena, California.

(Plates VII-X).

Unnamable butterflies are those sorts of Lepidoptera which are popularly termed hermaphrodites, freaks, sports, deforms, malforms, aberrations ([1]), monstrosities, etc. Such specimens have no right to specific names and if named, they fall into synonymy. I believe a consensus of opinion in this regard bears me out.

As a class, these "freaks of nature" are interesting to observe and it is the object of this article to illustrate several kinds. I cannot here go into a complete diagnosis of their unfortunate physical condition. In most cases the causes of their ailments are unknown. Our latest check lists still record some of these named "freaks" as good, but I believe all will be eventually culled out.

For convenience of illustration and division of text matter, I have separated such specimens into ten groups as follows:

1. Hermaphrodites (Individuals in which the characters of both sexes are combined) and Mosaics. Plate VII, fig. 1A is not really a hermaphrodite like fig. 1B, for example, but is a bi-formed *Papilio glaucus* L. ♀, having the dark form female on the left and the light form female on the right; specimen in the Academy coll. at Philadelphia; a similar specimen is figured in color by W. H. Edwards on Papilio plate 5 in "Butterflies of North America". Fig. 1B; ♀, same species; male left, female right; in Strecker coll., Field Museum, Chicago, Illinois. Fig. 1C; ♂, same species; right secondary only male; also

([1]) The word aberration or ab. means— "*A wandering deviation from what is right, natural; a mental (or physical) disorder*". It is a very general term which easily covers all "unnamable butterflies". It should not be used in classification for designating a grade of specimens; it implies no biological rank. For further discussion and reference see Ent. News, Nov., 1927, pp. 265-6.

in Strecker coll. Fig. 1D; ♀, same species; wings showing a conglomerate mixture of both sexes; also in Strecker coll.

2. CHRYSALIS BURNS. Specimens showing a bleaching out or irregular fading of the pigmental colors over the wings. Such specimens are commonly found in all species and in both sexes. They are disease-scarred individuals which have probably recovered from, or "pulled through," some mild affliction developed during the chrysalis stage. Plate VII, fig. 2A (type) shows a *Danaus menippe* (Hbn.) which was named *pulchra* (synonym) by Herman Strecker. Figs. 2B and 2C also show two other "birth-marked" specimens in the same species.

3. DWARFS AND GIANTS. Plate VIII, fig. 3C illustrates a normal size *Cynthia cardui* L. while figs. A and B show the opposite extremes. The name *minor* (Ckll.) should be in the synonymy, as it is based on small size only with no design or color change. Mr. T. D. A. Cockerell writes me this type was taken by him in Colorado flying with typical-sized specimens. I doubt if his original example was as small as the one shown by fig. 3A which was taken on the Mojave Desert.

4. RUBBED, FADED, OR DEGREASED SPECIMENS and those changed by long exposure to cyanide, etc. Such specimens are often mistaken for something new and undoubtedly names have been applied on this score. The illustrated figure shows a rubbed example of *Zerene eurydice* (Bdv.) which was given to me by a prominent western butterfly dealer who swore it was "a good thing" and worthy of a varietal name.

5. VENATIONAL MALFORMATIONS. Individuals whose vein patterns vary from normal and in consequence cause a change in maculation. Plate VIII, fig. 5A (upper side) and fig. 5AA (under side) show a variant *Argynnis cybele* (Fab.) named *bartschi* by Wm. Reiff. Fig. 5B (upper side) and fig. 5BB (under side) also show an irregularly veined *Argynnis coronis* (Behr) named *baroni* by W. H. Edwards. Both names should be in the synonymy. By closely observing the under sides of these specimens, the unusual and distorted position of the major veins will be noticed.

6. WING MALFORMATIONS. Specimens having deformed

wings of irregular contour. Examples of these unfortunate lepidoptera are everywhere common and no particular reason or reasons can be assigned for their condition, though much has been written on the subject. Plate IX, figs. 6A and 6AA show a *Papilio rutulus* Luc. named *hospitonina* by LeCerf of Paris. Its "crumpled" wing margins are easily seen. Figs. 6B and 6BB illustrate the "cramped" margins and corresponding marginal design alteration of a *Anthocaris sara reakirtii* Edw., which is figured by Comstock in his "Butterflies of California", plate 11, fig. 18. It is, fortunately, unnamed, though termed an aberration. Figs. 6C D E F G H I and J show examples of *Junonia coenia* Hbn. These readily picture the effects of wing malformation.

7. Pigmental Misplacements. Two types of this rare phenomenon are known. Plate IX, fig. 7A shows a female *Eurymus philodice* (Godt.) in which the colors are much "run out of bounds" or "spilled open" through the wing scales. The colors of this example resemble a paint pot and I wish it could be illustrated in natural color to show its motley rainbow combination of red, lilac, yellow and brown shades. The specimen is in the Museum of Comparative Zoology at Cambridge, Massachusetts. Fig. 7B shows the type of *Eurymus philodice rothkei* (Reiff). It is a case where some of the black pigment has remained in the veins or permeated their structures. I do not believe such specimens have a classificatory value or the right to a specific name. The type is in my collection.

8. Monstrosities. Under this heading comes a number of real "freaks", such as extra wing specimens, those matured without scales and those having unusual or superfluous parts or organs. As a novelty, I illustrate a female *Ascia monuste* (L.) with its larval head attached (Plate X, fig. 8). The specimen is in the Academy collection at Philadelphia and was taken in flight in Florida.

9. Fungus-affected Specimens. I am told that fungus growths are not uncommon in papered specimens which have been subjected to dampness. This is the only example I have noticed, however. The illustration (Plate X, fig. 9) shows such a

growth at the base of the eyes on the head of a *Papilio philenor* L. The growth is yellow in color. Can some one supply me with more information upon the subject of fungus on insects or direct me to articles on the subject?

10. Wing punctures. Plate X, fig. 10A shows two holes through the wing of a *Euphydryas phaeton* (Dru.). Under a microscope these show evidence of healing. Can this be possible? Note the bending of the vein between the two punctures. This specimen was kindly sent to me by Mr. E. L. Bell of Flushing, New York. Plate X, fig. 10B (upper side) and fig. 10BB (under side) show greatly magnified photographs of a puncture near the outer margin on the wing of a *Papilio rutulus* Luc. The hole has been accidently torn open and enlarged to the outer margin by the butterfly itself prior to capture. The wings being folded during the chrysalis stage, it is evident that the incision did not penetrate through to the under folds, but left its mark as seen by the two black spots inward from the puncture.

[Without pretending to furnish a bibliography for Mr. Gunder's article, we may direct those interested to Morgan and Bridges' paper on "The Origin of Gynandromorphs" in Publication No. 278, Carnegie Institute of Washington, 1919, 122pp., 4 pls., 70 text-figs.; P. Cappe de Baillon's recent "Recherches sur la Tetratologie des Insectes", Paris, 1927; and H. A. Hagen's "On Some Insect Deformities" (Memoirs, Mus. Comp. Zool. Harv. Coll., ii, no. 9, 23pp., 1 pl., 1876). In this last Dr. Hagen brings together from the literature and his own observations a number of cases of "Perfect Insects with the Larval Head" in 12 species of Lepidoptera, 3 of Coleoptera and 1 of Diptera. I have examined the abnormal specimen of *Ascia* (or *Pieris*) *monuste* at the Academy of Natural Sciences of Philadelphia figured here by Mr. Gunder. A small, narrow strip of each imaginal compound eye shows behind each side of the larval head-covering. The latter is slightly split along the two sutures which bound the adfrontal plates laterally. The specimen, a dark female, was one of a lot of this color form received in paper envelopes by Mr. R. C. Williams, Jr., from the collector, and had not attracted attention from anyone until after it was pinned and spread.—Editor.]

Some Observations on the Behavior of Cerceris architis Mickel (Hym.: Philanthidae).

By C. E. Abbott.

In the summer of 1926, having nothing better to do than build up deficient red blood cells, I was in the habit of frequenting a field east of Elgin (Illinois) to bask in the sun. I discovered several burrows in the clay bank at the top of an abandoned sand pit. Part of the time these burrows were inhabited by busy little black-and-yellow wasps about half an inch in length. For many hours each day the wasps labored irregularly at their excavations.

The opening of each nest was nearly circular and about one centimeter in diameter. Into this the owner plunged, only to reappear a little later, abdomen foremost, behind a heap of loose earth. This kind of digging continued until the opening of the nest was quite hidden. Then the insect appeared, head foremost, from below; the debris was scattered around the opening in the form of a low crater. Of course the nest that opened on a vertical surface did not have this accumulation, which in some cases amounted to a teaspoonful of loose soil. Occasionally a wasp enlarged the door of her burrow by dislodging bits of earth with her jaws.

Often the wasps remained in the nests for hours with their faces in the doorways. This was especially the case on dull days, at which time the only reaction the insects gave was brought about by my sudden appearance or the intrusion of other insects. In the first case each wasp dropped out of sight into its nest, only to cautiously reappear when nothing more occurred to cause alarm. Toward too curious insects they behaved differently; rushing out, they violently drove these away.

Aided by grass stems and plaster of Paris, I was able to trace the extent of some of these burrows. In consequence of roots and stones, they were somewhat tortuous; all tended to incline to one side, so that the whole was curved like a scimiter. There was a surprising uniformity of width throughout the length of each burrow. Excepting the closed end, where for two or three centimeters its width was fifteen millimeters, the average tunnel had a diameter of one centimeter.

In the terminal chamber, mixed with much loose earth, there were from three to seven weevils. In some nests the beetles were reduced to a few dry fragments. More often there were still slight evidences of life; twitching of the tarsi and movements of the head which ceased after twenty-four hours. The beetles stored by the wasps proved to be *Curculio nasicus* Say. They were about half an inch in length and of a light brown or buff color. They were remarkable for a proboscis nearly as long as the remaining parts of the body.

Each wasp, returned at irregular intervals with a weevil clasped beneath its body. At the door of its nest the wasp dropped the beetle, entered the burrow, and seizing the weevil, dragged it in.

I had the rare good fortune to see one of these wasps attack its prey. A living *Cerceris* and the beetle it had captured were put into a vial. Seizing the weevil by the left prothoracic leg, the wasp tried to drag it through the stoppered end of the bottle. Failing in this, she grasped her prey dorsally, taking its proboscis in her jaws; she then curved her abdomen beneath it and inserted her sting at the ventral juncture of the thorax and abdomen.

The departing wasps circled about their nests before taking off. When the position of objects in the vicinity of a nest were changed the returning wasp was unable to find her burrow.

In conclusion, I wish to thank Dr. S. A. Rohwer and his colleagues for the identification of the specimens.

To Authors of Entomological Papers.

EDITOR, ENTOMOLOGICAL NEWS: I herewith kindly ask you to inform your readers that I request those interested in having their entomological works noticed in the Russian entomological literature to forward their papers to me for the aforesaid purpose. V. YAKHONTOV, Manager of Entomological Department of Agricultural Experiment Station, Old Boukhara, Shiraboudin, S. S. S. R. (Russia).

Descriptions of New Species of North American Hydnocerinae (Col.: Cleridae).

By A. B. Wolcott, Field Museum of Natural History, Chicago, Illinois.

Hydnocera mira sp. nov.

Black, feebly shining; elytra piceous, basal third (suture excepted) red; antennae, mouth (mandibles piceous), palpi, front legs (outer edge of femora with an elongate piceous maculation), base and apex of middle femora, base of posterior femora, apex of middle and posterior tibiae, and tarsi pale testaceous; the tarsi somewhat infuscate.

Head, including the prominent eyes, slightly wider than the pronotum, rather coarsely and closely punctate; front with a large rounded impression on each side; pubescence sparse, long, erect, pale. Antennae short, stout, only slightly longer than the head. Pronotum slightly wider than long; apical constriction very feeble; sides abruptly strongly dilated; behind the dilation parallel to base; subapical transverse impressed line deep at flanks, feeble on disk; basal transverse line entire, distinct; lateral foveae large, not deeply impressed; punctuation same as that of head, with a few transverse regulae on disk and at sides; pubescence sparse, long, erect, pale. Scutellum densely clothed with white pubescence.

Elytra distinctly wider than the head, depressed, length slightly more than twice the width at base; sides parallel; apices obtusely rounded, not serrate, merely irregular in outline, narrowly dehiscent at suture; surface rather coarsely, closely punctate throughout; pubescence rather sparse, short, semi-recumbent, grayish white; color piceous, rufo-piceous at apex; basal third (suture broadly piceous) red, the posterior margin of the red area irregularly oblique from the lateral margin of the elytra to the piceous suture. Body beneath and abdomen shining, sparsely pubescent. Abdomen distinctly longer than the elytra. Legs rather densely clothed with long, erect, pale hairs. Length 5.7 mm.

One specimen: Sand Hills, Nebraska, July. *Type* (female) No. 942, in my collection.

This species is most closely allied to *wickhami* Wolc., from which it may be easily distinguished by the total absence of the post-median elytral fascia which is formed of silvery white hairs and which is so conspicuous in that species. Other differences that may be mentioned (aside from color) are the shorter antennae, less strongly constricted prothorax, the lateral dilations of which are more prominent, with the sides posteriorly straight to base, and the absence of a nearly smooth discal area.

Hydnocera puritana sp. nov.

Robust, depressed, moderately pubescent, feebly shining, aeneous; antennae, mouth and palpi dull testaceous; anterior and middle tibiae and all tarsi piceo-testaceous.

Head, including the not very prominent eyes, scarcely wider than the greatest width of pronotum; front rather feebly bi-impressed, moderately coarsely, occiput more closely, very feebly, finely rugulose. Antennae stout, slightly longer than the head. Pronotum nearly one-fourth wider than long (L:W: :48:60); sides rather strongly constricted near apex, moderately dilated at middle, parallel at base; lateral foveae small, deeply impressed; subapical and basal transverse impressed lines straight, deep; surface moderately coarsely, densely punctate, rugulose at apex and flanks.

Elytra distinctly wider than the head, twice as long as wide at base, feebly convex, slightly shorter than the abdomen; sides straight, very nearly parallel; apices separately obtusely rounded, very feebly serrate; humeri prominent; surface moderately coarsely, not closely punctate, in apical two-fifths densely scabrous; pubescence short, sparse, semi-erect, gray, more conspicuous in apical two-fifths, intermixed with sparse, erect, long, black hairs. Metasternum sparsely, finely rugulose. Abdomen rather coarsely, moderately sparsely, irregularly rugoso-punctate, the terminal segments more sparsely punctate; clothed with dense, long, white and sparse, black hairs. Legs sparsely clothed with long, erect, dark hairs. Length 6.2 mm.

One specimen: Boston, Massachusetts. June (Liebeck). *Type* (female) No. 654, in my collection.

Also allied to *wickhami* Wolc., and like *mira* distinguished by lacking the post-median fascia of silvery white hairs. In *puritana* the antennae are shorter, the humeri more prominent, the body above feebly shining, the prothorax is of a different form, with its transverse impressed lines entire, and the scutellum is nude, in all of these characters it differs from *wickhami*.

Hydnocera cuneiformis sp. nov.

Moderately elongate, rather depressed, shining, moderately sparsely pubescent, black; head and thorax faintly cupreoaeneous; antennae, mouth parts and elytra pale yellow, the last with piceous markings; legs pale yellowish red.

Head very finely and very sparsely punctate, rather densely clothed with depressed white pubescence, with a few longer erect white hairs intermixed; front with a crescentiform impression between the eyes. Pronotum nearly one-fourth wider than long (L:W: :29:37), nearly one-fourth narrower than the head across the eyes; surface finely rugulose; lateral dilation not very prominent; lateral foveae large and deep; subapical and basal transverse impressed lines deep and distinct; pubescence very sparse but with the long, erect, white hairs more conspicuous than on head. Scutellum triangular, black, the apex acute.

Elytra across the humeri very broad, equal in width to the head; sides straight, strongly convergent from humeri to apices, the latter very obtusely, separately rounded and distantly but not very strongly serrate; suture narrowly dehiscent in apical third; each elytron with a large, somewhat rounded impression at apical sixth, behind which the apices are very feebly tumid; flanks, apical and sutural margin in apical third strongly carinate; surface rather finely, very sparsely punctate, almost seriate, posterior to the subapical impressions more coarsely and closely punctate; pubescence very sparse, semi-erect, white; color pale yellow; at apical two-fifths a common, irregular, piceous maculation, which is formed by the apices and suture being broadly piceous, with a transverse extension of the same color just before the subapical impression, the maculation anterior to this confined to the suture and strongly attenuate anteriorly, reaching posterior margin of middle fifth of elytra; the dorsal surface of lateral carina piceous throughout its length. Legs rather sparsely clothed with moderately long, white hairs. Length 3.5 mm.

One specimen: Phoenix, Arizona. (Liebeck). *Type* (female) No. 1170, in my collection.

Different in form from any species yet described in our fauna, but bearing, in this respect, a good deal of resemblance to the Central American *H. guatemalae* Gorh., but there the similarity ceases, as the two species differ in nearly every detail of structure. The new species is best placed in proximity to *omogera* Horn, from which it may readily be distinguished by its much longer elytra, the sides of which are absolutely straight, the lateral margins not at all serrate, and the entire absence of a fascia of pubescence at apical third; the head is more sparsely punctate; the dilations of the pronotum are stronger; the elytra are much less coarsely and less deeply punctate, and the apices are more broadly obtusely rounded and much less strongly serrate.

In the specimen at hand the abdomen is a trifle shorter than the elytra, but it is quite evidently shrunken and contracted and consequently the elytra are, in all probability, normally a little shorter than the abdomen.

Hydnocera blanchardi sp. nov.

Dark blue, shining, thorax with slight aeneous luster; front and middle tibiae, hind tibiae at apex and base, all tarsi, antennae (club excepted), palpi, mandibles and labrum pale testaceous; antennal club pale fuscous.

Head, including the moderately prominent eyes, slightly wider than the pronotum, moderately finely but very densely punctate; front with a feeble crescentric impression; pubescence very short, sparse and recumbent, silvery white, with no intermixture of long dark or light hairs. Antennae short, stout, slightly longer than the head. Pronotum slightly wider than long, apical constriction moderately strong; sides broadly, rather strongly dilated, behind dilation parallel to base; subapical transverse impressed line deep and broad; basal impressed line deep; basal margin reflexed; lateral foveae feeble; sides with same punctuation as that of head, a small discal area devoid of punctures; pubescence short and recumbent whitish, intermixed with longer sparse, erect light brown hairs.

Elytra slightly wider than the head, depressed, about twice as long as the width across the humeri; sides very feebly narrowing toward apices, the latter separately rounded and rather strongly serrate; broadly dehiscent at suture; surface moderately coarsely, densely punctate, the apical two-fifths scabrous; pubescence same as that of pronotum but becoming a little more dense toward the apices, and with a feebly indicated post-median fascia composed of whitish pubescence. Body beneath and legs rather sparsely pubescent. Abdomen very slightly longer than the elytra. Length 3.2 mm.

One specimen: New Mexico, (Leng). *Type* in the collection of the late Frederick Blanchard to whose memory this fine species is dedicated.

Greatly resembles *H. fuchsi* Schffr., but in *blanchardi* the elytra are more densely punctate in more than basal half, while the apical two-fifths are scabrous (basal half densely-cribrate in *fuchsi)*, the transverse fascia is post-median (median in *fuchsi)*, the sides are less truly parallel, the apices are more strongly serrate and leave a portion of the abdomen exposed. The head in *blanchardi* is clothed with short, sparse, recumbent pubescence, with no intermixture of long dark hairs, these long, erect, dark hairs being very conspicuous in *fuchsi*. The coloration also is somewhat different.

Isohydnocera mima sp. nov.

Form of *I. tabida* Lec., but with sides of thorax much more strongly dilated. Aeneous-black, feebly shining; mouth, palpi, antennae (five apical segments, piceous) and anterior and middle legs pale yellowish; posterior legs black, with basal half of femora, knees and tarsi pale yellow; pubescence moderately long, erect and recumbent, rather dense, that of elytra conspicuously dense, white.

Head large and broad; eyes prominent; front feebly bi-impressed, finely and sparsely punctate, becoming very finely rugulose posteriorly. Pronotum about one-fourth longer than wide across dilations (L:W: :43:34); sides behind the dilations straight and feebly convergent to base; surface finely rugose, with large, feebly impressed punctures at the sides and in a little more than basal half; lateral foveae small, feebly impressed.

Elytra at base subequal in width to the head; sides feebly convergent to apex; apices obtusely, separately rounded, strongly serrate, tumid, slightly dehiscent at suture; surface coarsely, deeply and densely punctate, the tumid apices shining and very sparsely punctate. Underside shining, sparsely pubescent and finely punctate; abdomen one-half longer than the elytra, finely and sparsely rugulose. Length 5- 5.5 mm.

Two specimens: Arizona. *Type* (female) No. 1228, in my collection; *cotype* (female) in the collection of Mr. Chas. Liebeck, to whom I am indebted for the type specimen.

The new species appears to be very near *I. nigrina* Schffr., but differs from that, as described, by having the elytral apices strongly serrate and the legs much paler, the legs in *nigrina* being in great part black. The pubescence is also more dense than is implied in the description of *nigrina*, for it seems certain that Mr. Schaeffer would have mentioned the conspicuous and dense pubescence of the elytra, if it were present in his species.

Isohydnocera liebecki sp. nov.

Form similar to *I. curtipennis* Newm., but with much more elongate elytra and differently formed thorax. Black, moderately shining, sparsely pubescent; elytra dark piceous, humeri and apical portions rufo-piceous; palpi, antennae (segments 7-11 piceous) and legs pale yellowish, hind tibiae (base excepted) and hind femora near apex narrowly black.

Head only slightly wider than pronotum at widest part; front feebly impressed between the eyes, finely and very densely rugose, posteriorly more finely and sparsely rugose. Pronotum one-fourth longer than wide (L:W: :35:28); sides dilated, a little more strongly than in *curtipennis* but not constricted behind the dilation, straight and rather strongly convergent from apex of dilation to base of pronotum; surface coarsely alutaceous, with coarse, very sparse, feebly impressed punctures.

Elytra very elongate, at base as wide as the head; sides parallel to near the apex, thence feebly narrowing to the obtuse, non-serrate apices, the latter slightly dehiscent at suture; surface rather coarsely, deeply and densely punctate, the punctures largely confluent. Underside shining; abdomen but very slightly longer than the elytra. Length 5 mm.

Two specimens: Anglesea, New Jersey. June 20 and July 4 (Liebeck). *Type* No. 1229, in my collection; *cotype* in the collection of Mr. Chas. Liebeck, to whom I am indebted for the type specimen and to whom it gives me great pleasure to dedicate this very distinct species, which, it is only just to say, was recognized by Mr. Liebeck as being undescribed.

Closest allied to *I. curtipennis,* from which it may be readily distinguished by the very elongate elytra, which are more elongate than even in *I. tabida*, but much less dehiscent at the suture, the sides of the elytra more parallel and but feebly attenuate toward the apices, the latter are not serrate, while in *curtipennis* they are strongly serrate. The form of the pronotum, and the but slightly abbreviated elytra, which nearly cover the abdomen, are also distinctive characters.

On the Use of the Word "Chitinized".

By G. F. Ferris, and J. C. Chamberlin, Stanford University, California.

It would seem reasonable to suppose that such a fundamental subject as that of the nature of the non-cellular integument of insects should by this time be entirely understood and free from confusion. Yet apparently this is not the case. Let us consider some of the various statements concerning the matter.

Packard [1] presents the following. "If we allow an insect to soak for a long time in acids, or boil it in liquid potassa or

[1] Packard, A. S. Text-Book of Entomology, p. 29.

caustic potash, the integument is not affected. The muscles and the other soft parts are dissolved, leaving the cuticle clear and transparent. This insolubility of the cuticle is due to the presence of chitin, the insoluble residue left after such treatment."

And he quotes from Miall and Denny, "The Cockroach". "Chitin forms less than one-half by weight of the integument, but it is so coherent and uniformly distributed that when isolated by chemical reagents, and even when cautiously calcined, it retains its original organized form. The color which it frequently exhibits is not due to any essential ingredient; it may be diminished or even destroyed by various bleaching processes."

From all this we may conclude that the fundamental base of the non-cellular body wall is chitin and that this chitin is the carrier of other substances—such as pigments—that with it make up the cuticle.

Yet if we turn to one of the very recent text-books [2] we find a directly contradictory statement. "The well known firmness of the larger part of the cuticle of adult insects is due to the presence in it of a substance which is termed *chitin* . . . When freshly formed, the cuticula is flexible and elastic, and certain portions of it, as at the nodes of the body and of the appendages, remain so . . . we may speak therefore of chitinized cuticula and non-chitinized cuticula."

It is evident from this quotation that we have here a point of view which assumes that the base of the non-cellular body wall is not chitin at all, but some other substance in which the chitin is deposited. What that other substance may be is nowhere stated, nor apparently does anyone know.

The same point of view is even more definitely expressed in another text [3] where we find this statement. "For the most part, however, the cuticle forms a hard, inelastic exoskeleton which is due to its becoming permeated with a substance termed *chitin*."

Tillyard [4] says merely that "It (the exoskeleton) is com-

[2] Comstock, J. H. An Introduction to Entomology, p. 30.
[3] Imms, A. D. A General Text-Book of Entomology, pp. 6-7.

posed of *chitin*." He speaks further of "strongly chitinized" areas and of "soft, membranous chitin." It is evident that his point of view is in accord with that of Packard.

Now it is a common experience with anyone who works with insects by the methods now used by most of the students of the small forms such as the Coccidae, that even a rather short period of boiling in concentrated alkalis will profoundly alter these "chitinized" portions of the body wall, removing from them their color and reducing them to a flexible and membranous condition. In fact attention is called to this very circumstance by most of the authors from whom we have quoted. We have then a very curious circumstance. This chitin which *permeates* some other substance that forms the cuticula and which gives to it hardness is the first thing to disappear although by its very definition it should be the last!

As a matter of fact, by the very definition of it, chitin is the basic substance of which the non-cellular body wall is composed. The *entire body wall,* membranous and hard, is basically composed of chitin and this chitin serves as the carrier in which other substances are deposited. The body wall is not some other substance permeated with chitin, it is chitin permeated with other substances. This view is in accord with that of Packard and of Tillyard and opposed to the view of Comstock and Imms.

It is entirely *improper* then to speak of "chitinized" and "unchitinized" areas. There are no such things as unchitinized areas except pores and similar apertures and the harder portions are areas—possibly, it is true, of thicker chitin—in which there has been formed a deposit of other substances which cause the hardening and pigmentation. This is simply in accord with the observed facts. It is in accord with certain experiments made by the second author of this paper, in which it was found—as has been found by others—that even after the most rigorous treatment with acids and alkalis the form of the insect still remains in a soft and flexible condition and that the substance of this form is what is commonly considered to be chitin.

[4] Tillyard, R. J. Insects of Australia and New Zealand, p. 9.

The other substances which are borne by the chitinous base and which are removed by the action of reagents are apparently of a proteinaceous nature. The chitin itself is pure white and transparent.

All of this has a certain practical bearing. For one thing it has to do with the matter of the action of stains. The stains that are at present being used extensively in the study of such small insects as the Coccidae—magenta and acid fuchsin—are not in any sense chitin stains. Actually they are specific stains for at least a part of the substances which are contained in the chitin and which are of a proteinaceous nature. As a matter of fact, a true chitin stain is exactly what is not wanted for such work, for such a stain would give little or no differentiation, while these other stains select for their action those areas which are commonly considered as "chitinized."

In the preparation of such material for staining the treatment must be such that these proteins are not affected by it. Too prolonged treatment with alkalis or too intense heat will remove or alter them in such a way that the stains are not effective.

It would be well if our terminology took cognizance of the facts in connection with this matter and were brought more into accord with them. It is evidently quite incorrect to speak of chitinized and unchitinized areas. It is not entirely correct to speak of areas of stronger or weaker chitinization when what we actually mean are areas in which these other substances are or are not deposited without regard to the amount of chitin that may be present.

We might very logically extend the use of the root which appears in the word "sclerite." This word alone is hardly sufficient to meet all our needs and we could speak of "sclerotic areas" or of "sclerotized areas". Such usage should be much more satisfactory than that which is at present followed, for it avoids the obvious contradiction which appears in the present practice and the confusion of thinking that is at the root of this contradiction.

A New Endomychid from Florida[1] (Coleop.).

L. B. WALTON, Kenyon College, Gambier, Ohio.

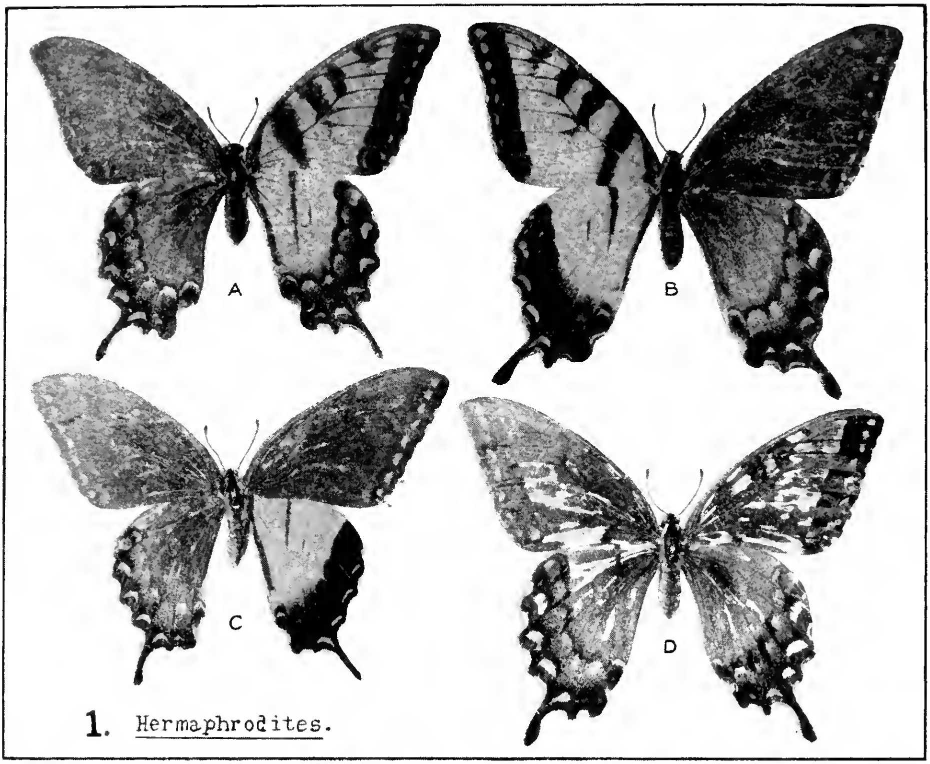
An Endomychid belonging to the genus *Stenotarsus* quite distinct however from our common *S. hispidus* (Herbst) so widely distributed over the eastern part of the United States, was recently forwarded me for identification by Mr. W. S. Blatchley, of Indianapolis, Indiana. The single specimen collected by Mr. Blatchley was obtained on the west coast of Florida at Dunedin, April 10, 1926, in beating red cedar (Juniper).

The species is easily distinguished from *S. hispidus* by having the seven terminal segments of the antennae black, by the uniformly testaceous color of the dorsal side, and by the black areas covering the underside of the metathorax and abdomen. Casey (1916) described *S. solidus* from North Carolina as a new species stating that the "ninth antennal joint (was) distinctly longer than the tenth and not subequal in length as in *hispidus*". All of the many specimens of *S. hispidus* which I have seen however, have the ninth segment of the antennae slightly longer than the tenth segment. Inasmuch as the other characters noted have on the basis of the description only a relatively slight comparative value, the form scarcely merits being retained even as a variety.

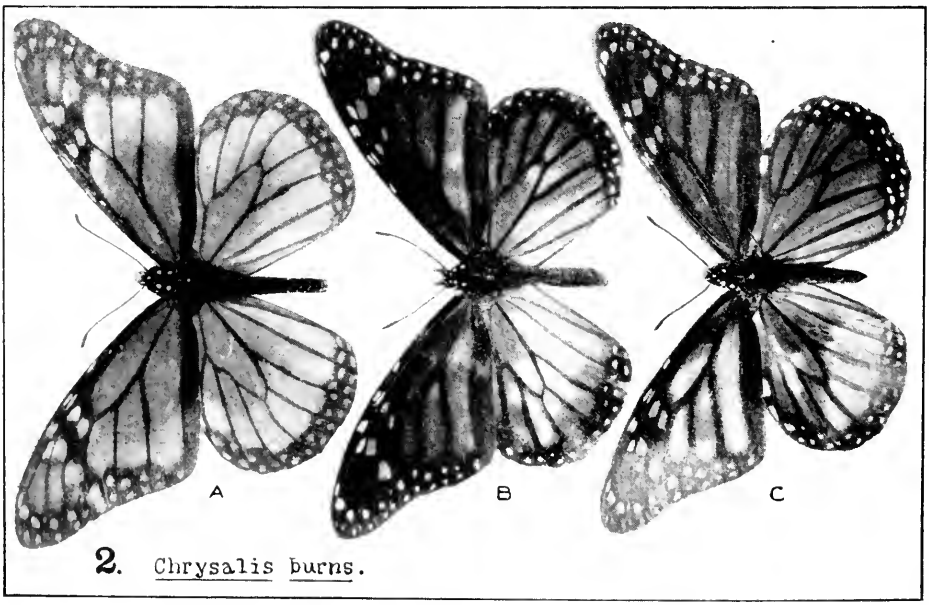
The genus *Stenotarsus* is an extremely large one numbering some one hundred and fifty species confined almost entirely to the tropical regions, only a few being found in the temperate zones. The punctuation of the elytra may be utilized to separate the forms into at least three fairly well defined groups, commencing with the well defined striate forms and ending with the irregularly punctuate forms found in North and South America. If we assume with Tillyard that the arrangement of the punctures in the form of striae represents a more primitive condition, so far as the Coleoptera are concerned, than the irregular arrangement, the trend of migration in the group is clearly indicated.

The two species found within the limits of the United States and Canada may be easily separated by the following characters.

[1] Contributions from the Samuel Mather Science Hall. Biology No. 32.

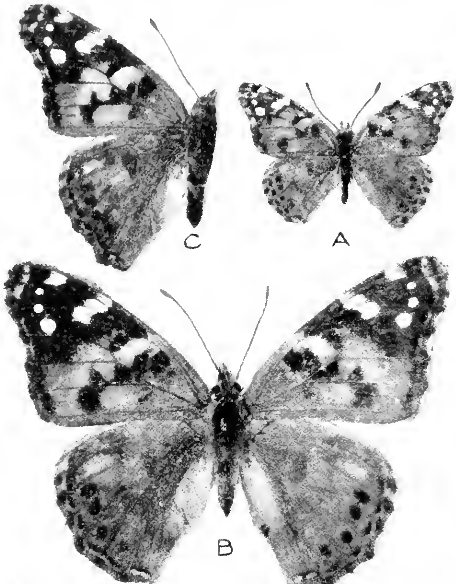


1. Hermaphrodites.

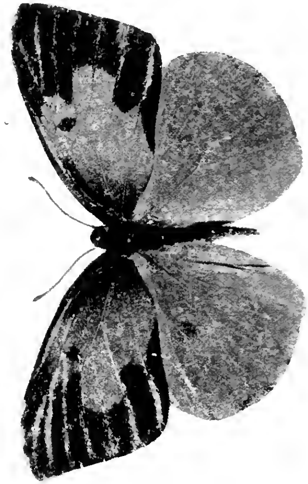


2. Chrysalis burns.

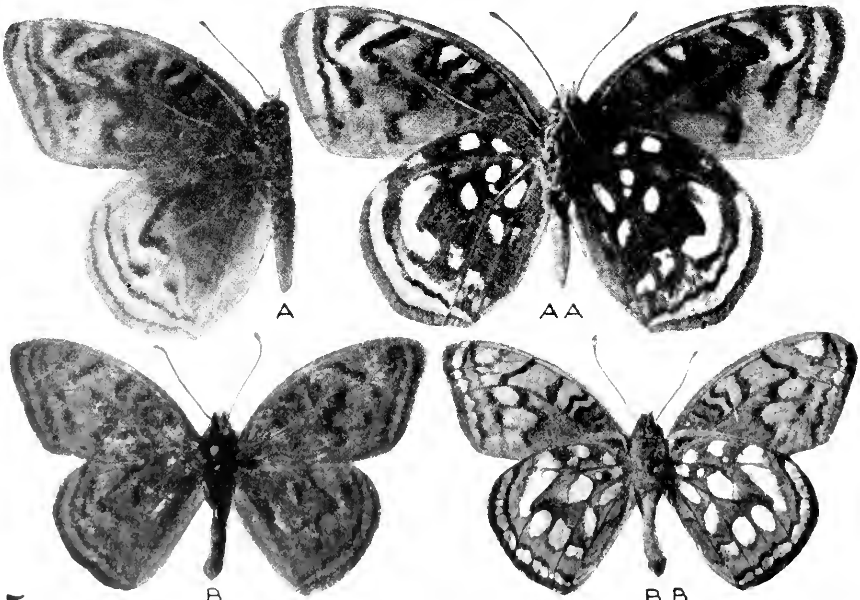
UNNAMABLE BUTTERFLIES.—GUNDER.



3. Dwarfs & Giants.

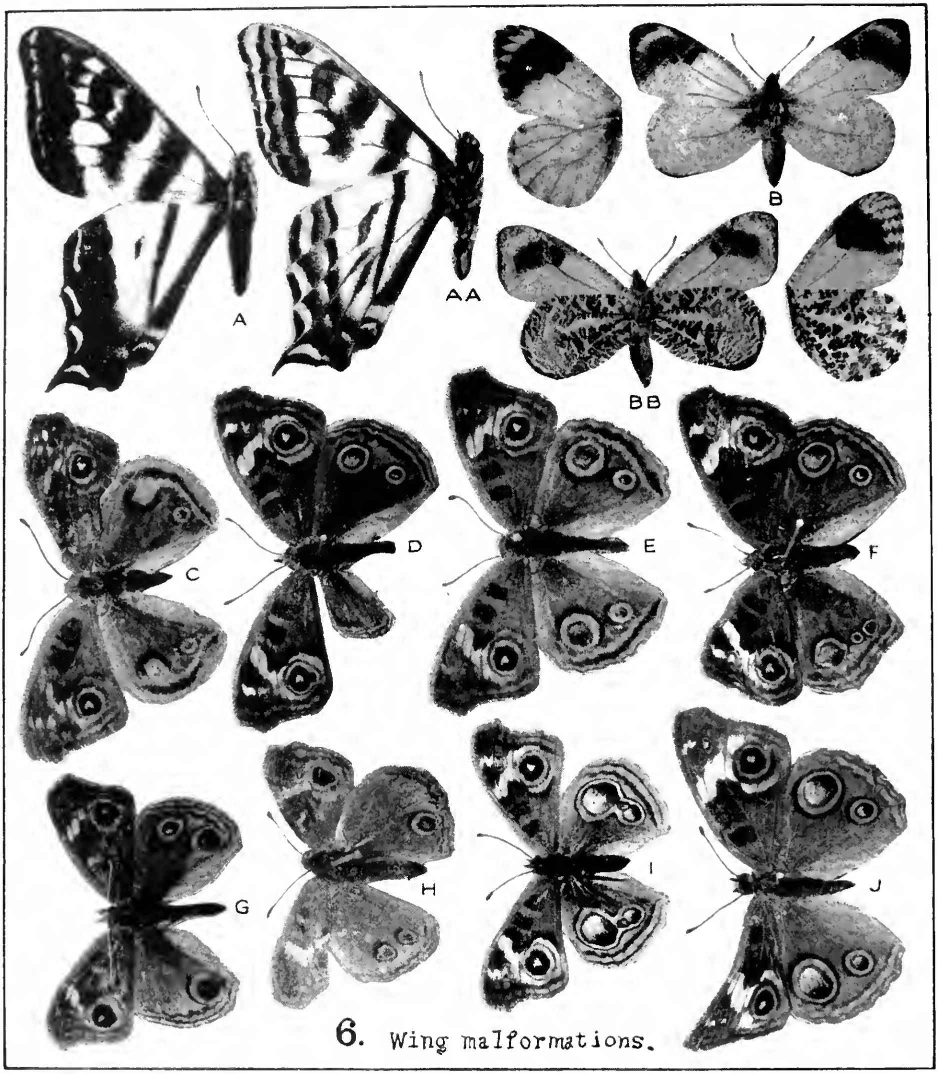


4. Rubbed specimens, etc.

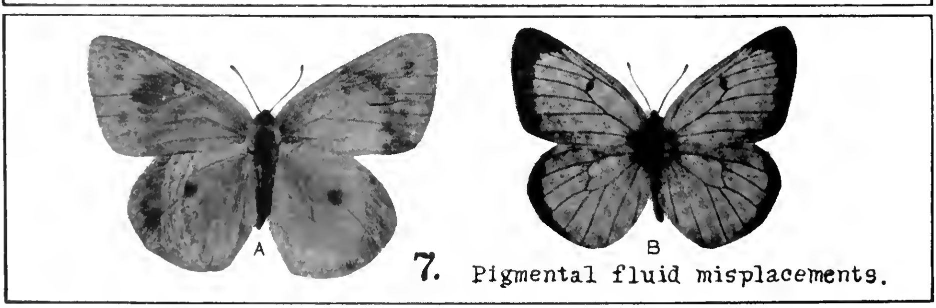


5. Venation malformations.

UNNAMABLE BUTTERFLIES.—GUNDER.

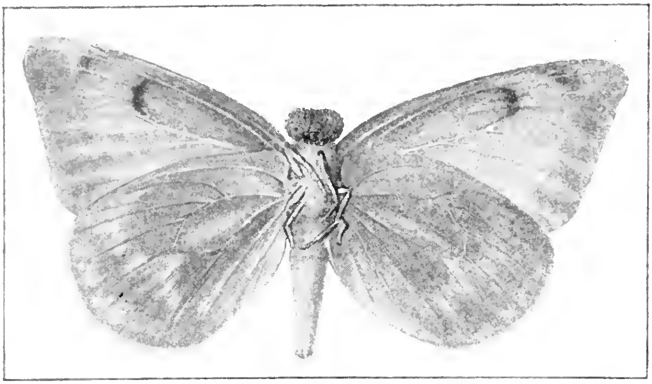


6. Wing malformations.

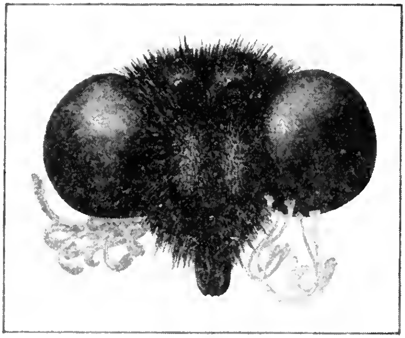


7. Pigmental fluid misplacements.

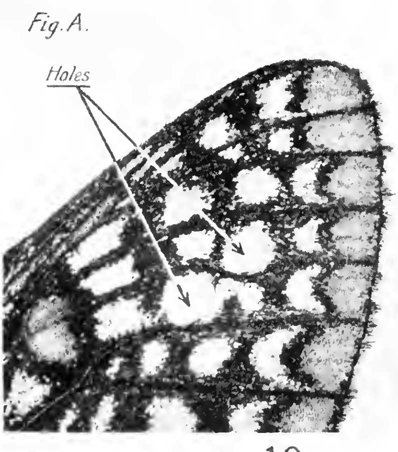
UNNAMABLE BUTTERFLIES.—GUNDER

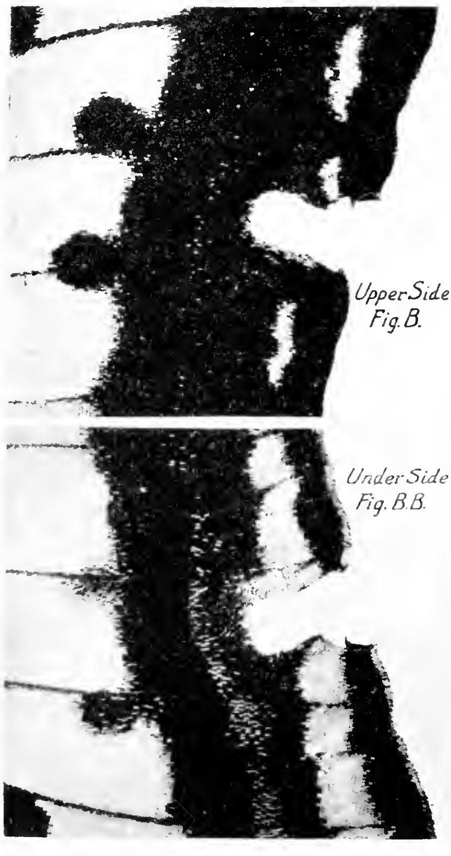


8. Monstrosities.



9. Fungus.





10. Parasitic wing punctures.

UNNAMABLE BUTTERFLIES.—GUNDER.

Table of Species.

Antennae with six distal segments black; disk of each elytron black with a narrow pale yellow border sometimes obsolete along the suture; underside uniformly pale yellow.
S. hispidus.

Antennae with seven distal segments black; dorsal surface of the body uniformly pale yellow except the eyes; abdomen and metathorax beneath with large black central area.
S. blatchleyi.

Stenotarsus blatchleyi n. sp.

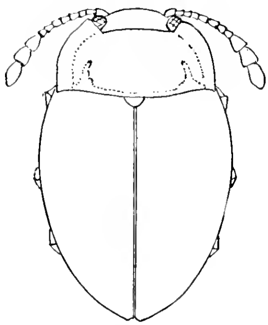


Fig. 1. *Stenotarsus blatchleyi* (x 10), from Dunedin, west cost of Florida.

Uniformly light yellow in color with the exception of the seven distal segments of the antennae, the eyes, and a central area covering the greater part of the underside of the abdomen and the metathorax, black; clothed with long yellowish hairs.

Form elongately oval, the elytra gradually narrowed behind so that an acuminate appearance is presented; legs comparatively short; antennae extending slightly beyond the posterior margin of the pro-

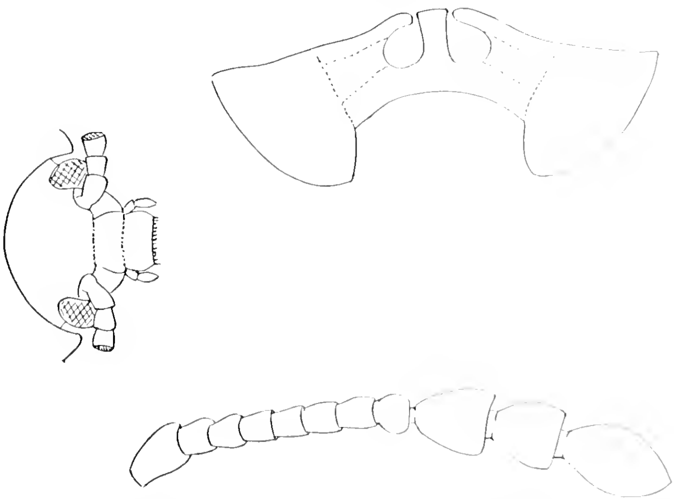


Fig. 2. *Stenotarsus blatchleyi.* (A) Underside of prothorax (x 30). (B) Antenna (right) (x 40). (C) Head (x 15).

notum, the first segment somewhat elongate, second globose, third to seventh segments slightly increasing in length, the sixth and seventh segments distinctly longer than broad, the eighth segment globose, and the ninth, tenth and eleventh segments forming a club the length of which is approximately equal to the length of segments three to eight inclusive; distal segment elongately oval and acuminate at tip.

Pronotum transverse with posterior angles slightly acute, decidedly narrowed anteriorly, central area convex, marginal lines distinct, longitudinal sulci scarcely attaining the middle, slightly convergent anteriorly, fine basal sulcus almost in contact with the posterior margin.

Scutellum punctuate, broadly triangular; elytra with prominent umbones, entire surface finely and irregularly punctuate; abdomen with first segment equal in length to the three succeeding segments, the fifth longer than the fourth segment, and the narrow sixth longer than the fifth segment.

Length, 4 mm. Diameter, 2.6 mm.

Type in collection of W. S. Blatchley. Taken at Dunedin, Florida.

I take much pleasure in dedicating this species to Mr. Blatchley who has done so much efficient work in promoting the cause of systematic entomology. It is closely related to *S. latipes* Arrow (1920) erroneously identified by Gorham in the Biologia Centrali-Americana (1899) as *S. angustulus* Gerstaecker, as pointed out by Arrow. It is to be distinguished however from that species in possessing four basal segments of the antennae which are pale yellow, in its smaller size, and in having the antennae decidedly less than half the length of the body, a characteristic however which differs in the sexes of many species of *Stenotarsus*. In *S. latipes* the two basal segments of the antennae are pale yellow, the third and fourth are pale brown, and the seven distal segments black, while the length of the individual is noted as 5.5 mm. instead of 4 mm. as in *S. blatchleyi*. A careful comparison of the two species would undoubtedly show other distinct differences.

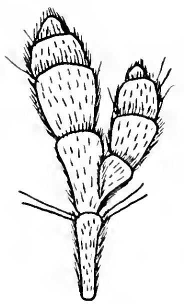
Continued careful collecting in Florida will undoubtedly yield many more subtropical species of insects particularly among the minute forms so often overlooked by the average individual interested in entomological pursuits. We should thus be quite appreciative of the results obtained by Mr. Blatchley in helping to demonstrate the value of keen observation in connection with the fauna and flora of Florida.

Bifurcation of Antenna in Balaninus (Coleop.: Curculionidae).

By Orlando Park, Whitman Laboratory, University of Chicago.

The abnormal modification of antennae has been noted previously in the Coleoptera by a number of observers, by Jayne ('80), Riley ('91), Schwarz ('90), Scudder ('91), and by Cockayne ('25) among others. Bateson ('94) lists many cases, more or less complex, originally described by G. Kraatz, Albert Mocquerys and a host of other European workers.

As a preface to future work, I wish to record another malformed antenna among Coleoptera. The specimen is a male *Balaninus rectus* Say, normal save for a deformed left antenna. As illustrated in the accompanying figure, the seventh segment of the funicle is bifurcated. Each distal, articulating surface of this swollen segment bears a three-segmented club; one of these is normal with reference to the club of the right antenna, and is obviously the true continuation of the funicle. The other club is smaller in size, partially rotated and apparently is the duplicating member. Nothing definite may be said on the symmetry involved as the normal club is a bilaterally symmetrical structure, in its major details at least, rendering any interpretation doubtful (Bateson l. c. p. 513, 548).



Abnormal antenna of *Balaninus rectus* Say.

Such a duplication of the distal end of an appendage is probably due to a chance injury at a more proximal point (Cockayne l. c., after Bateson), possibly a longitudinal incision of the structure at an earlier stage of development. Cockayne (l. c.) lists a case in *Photuris trilineata* Say, bearing a certain similarity to the one described, and the results obtained by Shelford ('15) on the labrum of *Cicindela* may indicate a possible explanation. Such malformations, in the broad sense, are not uncommon among the Caraboid, Scarabaeoid, and Cerambycoid stocks but seem to be unusually scarce among the

Rhynchophora, as has been noted by Bateson. The latter lists but two cases of simple antennal duplication among weevils, (l. c. p. 550).

The specimen was taken in the lower beach drift of Lake Michigan, alive, near Tremont, Indiana (August 29th, 1925) and is now in the collection of the writer.

LITERATURE CITED

BATESON, W. 1894 Materials for the study of variation. London.

COCKAYNE, E. A. 1925 Teratological specimens in the Hope Department of Zoölogy in the Oxford University Museum. Trans. Ent. Soc. London, pp. 395-403.

JAYNE, H. F. 1880 Some monstrosities in Coleoptera. Trans. Am. Ent. Soc., 8:155-162:1880.

RILEY, C. V. 1891 (Note) Proc. Ent. Soc. Wash., 2:181.

SCHWARZ, E. A. 1890 (Note) Proc. Ent. Soc. Wash., 2:70.

SCUDDER, S. H. 1891 A decade of monstrous beetles. Psyche, 6:89-93.

SHELFORD, V. E. 1915 Abnormalities and regeneration in Cicindela. Ann. Ent. Soc. Am., 8:291-294.

Fourth International Congress of Entomology.

Dr. O. A. Johannsen, American Executive Secretary of the Congress, has sent out the following preliminary program of the meetings to be held at the Baker Laboratory of Chemistry, Cornell University, Ithaca, New York, except when otherwise stated.

Four general sessions will be held, at which papers of broad interest will be presented by the leading entomologists of the world. The afternoons will be devoted to meetings of the following sections and subsections: 1. Taxonomy, Distribution and Nomenclature. 2. Morphology, Embryology and Physiology. 3. Ecology. 4. Medical and Veterinary Entomology. 5. Genetics. 6. Apiculture. 7. Economic Entomology: *a*. Fruit Insects; *b*. Cereal- and Truck-Crop Insects; *c*. Cotton Insects; *d*. Insecticides and Appliances; *e*. Forest Entomology.

Saturday and Sunday, August 11 and 12, Willard Straight Hall, headquarters of the Congress, will be open for registration and information.

Sunday, August 12, opportunities will be available for field excursions to some of the interesting collecting grounds in the vicinity of Ithaca, such as the sphagnum bogs at McLean. 8:00 p. m., informal gathering at Willard Straight Hall.

Monday, August 13, 10:00 a. m., first general session. Address of welcome by Dr. Livingston Farrand, President of Cornell University. Opening address of Congress by President L. O. Howard, followed by a general session. 2:00 p. m., section meetings. 8:00 p. m., smoker.

Tuesday, August 14, 9:00 a. m., general session. 2:00 p. m., section meetings. 4:30 p. m., picnic supper at Enfield Falls.

Wednesday, August 15. The Wednesday meetings will be held at the New York State Agricultural Experiment Station, Geneva, New York. (Geneva is forty miles from Ithaca by train or automobile.) 10:00 a. m., inspection of the Experiment Station. 3:00 p. m., section meetings.

Thursday, August 16, 9:00 a. m., general session. 2:00 p. m., section meetings.

Friday, August 17, 9:00 a. m., section meetings. 2:00 p. m., general session and business meeting. 7:00 p. m., banquet, charge $2.00.

Saturday, August 18, 9:00 a. m., informal meeting of sections.

General information. In Ithaca, at the headquarters of the Congress, rooms may be engaged at the university dormitories at from $2 to $2.50 a day for each person. Rooms in private houses may be obtained at $1 a day. Board is obtainable at cafeterias and restaurants on the campus, as well as at other places, for from 40 to 60 cents a meal. Suitable camping quarters are available on the campus for those who may wish to camp out. Tea will be served at Willard Straight Hall every afternoon between four and six o'clock. Motion-picture films of interest to biologists, theatricals, and other forms of entertainment are scheduled for those evenings not otherwise provided for in the foregoing program. Trips to near-by places of interest, and other forms of diversion, will be arranged for the entertainment of the women who may not be primarily interested in the entomological program.

Excursions: After the Congress the following excursions have been arranged:

Sunday, August 19, an excursion to Niagara Falls and return to Ithaca. Special round-trip rate, $7.40. Members who desire to go to Pittsburgh before proceeding to Washington may leave Niagara Falls for Buffalo and go thence by night train to Pittsburgh. This deviation from the plan will involve an additional cost for railway fares ranging from $7 to $10, depending on whether or not a sleeper is taken. The fare from Niagara Falls to Buffalo is 50 cents; from Buffalo to Pittsburgh, $9.20;

from Pittsburgh to Washington, about $10. Those who desire to omit Pittsburgh from their itinerary will return on Sunday from Niagara Falls to Ithaca.

Monday, August 20, by rail to Washington, D. C. Leave Ithaca 9 a. m. Arrive at Washington 10 p. m. Fare, $12.12.

Tuesday, August 21, to Friday, August 24, in Washington. United States National Museum; United States Bureau of Entomology; other points of interest. One afternoon at Plummer's Island.

Friday, August 24, p. m., by rail to Philadelphia. Arrive 6 p. m. Fare, $4.90.

Saturday, August 25, in Philadelphia. Academy of Natural Sciences; American Entomological Society.

Sunday, August 26, field excursion to the New Jersey Pine Barrens.

Monday, August 27, the Japanese Beetle Laboratory at Moorestown and Riverton. Afternoon—continue from Riverton via Trenton to New York. Arrive 6 p. m. Fare from Philadelphia to New York, $3.24.

Tuesday, August 28, to Boston by motor bus. Fare, $3 and above.

Wednesday, August 29, in Boston. Museum of Comparative Zoology; Boston Society of Natural History; the Corn-Borer Laboratory at Arlington.

Thursday, August 30, in Boston. Bussey Institution of Harvard University; Arnold Arboretum; the Gypsy Moth Laboratory at Melrose Highlands. To New York via steamship, fare $4 to $5 (stateroom $1 and above).

Friday, August 31, in New York. Brooklyn Museum; New York Zoological and Botanical Gardens.

The total cost of this excursion, including board, room and railway fares, need not exceed from $90 to $100. If either Pittsburgh or Boston (including Melrose Highlands) were omitted, the fares would be $10 less. In most cities rooms without bath may be obtained as low as from $2 to $3 a day. Board will average $1.50 and upward a day.

Indications are that this will be a record meeting. Nearly a hundred European entomologists have already signified their intention of coming, and many more are expected.

Return sailings to Europe on either English or Dutch lines, Saturday, September 1. Those omitting the excursion to Philadelphia or Boston may sail on August 25.

Inquiries regarding housing and local entertainment should be addressed to the chairman of the Committee on Local Entertainment, Dr. P. W. Claassen, Cornell University, Ithaca, New York.

New Synonymy (Lep.: Saturnidae).

CALLOSAMIA SECURIFERA Massen.

1873 *Samia securifera* Massen, in Massen & Weymer Beiträge zu der Schmetterlings Kunde, ff. 50, 51, Central America.

1908 *Callosamia angulifera* Walker, Var. *Carolina* Jones Ent. News, XIX, 231.

1909 *Callosamia carolina* Jones, Ent. News, XX, 49 pl. III, ♂ & ♀ pl. IV, Cocoons.

The figures in the *Beiträge* are rather crude, but easily recognized as the form described by Jones. In the illustration of the male, the discal marks on the primaries are much more conspicuous than in the type of *carolina*, but this a variable feature in the genus *Callosamia*. Jones, in his description of the male, says "discal mark on primaries, yellow and prominent, on secondaries absent or very faintly indicated." The type males in the collection of the Academy of Natural Sciences of Philadelphia, may be less conspicuously marked than the average; I have bred some male *prometheus* with large discal marks, some without any. I have also bred a female *prometheus*, without any discal marks on any wings (ab. ♀ *caeca* Ckll.).

The suffused color of the inferiors of the male on both upper and under surfaces is a good distinguishing character.

Massen in his short denomination of the species writes "probably the southern form of *angulifera*," but I can see no reason why *securifera* should not have specific rank. The life history is not the same as *angulifera*, and as species go, it is as good as any other. Besides the ♂ type and ♀ allotype of *carolina* from South Carolina, we have 2 ♂ ♂ and 2 ♀ ♀ from Mobile, Alabama, collected by Mr. W. C. Dukes. They all match Massen's figures very well.

FRANK HAIMBACH, Acad. Nat. Sciences, Philadelphia.

Personals

Dr. Carlos E. Porter, of Santiago, Chile, editor of the *Revista Chilena de Historia Naturale*, has been elected president of the Entomological Society of Spain.

Prof. James S. Hine, of Ohio State University, and Dr. Annette F. Braun, of Cincinnati, have been elected President and Vice President respectively, of the Ohio Academy of Science. (*Science*, May 25, 1928.)

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

GENERAL.—**Burger, O. F.**—Obituary note. [39] 11: 52. **Claude, Joseph F.**—Recherches biologiques sur les Prédateurs du Chili. [Ann. des Sci. Nat., Zool.] 11: 67-207, ill. **Cresson, E. T.**—Biography by P. P. Calvert. A contribution to the history of entomology in North America. [1], 53, Suppl.: 1-63, ill. **Curtis, W. P.**—Nomenclature. [21] 40: 59-60. **Eidmann, H.**—Insekten als haarschmuck in China. [49] 17: 46-49, ill. **Graves, P. P.**—Dr. Verity's nomenclature; a reply. [21] 40: 56-57. **Hingston, R. W. G.**—Field observations on spider mimics. [93] 1927: 841-857, ill. **Horn, W.**—Et meminisse et vaticinari liceat. Ueber sanierungs-gedanken. [49] 17: 87-90. **Howard, C. W.**—Obituary. [4] 60: 101-102. **Lhoste, L.**—Note sur la faune entomologique des graines. [Misc. Entom.] 30: 94-96. **Lutz, F. E.**—Little "Beasts of prey" of the insect world. [15] 1928: 188-190, ill. **McAtee, W. L.**—Automatic nomenclature. [10] 30: 72-76. **Robertson, C.**—Localities of insects collected by Charles Robertson. [5] 35: 61. **Scriba, F.**—Obituary. [17] 45: 5. **Stiles & Hassall.**—Key-catalogue of insects of importance in public health. [U. S. Hygienic Laby.] Bull. 150: 291-408. **Pic, M.**—Evolution descriptive, variétisme. [Miscel. Ent.] 30: 86-90. **Weiss & Ziegler.**—The entomology of Hooke and Leeuwenhoek. [6] 36: 95-104.

ANATOMY, PHYSIOLOGY, ETC.—Bischoff, H.—Zur frage des kopfaustausches und der instinktveränderungen bei insekten. [34] 76:204-208. **Cleveland, L. R.**—Further observations and experiments on the symbiosis between termites and their intestinal protozoa. [92] 54:231-237. **Eckardt, G.**—Zur frage des melanismus durch einwirkung von fäulnisgasen. [18] 21:405-407. **Frisch, K. v.**—Versuche über den Geschmackssinn der Bienen. [Die Naturwissenschaften] 16; 307-315, ill. **Gabritschevsky, E.**—Expériences sur le déterminisme et la réversion des caractères polymorphes larvaires de Miastor metroloas. (Cecidomyidae) [25] 1928:75-79. **Keys, A. B.**—Ectoparasites and vitality. [90] 62:279-282. **Kleinschmidt, O.**—Die formenkreislehre und das weltwerden des lebens. [Die Formenkreislehre] 1926:1-188, ill. **Kuhnelt, W.**—Ueber den bau des insektenskelettes. [89] 50:219-278, ill. **Peacock & Gresson.**—The rôles of the nurse-cells, oocytes and follicle-cells in Tenthredinid oogenesis. [Quart. Journ. Micr. Sci.] 71:541-561, ill. **Schmalfuss, H.**—Zum neuzeitlichen Melanismus bei schmetterlingen. [18] 21; 453-454. **Seidel, F.**—Die determinierung der keimanlage bei insekten II. [97] 48:230-251, ill.

ARACHNIDA AND MYRIOPODA.—*Chamberlin, R. V.—Notes on spiders from the La Sal Mountains of Utah. [4] 60: 93-95. **Hassan, A. S.**—The biology of the Eriophyidae with special reference to Eriophyes tristriatus (Nalepa). [67] 4: 342-394, ill.

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Comments on the Odonata Recorded in "A List of the Insects of New York." (See the NEWS for April, p. 135.)

The 159 species of Odonata recorded from New York State in the long awaited "List of the Insects of New York", represent an imposing array of material and State records. For means of judging the completeness of this work, the following figures may be of significance:

Region	Authority	Date	No. Species
World	Muttkowski	1910	2,631*
North America	Muttkowski	1910	494*
New England States	Howe	1920	156
Michigan	Byers	1927	131
Indiana	Williamson	1917	125
Connecticut	Garman	1927	112

* Includes subspecies.

Of particular interest to me is the large number of southern species included, names such as *Agrion amatum*, *Lestes vigilax*, *Argia bipunctulata*, *Ladona deplanata*, *Libellula flavida*, *Libellula vibrans* and *Pachydiplax longipennis*, although not unrecorded from the north, are ones that we more naturally associate with the Dragonfly fauna of the south-eastern states.

There are several errors in the list that I would like to mention, more for the sake of the avoidance of confusion than in the spirit of fault finding. On the bottom of page 45, the first genus mentioned is that of *Calopteryx* Burmeister. The genus *Calopteryx* was judged, some eighteen years ago, by the Commission on Nomenclature of the International Zoological Congress to be a synonym of *Agrion* Fabricius. Hence the word *Agrion* should be subsituted for that of *Calopteryx* wherever the latter appears. Page 48, line 8 should read *E. vesperum* Calv. and not *E. hesperum* Calv. Likewise, page 51, the last line should read *A. tuberculifera* Wlk., not *A. tuberculata* Wlk. The genera on page 46 from line 12, to page 48, including *Anomalagrion* on page 49, have been included in the Damselfly family *Agrionidae*, I know of no modern list of Odonata that does not place these genera in a separate family, that of the *Cocagrionidae*. It is, therefore, my belief, that the words, Family *Coenagrionidae* Kirby, should be added on page 46 following the genus *Hetaerina*, and preceding the genus *Lestes*.

Two other matters pertaining to this list of Odonata present themselves at this time. It was my privilege to work on the Odonata collections at Cornell University during the winter of 1926-27, after the list in question had been compiled. During the progress of this work I determined that the species listed on page 48, line 21, as *N. carlotta* Butler is in reality a synonym of *Nehalennia irene* Hagen. Also, that the species, *Gomphus cornutus* Tough, listed on page 50, line 14, a record based on a single specimen from the McLean Reservation, is a misidentification for *Gomphus furcifer* Hagen. *Gomphus cornutus*, as far as I know, occurs only in Michigan and Wisconsin.

C. Francis Byers, Dept of Biol., Univ. of Florida.

Leaf-Mining Insects. By James G. Needham, Stuart W. Frost, Beatrice H. Tothill. Baltimore: The Williams and Wilkins Company, 1928. Pp. 351. 91 figures. 3 plates.

Under this title, the authors have brought together a wealth of general information on the subject of leaf-mining larvae in the four orders, Lepidoptera, Coleoptera, Diptera and Hymenoptera. The first two chapters are of a general nature and deal with such topics as the leaf as a dwelling place, the types of leaf-mining larvae, the general tendencies in evolution of a form of body adapted to leaf-mining, the mines themselves, the origin of the leaf-mining habit and its intergradation with other habits, extent of the leaf-mining habit and preferred plant hosts. They contain such usable features as a classification of mines and the relation of mining operations to leaf structure, a table (p. 35) for separating the larvae of the four orders and general directions for collecting and rearing leaf-miners. The last topic could well have been somewhat enlarged upon in a book which contains so much of interest to the field worker.

Chapter III is devoted to the Lepidoptera in general and the succeeding eight chapters deal with those subdivisions of this order in which the leaf-mining habit has developed. The plan is to describe in general each group (egg, larva, pupa, adult), the character of the mining operations and point out the particular modifications and adaptations to the mining habit shown, followed by examples of representative members. The widespread development of the mining habit in the Lepidoptera is indicated by the proportion of the book given up to this order—140 pages out of a total of 280 pages of text matter.

The same plan is followed in the other three orders, Coleoptera (Chapter XII), Hymenoptera (Chapter XIII), Diptera (Chapter XIV). In these orders, tables and keys to species which should be of value to the worker are included.

The steps in the specialization of form for the leaf-mining habit, more particularly as shown by Lepidopterous larvae, where the extreme of modification is exhibited in the mouthparts of the sap-feeders, the remarkable convergence in form in the mandibulate leaf-mining larvae, and adaptation of larval habits to the mining life, briefly outlined in the first chapter, furnish abundant material of interest to the general biologist and the student of evolution, and are ably presented by the authors in the general chapter on Lepidoptera (Chapter III) and in the general parts of the chapters devoted to the other three orders.

To the field worker, whether he be ecologist, amateur student of nature, plant pathologist or economic entomologist, those parts of the general chapters which deal with the individuality of mine, which enables recognition of a genus, or even of a species within it, and the general descriptions of mining habits under each group, will be of especial interest and value. Some of the generalizations given under mining habits may require modification with increasing knowledge (*e. g.* in *Bucculatrix*). Again the facts scarcely warrant the distinction made (cf. pp. 19, 20) between the form of mines of the same general type in firm and soft leaves, as both forms may occur on the same leaf.

Valuable features of the book to the outdoors observer are the lists of leaf-mining insects and their hosts (Chapters XV and XVI). It seems to the reviewer that here it would have been advisable to append a note to the effect that the list includes those species of which there is a definite record of mining habit; the omission of many species (even where food plant is known) in genera of leaf-mining habits may cause confusion and misconception in the mind of the inexperienced worker to whom complete lists of species and bibliographical references are not available. *Epermenia* appears to be omitted from the list of leaf-mining Lepidoptera, and *Gracilaria alnivorella* and *G. purpuriella* are erroneously listed under *Scythris.*

The bibliography will be an invaluable aid to the student, and brings together, particularly in the Microlepidoptera, a great proportion of the papers dealing with the group.

It is unfortunately necessary, in a book whose conception and treatment have so much of merit and value, to point out some of the blemishes and errors. The tremendous number of typographical errors, especially in the scientific names throughout text and lists, is much to be regretted; it is impossible to enumerate these. The omission of words and the use of a word with opposite meaning to the one intended occur in several instances, but the context will generally indicate the correction. In the bibliography, obvious errors in transcribing references appear. Figure 2, purporting to be an illustration of *Lithocolletis hamadryadella,* does not represent that species, which is correctly delineated by figure 43, but more probably represents *L. macrocarpella.* Figure 51 more likely illustrates the mine of *Psacaphora terminella,* and not that of a *Cosmopteryx.* The second species mentioned under the family Cycnodiidae (p. 151), the bulrush leaf-miner, is a Gelechiid, *Aristotelia robusta,* and not a species of *Aphelosetia* (*Elachista*); it is referred to its correct position in the list.

The book forms a valuable addition to our entomological literature on a little-known subject, and students owe a debt of gratitude to the authors for gathering together in accessible form this mass of information.—Annette F. Braun.

OCTOBER, 1928

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CHARLES ROBERT OSTEN SACKEN,
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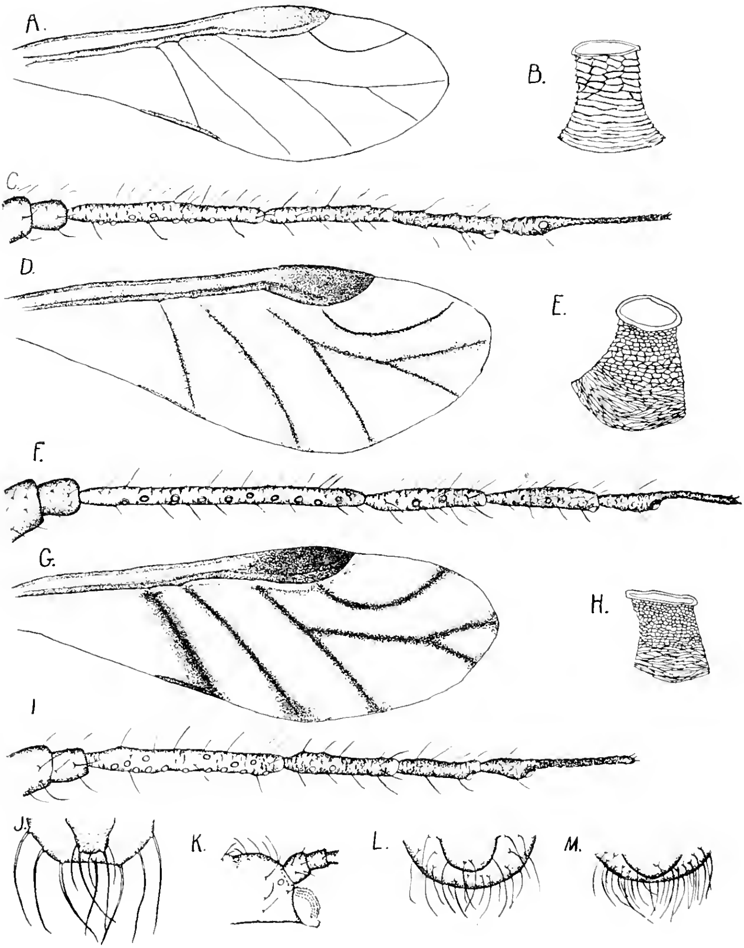

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NEOTHOMASIA UTAHENSIS N. SP., D-F, K, L.
NEOTHOMASIA POPULICOLA, G-I, M.
KNOWLTON.

ENTOMOLOGICAL NEWS

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Notes on a Few Species of Neothomasia from Utah[1] (Homop.: Aphididae).

By George F. Knowlton, Logan, Utah.

(Plate XI.)

Neothomasia salicinigra Knowlton. (Plate XI, figs. A-C, J.)

This dusky aphid was collected in Cedar Canyon, Utah, during the summer of 1925. The collection was made on willow at an elevation of 7000 feet, the aphids feeding on the bark of small twigs.

Alate vivipara.—Body black, rather broad and 1.35 to 1.75 mm. long; rostrum scarcely reaching second coxae; head broad and rounded in front; antennae black, except base of III, and armed with rather long curved sensilla; antennal III, 0.34 to 0.37 mm. long, with 8 to 10 wide-margined sensoria in irregular to scattered row; IV, 0.2 to 0.25 mm., with 0 to 3 sensoria; V, 0.17 to 0.21 mm., occasionally with one secondary sensorium; VI, 0.29 to 0.36 (0.09+0.2 to 0.1+0.26) mm.; legs rather short, dusky to black; wing venation typical; veins dark with membrane slightly dusky; abdomen with dark bands in dorsal surface, and with dark areas on the sides; cornicles short, 0.09 to 0.11 mm. long, with closed reticulations over much of the surface and with a moderate flange; cauda rounded to slightly elongate, and without constriction; anal plate broadly rounded.

This species resembles *Neothomasia salicicola* (Essig) in many ways. The winged form differs from the latter particularly in the following respects: antennal segments longer; sensoria more numerous on antennal III and sometimes occurring on IV and V, also; head more flattened across the front; cauda shorter and broader.

[1] Contribution from Department of Entomology, Utah Agricultural Experiment Station, Logan, Utah. Approved for publication by Director.

Neothomasia utahensis Knowlton, n. sp. (Plate XI, figs. D-F, K, L.)

This aphid was present in large colonies on the bark of willow (*Salix* sp.) at Hyde Park and North Logan, Utah, on June 22, 1925. The small twigs were most commonly attacked well out toward the tips, and the aphid colonies very frequently extended on to the tender new growth. Some of the aphids were feeding on the leaves and their petioles, but bark feeding was much more common. The aphid colonies were attended by a great number of ants of the species *Formica rufa.*

This aphid very much resembles *Neothomasia salicicortices* (Essig), but the winged form differs from the latter in the following respects: antennal III usually longer and with fewer sensoria; base of antennal VI shorter, with filament noticeably longer than base; anterior margin of head less rounded; wing veins and the marginal shading noticeably darker.

Alate vivipara.—Body wide, more or less dorso-ventrally compressed and armed with long prominent hairs; size 2 to 2.6 mm. long; head and thorax black; anterior margin of head rather straight with a slight median depression; antennae attached in a slight depression under margin of the head; rostrum reaching third coxae; antennae dusky to black, with proximal three-fourths of III, and a narrow band at distal ends of III, IV, and V yellowish; antennal III, 0.5 to 0.55 mm. long and armed with 9 to 13 round sensoria, the average being 11 to 12; IV, 0.25 mm., with one to three sensoria; V, 0.21 mm., occasionally with one secondary sensorium; VI, 0.1+0.14 mm.; legs of moderate length, hind tibiae 1.1 mm. long; front wings with media twice branched, and with dusky shading along each side of the dark veins, hind wings with both media and cubitus present, dusky and very faintly clouded along their margins; abdomen dusky brown, with dark bands on the dorsum and black areas on the sides of the segments; cornicles black, truncate, 0.1 mm. long, with closed reticulations over much of the surface; cauda black, rounded, armed with four long hairs; anal plate black, broadly rounded, armed with numerous long hairs.

Type in the collection of the writer. Paratypes are in the U. S. National Museum.

NEOTHOMASIA POPULICOLA (Thomas). (Plate XI, figs. G-I, M).

This is one of the most common aphids infesting Utah poplars. The infestation often becomes very severe. The aphids attack the bark on the twigs and become numerous on the leaves and petioles. Leaves of balsam poplars at Smithfield were heavily infested with this species during the fall of 1926.

Collections have been made on *Populus angustifolia, P. balsamifera, P. tremuloides,* and *Salix fluviatalis.*

Alate vivipara.—Body black and armed with long, curved hairs; rostrum reaching second coxae; antennae black, with proximal four-fifths of III lighter; antennae inserted slightly under margin of head; antennal III, 0.3 to 0.38 mm. long and armed with 12 to 20 round sensoria; IV, 0.2 to 0.25 mm., with two or three sensoria; V, 0.17 to 0.2 mm.; VI, 0.1 + 0.19 to 0.11+0.21 mm.; wing venation typical, veins dusky; front wings with dusky to black shading along the veins and at tips; legs moderately long; abdomen blackish with darker bands on dorsum and black areas on the sides; cornicles short, yellowish to dusky, 0.1 mm. long, with closed reticulations over much of the surface; cauda rounded; anal plate broadly rounded.

Apterous vivipara.—This form has a large yellowish Y-shaped area on the abdomen.

In Utah, this species has been collected from Bellevue, Benjamin, Brigham, Eden, Emigration Canyon, Farmington, Garden City, Leeds, Logan, Payson, Providence, Provo Canyon, Saint George, Salina, Salt Lake City, Smithfield, Tremon, and Zion National Park. The writer has also collected his aphid from the Kaibab Forest, Arizona; Emigration Canyon and Paris, Idaho; Savage, Minnesota, and St. Croix Falls, Wisconsin.

Explanation of Plate XI.

Neothomasia salicinigra Knowlton. *A,* wing; *B,* cornicle; *C,* antenna; *J,* cauda and anal plate. *N. utahensis* Knowlton, n. sp., *D,* wing; *E,* cornicle; *F,* antenna; *K,* head; *L,* cauda and anal plate. *N. populicola* (Thomas), *G,* wing; *H,* cornicle; *I,* antenna; *M,* cauda and anal plate. All down from alate females.

Museum of Comparative Zoology Reopened.

Agassiz Museum, the Harvard University museum of comparative zoology, was opened again to the public beginning June 19, following the first extensive remodeling it has had in fifty years. (*Science,* June 22, 1928.)

Florida Dragonflies Captured by the Automobile.

By C. Francis Byers, Dept. of Biology, University of Florida.

In a recent article on, "The Automobile vs. Insects", (Ent. News, Vol. 38, No. 2-3), A. O. Larson points out the importance of these machines in the collecting and distribution of insect life, especially in the orders of Lepidoptera, Coleoptera and Diptera.

This past fall (Oct.-Dec. 1927), I was very much impressed by the large number of insects on the radiators of the automobiles parked along the streets of Gainesville and on the Campus of the University of Florida. While the predominating forms to be found in this peculiar "habitat" were members of the orders indicated by Dr. Larson, the large representation of Odonata was noteworthy and came as somewhat of a surprise. Being particularly interested in Dragonflies, I mystified many a peace loving citizen of this fair town by suddenly darting out from the side walk and snatching a somewhat, more or less, disreputable "mosquito-hawk" from a way-side Buick, Dodge or Nash. If the find was a good one, I would remain to determine from the driver of the car the probable date and locality of the capture, all of which were in the Gainesville region, certainly not out of Alachua County.

Through the above process several very interesting facts and theories came into being, and a rather select list of Odonata were obtained, as follows:

1. Anax junius (Drury). Two nearly perfect specimens were taken, one, a male, on November 3rd; the other a female, on December 5th. While these were the only two specimens actually collected, the remains of others, too mutilated to be available, were recorded. The species is a very common one in this region in the autumn.

2. Gynacantha nervosa Rambur. One female taken from an automobile in the spring of 1924; not represented in the 1927 collection. It was frequently seen on the wing, however. (Byers. Ent. News, Vol. 38, p. 319.)

3. Gynacantha bifida Rambur. Early in morning of October 10th, a female specimen of this species was found on

a Buick roadster. The muscles of the body were still soft, though the insect was apparently dead. *G. bifida* is a typically tropical Odonata, and while its occurrence in Florida has previously been noted, it is extremely rare in this part of its range. It seems to be a general phenomena that insects of tropical distribution work their way north in Florida during the fall months.

4. Tricanthagyna trifida (Rambur). The addition of this form to the list of Dragonflies captured by Gainesville motorists was perhaps the most noteworthy of all those made. Its twilight flying habits together with its swiftness and agility have caused its appearance in collections to be necessarily rare. However, the automobile has succeeded in overcoming both of these obstacles to collection, and consequently *T. trifida*, was well represented among the Dragonflies falling victim to this peculiar collecting means. A male specimen was taken still alive from a gutter beside a parked car, on October 21st. A male and a female were found on one radiator on the morning of October 24th. On December 10th three *teneral* specimens were secured from a Nash. All during the fall this species seemed to be quite common along toward early evening. One unlucky individual was observed in a theatre and still another in Church. The collection of tenerals in December seems to indicate that their emerging period is in the fall, an idea borne out by their increasing numbers during the fall months. The first of the above listed specimens of this species was very hard to distinguish from *T. caribbea,* especially while it was still alive.

5. Somatochlora filosa (Hagen). One male secured on November 11th. *S. filosa* is the only member of this genus in the south-eastern states, and while fairly plentiful in Georgia, its occurrence in Florida has always been considered rare.

6. Erythemis simplicicollis (Say). A common species of Odonata in the Gainesville region. Well represented in the 1927 Automobile collection, though too mutilated to bother, in most cases, removing from the cars.

7. Sympetrum corruptum (Hagen). One male was

found on the radiator of a Chrysler, parked near Science Hall, University of Florida Campus, late in the afternoon of November 9th. To the best of my knowledge this is the first record of the capture of this common northern species as far south as the state of Florida. The owner of the car assured me that he had not been driving far out of Gainesville for the past several days. This is, therefore, a new Florida record.

8. PACHYDIPLAX LONGIPENNIS (Burmeister). A very common southern Dragonfly, well represented on the automobile radiators, both whole and in part.

9. TRAMEA CAROLINA (Linne). Another fairly common victim of our mechanical trap.

10. PANTALA FLAVESCENS (Fabricius). Although none of these adroit cosmopolitan Odonata were observed flying, two of them were found on machines. One male on a Buick, November 11th; another on a Nash, December 2nd. Both of these specimens were in good condition and were apparently recently killed.

These ten species complete the list of Dragonflies that I have collected from automobiles around the city of Gainesville, in the fall. On examination of the data, several interesting points come to light:

1. All the species represented are strong flying and agile forms. Especially is this true of *Anax, Gynacantha, Tricanthagyna, Somatochlora, Tramea* and *Pantala.*

2. The listed species are usually all wanderers. The pond-loving *Zygoptera, Plathemis, Perithemis,* etc., or the woods-loving *Libellula* were not captured, apparently, by automobiles. From which observation a moral could be derived.

3. The automobiles upon which these Odonata were found were all of the higher powered types. The Fords and Chevrolets were not overly successful, in this respect at least.

4. The number of individuals and species comprising the 1927 Automobile list, I believe to be in excess of the average number that usually fall victims to this agent.

It was in an effort to account for these points that I tried to find out just where the automobiles were being driven and under what conditions. Accurate data was impossible to secure. However, about four miles south of Gainesville, there is a peculiar ecological habitat covering some twenty-five square miles, known as "Payne Prairie" or "Alachua Lake". At one time in its history this locality was covered with water and was a true lake. Since that time, however, due to the vicissitudes of underground limestone drainage, most of the water of the old lake has drained off, leaving a semi-marsh condition with occasional pools of open water, surrounded with luxuriant growths of water-hyacinth. A paved road from Gainesville to Ocala extends, on an artificial embankment, for nearly three miles across this marsh. The drive across the Prairie is a popular one with the Gainesville motorists, especially the students; while speeding over the three mile stretch is the rule of procedure if one has a high powered car. It is to this that I attribute much of the success of the automobile in collecting Odonata in the Gainesville vicinity.

Pyrgus* centaureae and freija (Lep.: Hesperiidae).

By A. W. Lindsey, Denison University, Granville, Ohio.

The suggestion by Mr. B. C. S. Warren that the species commonly known as *Hesperia centaureae* Rambur is in reality made up of two distinct species and his application of the name *freija* to the supposedly undescribed species have caused no little comment among systematists interested in the Hesperioidea in the United States. Mr. Bell's summary of the case (Ent. News xxxvii, 109-110, 1926) first attracted my attention seriously to the problem, for at that time I had no *centaureae* from New Jersey and suspected that my material might include nothing but *freija*. Since the publication of Mr. Bell's paper I have secured two specimens from New Jersey and enough material from Labrador and Lapland to make my series adequate for the serious consideration of the validity of the two names.

* Since Hubner's Tentamen has been officially discarded *Urbanus* cannot be used in place of *Hesperia* Auct. *Pyrgus* is the next available name.

In order to avoid personal bias as much as possible I have studied over these specimens at intervals for a year. From time to time I have made microscope slides of the genitalia of specimens which seemed to present significant superficial characters.

As a summary of Warren's distinctions between *freija* and *centaureae* I can do no better than to refer to Bell's paper cited above or to Warren's *Monograph of the Tribe Hesperiidi* (Trans. Ent. Soc. Lond. 1926, Part I). It seems unnecessary here to consider in detail the differences said to exist between the two species.

In going over my material I find it possible to pick out specimens of *freija* Warren from Lapland, Hayden Peak, Colo. (13,000 ft.), and Nain, Labrador, but upon examining their genitalia I find that only the specimen from Hayden Peak shows any real resemblance to Warren's figure of the genitalia of *freija* (Trans. Ent. Soc. Lond. LXXIV, pl. XV, fig. 2). The broad terminal part of the clasp to which Warren has applied the name cuiller shows in this slide a prominent dorsal point, but its ventral margin is so strongly convex that it bears a much greater resemblance to his figure of the genitalia of *centaureae* (loc. cit. fig. 1). The most striking slide in my possession is from a Lapland insect; in this slide the left cuiller is nearly identical with Warren's figure under the name *freija* while the right cuiller bears more resemblance to that of *centaureae*.

Likewise I have picked specimens which appeared to be *freija* on the dorsal surface according to characters given in Warren's monograph, only to find that the lower surface might be characteristically like the figures of *centaureae*. It is a bewildering situation which leads me to the conclusion that we cannot have two valid species here.

I have not the slightest doubt that it is possible to find specimens which show the characters described by Warren. My objection is wholly directed against their interpretation. Here we have a species circumpolar in distribution, extending far to the south on our continent at high altitudes. My series of fifty specimens represents all of the localities and dates ascribed to *freija*, yet I am forced to conclude that I have no specimens which agree in all particulars with the description of *freija*. If then, we have *centaureae* and *freija* in exactly the same regions of North America at exactly the same time, it seems doubtful that they are pure species. In Europe, according to Warren's data, *centaureae* occurs farther south than *freija*. Is it not possible that the conditions which favor the appearance of the characters of *centaureae* are normal at lower latitudes and either rare or occasional at higher latitudes and altitudes? The fact that Bell refers his New Jersey specimens unhesitatingly to *centaureae* still further suggests this possibility. My own two specimens from Great Notch, N. J., bear out this view although their dorsal maculation savors strongly of *freija*.

Under ordinary conditions it seems inadvisable to deny the existence of species like these. We must admit that the New Jersey *centaureae* are as rigidly separated from those of Labrador or Lapland as if they were actually different species, and isolation under different conditions may well develop them in time into distinct species. But when no isolation of space or time can be demonstrated I fail to see the process by which anything more than a variable species can be developed. The rigorous climates in which these insects live are an adequate guaranty of extreme variability and there is no known barrier to the free interbreeding which would maintain a common level of development including their wide range of variation.

From a sound biological point of view it seems that *freija* and *centaureae* must be regarded as the same species, and in my own material there is nothing to indicate that even varietal names are desirable. It is certain that other data than can be derived from the study of adult specimens are necessary to prove the existence of more than one species.

Dr. Herbert Osborn, research professor at the Ohio State University, by vote of the fellows of the Entomologicol Society of America has been elected to honorary fellowship in the society. Other honorary fellows are C. J. S. Bethune, J. H. Comstock, S. A. Forbes, L. O. Howard and E. A. Schwarz. (*Science*, July 20, 1928.)

An Additional Annotated List of the Ants of Mississippi.

With a Description of a New Species of Aphaenogaster (Hym.: Formicidae).*

By M. R. Smith, A. and M. College, Mississippi.

In a previous paper (Ent. News, Vol. 38, pp. 308-314, (1927), 11 species of ants were recorded as new to the state, thus making a total of 87 species for Mississippi. In the present article 19 additional species are listed, one of these being a new subspecies of *Aphaenogaster texana* Emery, which is subsequently described.

Descriptions are given for the female of *Pheidole dentigula* M. R. Smith and also for what is apparently the male of *Sysphincta pergandei* Emery.

The species are not only numbered and listed below according to their respective subfamilies but are also accompanied by the usual biological notes.

Subfamily Ponerinae.

88.—Sysphincta pergandei Emery.

♂ Length: 3.6 mm. Head, excluding the mandibles, slightly broader than long when measured from side to side thru the center of the eyes, posterior border and posterior angles strongly rounded. Vertex with 3 prominent ocelli, the distance between one of the lateral and the median ocellus less than that between the two lateral ocelli. Eyes large, elliptical, and convex, the interior borders of each almost parallel with one another. Cheeks, due to the extensive size of the eyes, poorly developed. Clypeus strongly protuberant medianly, the posterior border extending as a sharp angular point past the insertions of the antennal scapes. An apparently faint furrow or groove extending from the depressed frontal area to the anterior border of the median ocellus. Mandibles triangular, with a sharp apical and a blunt basal tooth, the dental borders between the two strongly emarginate. Maxillary palpi 4—segmented, labial palpi 2—segmented. Antennae 13—segmented, pedicel subglobular, funiculus filiform.

Thorax short and massive; viewed dorsally, the mesonotum and scutellum comprise the greater part of the thorax. Pro-

*A contribution from the Mississippi Agricultural Experiment Station.

notum somewhat concealed by the mesonotum, and with the anterior border strongly reflexed at its junction with the head. Mesonotum without Mayrian furrows, but with a parapsidal furrow on each side. A deep, but narrow, depressed area bearing longitudinal striae, between the mesonotum and scutellum. Metanotum forming a rather angular tooth, which is carinate medianly. The concave, declivous surface of the epinotum, longer than the base of the epinotum. Pedicel 1—segmented, the node or petiole with the posterior border constricted and reflexed. First segment of the gaster, also constricted at its base and apex, and at least twice as broad as the petiole. Gaster with 6 visible segments dorsally, the second segment occupying a very large proportion of its area.

Mandibles shining, sparsely punctate. Mesepisternum of the thorax, and the gaster, smooth and shining. Antennae and legs subopaque. Remainder of the body rather opaque due to the sculpturing and pubescence.

Hairs grayish, short, suberect, covering all parts of the body. Pubescence fine and distinct, also covering all parts of the body, but not easily discernible on the thorax and gaster, giving these parts in certain lights, a fulvous color.

Head, excluding the mandibles, cheeks, clypeus, antennae, and the dorsum of the thorax, and the gaster, almost black. Mandibles yellowish; cheeks, clypeus, antennae, legs, lateral parts of thorax, and the venter varying from ferruginous to brown.

Although the worker of this species was described by Emery in 1895, apparently no one has published a description of the male of this rare, primitive ant. The above description is based on an alate specimen which was collected at Artesia, Mississippi, on the afternoon of August 26th, 1927.

S. pergandei Emery, although a very rare ant, is the most common species of this genus. Wheeler states that the ants nest under stones in rather moist places, usually in meadows. The colonies are composed of only a very few individuals. The ants which are subterranean in habits apparently feed on the flesh of organisms. The species, *S. pergandei* is common to the eastern half of the United States.

89.—Stigmatomma pallipes Haldeman.

Adaton. Only one specimen (a worker) of this primitive ant has been taken in this state. This specimen which is larger, more ferruginous brown and more heavily sculptured than the specimens of *pallipes* from Wisconsin in my collection, may prove to be a new subspecies or variety. The ant was taken in the rather dense, moist woods at Adaton. The student who collected the ant could not furnish any definite information as to the exact spot in which he captured the individual.

90.—Proceratium croceum Roger.

Columbus. Three deälated females of what is apparently this species were taken in a small woodland patch near Columbus. One of the females was found beneath the bark of a pine log in the vicinity of the following other species of ants: *Strumigenys pulchella* Emery and *Aphaenogaster lamellidens* var. *nigripes* M. R. Smith. An interesting myrmecophilous beetle, *Tmesiphorus carintus* (Say), was also found here. The two remaining females were secured from beneath the bark of pine stumps. One of these was found beneath the bark of a stump along with the following ants: *Solenopsis molesta* Say, *Strumigenys pulchella* Emery and *Pheidole dentata* Mayr. No workers were seen with any of the females although a careful search was conducted for them.

The female of *P. croceum* can be distinguished from the female of the other North American species of *Proceratium* by its large size (5 mm.) and by its much thicker petiolar scale.

91.—Proceratium crassicorne Emery.

Columbus. One deälated female of what is apparently this species was taken from beneath the bark of a pine stump in the same habitat as the preceding species. The frass beneath the bark was fine and slightly moist.

92.—Ponera gilva Roger.

Columbus. Approximately forty workers were collected from beneath the bark of a pine log in the same habitat as the species of *Proceratium* mentioned in this article. The frass beneath this log was very moist as was also the log. No immature stages or sexed forms of the ants were observed. The workers which bear somewhat of a resemblance to the workers of *Proceratium* were very slow of movement. Some of these tried to escape capture by hiding in crevices and remaining perfectly quiet. From the same log were collected two individuals of a new species of Fulgorid belonging to the genus

Epiptera and the ants: *Pheidole dentata* Mayr and *Aphaenogaster texana* var. or subsp. *Ponera gilva* Roger does not appear to be as common in Mississippi as some of the other species of *Ponera*.

The worker of this yellowish or somewhat ferruginous colored species can be distinguished from the worker of the other species of *Ponera* in Mississippi by its laterally margined epinotum and by its very much thickened (longitudinally) petiolar scale.

Subfamily Dorylinae.

93.—Eciton (A.) carolinensis Emery.

Ellisville, A. and M. College, Columbus. Three colonies of this ant have been seen in Mississippi and strange to say all of these were found in some form of decaying wood. A colony at Ellisville occurred in the rotten branch of a tree. The branch was about six inches wide and four feet long. A single female and from 5,000-10,000 workers and some larvae were noted inside the branch. At A. and M. College another colony approximately the same size was located in the base of a rotten pine stump. At Columbus a third colony was noted nesting inside of a fence post lying in a pasture. The post although firm outside was hollow inside and furnished excellent quarters for the colony which consisted of a single female, many workers and some larvae.

The worker of *E. carolinensis* bears a striking resemblance to the worker of *E. opacithorax* Emery. The worker can be distinguished from the worker of that species however, by the more nearly square petiole and postpetiole and by the much more heavily incrassated antennae.

Subfamily Myrmicinae.

Pheidole dentigula M. R. Smith.

♀. Length: 3.5 mm. Head, excluding the mandibles, slightly longer than broad, with rather widely and deeply emarginate posterior border, and rounded, yet distinct posterior angles. Anterior border of gula with two short, coarse teeth, which are easily seen when the head is viewed from the side. Mandibles large, somewhat flattened dorsally, each with 2 large apical and 2 small basal teeth. Clypeus emarginate. Frontal area small, subtriangular, broader than long. Antennal scapes slender, longer than in the worker, but yet not attaining the posterior angles of the head. Vertex with 3 large and prominent ocelli.

Thorax short, robust. Humeral angles of the prothorax well developed but obscured from above, by the rounded anterior border of the large and prominent mesonotum. Parapsidal furrows on the mesonotum not clearly discernible. Viewed laterally the mesonotum and scutellum are flattened. Epinotum with a pair of large, blunt, angular teeth or spines, the area between these concave.

Postpetiole about two and one-half times as wide as long, the sides conulate. Postpetiole at least twice as wide as the petiole. Gaster with distinct humeral angles.

Mandibles and clypeus shining, the former with prominent, scattered punctures. Head subopaque, longitudinally rugulose, with the areas between the rugulae finely punctulate, the region around the posterior angles reticulate-punctulate. Mesonotum, mesopleurae, metanotum, scutellum, legs, postpetiole and gaster smooth and shining. Epinotum long, transversely rugulose-punctate.

Hairs pale yellowish, long and abundant, suberect to erect.

Ferruginous; mandibles, and sclerites at base of wings darker.

The above description is based on a deälate female, which with a worker was taken at A. and M. College. Both individuals were found in rich mucky soil around the base of a stump. The soldier and worker were described in a previous paper.

94. Aphaenogaster lamellidens Mayr.

Ocean Springs. A number of workers from the above locality were sent to the writer by the late R. P. Barnhart, without remarks concerning their nesting habits. The variety *nigripes* M. R. Smith, appears to be more common than *lamellidens* in this state, and is usually found nesting in logs or in the soil beneath them.

95.—Aphaenogaster fulva subsp. aquia Buckley.

Rara Avis. Several workers of this species were collected from the ground in a dense patch of woodland at the above locality. As Emery has remarked, *aquia* is somewhat smaller than *fulva* Roger (4.-4.66 mm.). The epinotal spines are shorter than half of the basal surface of the epinotum and the anterior portion of the mesothorax when viewed frim the side does not extend beyond the general surface of the prothorax so prominently as with *fulva*. The sculpturing is also weaker.

(To be continued.)

Descriptions of Four New North American Species of Megaloceroea (Hemip.: Miridae).*

By Harry H. Knight, Ames, Iowa.

In working out an interesting new species of *Megaloceroea* collected in Yellowstone National Park during 1927, I have taken occasion to work over the available material in this genus with the result that four new species are herewith described.

Megaloceroea curta, sp. nov.

Allied to *debilis* Uhler, but distinguished by the longer rostrum, somewhat shorter frons with transverse apex, and in structure of male genital claspers; female differs in the transverse posterior margin of the ninth tergite.

♂. Length 8.4 mm., width 2.1 mm. Head: width .95 mm., vertex .41 mm.; tylus not so strongly swollen on basal half as in *debilis*, the black color beginning on basal half, leaving the median line and apex pale; juga black, the dark color extending back rather broadly around the eyes to collum. Rostrum, length 2.9 mm., extending slightly beyond posterior margins of hind coxae, or upon third ventral segment, black, basal segment pale. Antennae: segment I, length 1.48 mm.; II, 3.85 mm.; III, 2.8 mm.; IV, 1.42 mm.; black, segment II somewhat brownish. Pronotum: length .92 mm., width at base 1.6 mm.; basal margin more transverse than *debilis*, and broadly exposing the mesoscutum; a broad, black stripe each side of disk, covering the calli and extending back more or less behind middle of disk; propleura pale, a triangular blackish ray behind lower margin of coxal cleft. Scutellum smooth, obsoletely punctate, pale, narrow, lateral margins and outer margin of mesoscutum black.

Hemelytra pale, clavus, inner angle of corium, and membrane more or less pale fuscous; a few dark punctures bordering claval vein; an opaque, white calloused line bordering vein around apical half of larger areole. Body beneath pale to fuscous, genital segment and sides of venter fuscous, the dark lateral line not clearly set off as in *debilis*.. Legs fuscous, femora somewhat lighter beneath, with row of fuscous spots on anterior aspect. Genital claspers distinctive, left clasper broader than *debilis*, a thin blade of chitin arises on dorsal edge within the curved part of clasper.

♀. Length 7.4 mm., width 2.2 mm. Head: width 1 mm.,

*Contribution from the Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

vertex .56 mm. Rostrum, length 3.5 mm., reaching to anterior margin of fourth ventral segment. Antennae: segment I, length 1.42 mm.; II, 3.7 mm.; III, 2.6 mm.; IV, 1.3 mm. Pronotum: length 1 mm., width at base 1.54 mm. Hemelytra short, the last tergite usually visible from above. More robust than the male but very similar in coloration.

Holotype: ♂. August 8, 1927, Yellowstone National Park, Wyoming (H. H. Knight); author's collection. *Allotype:* same data as the type. *Paratypes:* 7♂, 18♀, taken with the types by sweeping mixed grasses and sedges near the roadside on the high treeless plateau between Roosevelt Lodge and Mammoth Hot Springs. IDAHO—♀ June 22, 1926, McCall (R. W. Haegele). MONTANA—♂ July 23, 1902, Copperopolis; ♀ July 18, 1913, alt. 5500 ft., Gallatin County (Mont. Agr. Expt. Sta.).

Megaloceroea hirsuta, sp. nov.

Distinguished by the erect long hairs covering all parts of body and legs, dorsum impunctate; elongate, tip of abdomen just reaching middle of cuneus in the male.

♂. Length 8.9 mm., width 1.7 mm. Head: width 1 mm., vertex .46 mm.; tylus angulate and swollen at middle, basal half with median line and marks each side blackish; frons with oblique, granulate, fine dark lines each side of middle. Rostrum, length 2.25 mm., only reaching upon middle coxae. Antennae: segment I, length 1.6 mm., yellowish to fuscous, darker about base of hairs, set with erect long fuscous hairs, length of many exceeding thickness of segment; II, 3.94 mm., brownish black, closely pubescent with pale and fuscous hairs, the dark hairs longer near base, length of several exceeding thickness of segment; III, 2.8 mm., blackish. Pronotum: length 1.06 mm., width at base 1.58 mm.; disk with several very fine punctures on middle; calli with several irregular dark glabrous marks and small spots; pale, a rather broad fuscous stripe each side extending from front margin, covering width of callus, somewhat paler but wider at base; propleura pale, a reddish to fuscous stripe extending from behind eye, across lower half of coxal cleft to basal margin. Mesoscutum broadly exposed, yellowish brown, fuscous each side. Scutellum smooth, pale, dark along basal half of lateral edges.

Hemelytra long, widest near scutellum, cuneus long and slender, extending beyond tip of venter by half its length; pale to dusky, darker on clavus and inner half of corium; membrane and veins pale fuscous, darker each side near cuneus. Body pale, sternum, mark through pleura, and rather broad stripe on sides of venter, fuscous to reddish. Legs pale but thickly dotted with small and some large fuscous markings, tibiae somewhat darker and tarsi black; thickly set with erect, long pale hairs, length of those on tibia equal to twice thickness of segment. Genital claspers distinctive, left clasper broad on basal half then suddenly constricted to a slender rounded and incurved arm which becomes acuminate at apex; right clasper small, rather thick, with a prominent hook or claw extending distad from posterior dorsal angle.

Holotype: ♂. Sept. 26, 1925, Santa Rita Mts., Pima County, Arizona (C. T. Vorhies); author's collection. *Paratypes*: 5 ♂, Fort Davis Mts., Texas.

Megaloceroea punctata, sp. nov.

Distinguished by the strongly punctate corium, clavus, scutellum and pronotum; first antennal segment not equal to width of head; distinguished from *rubicunda* Uhler in the less prominent tylus and frons, carinate pronotum, punctate scutellum and spotted femora.

♂. Length 5.6 mm., width 1.36 mm. Head: width .83 mm., vertex .42 mm.; tylus only moderately prominent, frons not sharply set off from base of tylus as in *debilis* and other species. Rostrum, length 2.84 mm., reaching upon fourth ventral segment. Antennae: segment I, length .62 mm.; II, 1.72 mm.; IV, broken; reddish brown, segment I blackish on basal half but chiefly on anterior aspect. Pronotum: length .88 mm., width at base 1.24 mm.; lateral margins of disk carinate, slightly sulcate, basal margin broadly rounded but distinctly sinuate at median line; coarsely and rather closely punctate, several punctures on anterior margin and on calli, many punctures infuscated. Mesoscutum only moderately exposed, lateral angles each with two transverse grooves. Scutellum also punctate, pale, narrow lateral margins fuscous.

Hemelytra with clavus and corium distinctly punctate; pale, punctures and clavus laterad of claval vein fuscous; corium except along radial vein, and inner half of cuneus reddish; membrane fuscous. Clothed with moderately fine pale yellowish pubescence. General coloration pale yellowish, median vitta and two lateral marks on basal half of tylus, also apex of tylus, arcuate mark bordering inner margins of eyes and antennae, collum except median line, and calli, black; dark color each side of frons and vertex more or less reddish to black. Mark behind lower margin of eye, across lower half of coxal cleft, mark on metapleura and base of hind coxae, and the usual lateral line on venter, reddish. Legs pale, femora with two rows of distinct black spots on anterior aspect, also several spots on distal half of posterior aspect, and two rows of fine black spots on basal half of tibiae; tarsi and tips of tibiae black. Right genital clasper with a distinct claw at tip, margin of genital segment with a slight tubercle at base of right clasper.

♀. Length 6.6 mm., width 1.6 mm. Head: width .87 mm., vertex .52 mm. Antennae: segment I, length .66 mm.; II, 2.87 mm.; III, broken. Pronotum: length 1.06 mm., width at base 1.39 mm. More robust than the male but very similar in coloration, punctuation, and pubescence.

Holotype: ♂ August 24, 1906, Nogales, Arizona (F. W. Nunenmacher); author's collection. *Allotype:* August 23, topotypic. *Paratype:* Aug. 16, topotypic.

Megaloceroea letcheri, sp. nov.

Allied to *punctata,* but differs in the longer first antennal segment which exceeds width of head, and the more prominent eyes; also differs in the prominent erect hairs on dorsum and first antennal segment; differs from *hirsuta* in the punctate dorsum and shorter first antennal segment.

♂. Length 7.1 mm., width 1.8 mm. Head: width .98 mm., vertex .41 mm.; eyes larger and more prominent than in *punctata,* apex of frons more prominent; pale to yellowish, fuscous about inner margins of eyes and on collum. Rostrum, length 2.8 mm., just attaining posterior margins of hind coxae. Antennae; segment I, length 1.09 mm., reddish brown to fuscous, thickly clothed with nearly erect dusky hairs, length of hairs about equal to two-thirds thickness of segment; II, 3.4 mm., brownish to dusky; III, broken. Pronotum: length 1 mm., width at base 1.48 mm.; lateral margins not so distinctly margined as in *punctata.* Pronotum, scutellum, clavus and corium punctate nearly as in *punctata,* but the whole dorsum clothed with erect, long pale hairs. Mesoscutum with three very distinct transverse grooves on each lateral angle.

General coloration yellowish to dusky, membrane fuscous, no reddish evident in the unique type, also without lateral line on venter. Legs thickly clothed with erect pale hairs, yellowish, tarsi black, with a few obsolete fuscous spots on femora. Right genital clasper with a distinct claw at apex, but curved more sharply downward than in *punctata.*

Holotype: ♂ July 25, 1922, Douglas, Arizona (H. Letcher); author's collection.

Megaloceroea rubicunda Uhler.

I have seen cotypes of this species, also a female, August 16, White Mountains, New Mexico (Townsend). A male specimen is at hand from Douglas, Arizona, July 22, 1922 (H. Letcher), which I place here although the first antennal segment is somewhat longer and more slender while the scutellum is impunctate, but the latter is roseus in color and with indications of red on median line.

For purposes of comparison the following characters are recorded from a male cotype: Head: width .84 mm., vertex .43 mm. Rostrum, length 2.6 mm., reaching upon fourth ventral segment. Antennae: segment I, length .68 mm., thus not equal to width of head, thickness .15 mm., clothed with short brownish pubescence; II, 2.81 mm., cylindrical, black; III, 1.51 mm.; IV, broken. Pronotum, length .95 mm., width at base 1.47 mm. Scutellum with a few obsolete punctures, pale roseus, median line set off by two slender and partially interrupted reddish lines each side of the pale median line, the latter extending slightly into the blackish at base.

Spiders and Bedbugs (Araneina, Hemiptera).

Dr. N. Lorando, of Athens, Greece, has been taking an interest in the way of destroying bedbugs among the refugees out there occupying wooden barracks. The methods of disinfection that were tried were not successful. So he thought of trying to find a natural enemy to destroy the bugs. He writes me that a spider finally arrived from the neighborhood, which killed all the bedbugs in the camps. He sent me three vials containing at the start, living bedbugs and spiders. I sent these specimens to Dr. A. Petrunkevitch, of New Haven, who writes me that vial No. 1 contained a spider of the genus *Thanatus,* probably *flavidus* Simon (a Thomisid); vial No. 3 contained a spider which was probably a very young *Tegenaria domestica.* In vial No. 2, curiously enough, the spider had been eaten up by the bedbugs, but from the fragments he judged that it was a *Tegenaria.* It is interesting to note that the bedbugs and the spiders, which were sent from Athens on April 18, arrived in Washington alive and in good condition, with the exception of spider No. 2. They were still alive in New Haven on May 21, when Doctor Petrunkevitch wrote me. This statement must be modified somewhat, since undoubtedly the spiders had killed a few of the bedbugs on the journey.

L. O. HOWARD, Washington, D. C.

ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., OCTOBER, 1928.

The Fourth International Congress of Entomology.

The first International Congress of Entomology was held in Brussels in 1910, the second in Oxford in 1912, the third was to have been in Vienna in 1915 but, owing to the war, was postponed until 1925 and met in Zürich. The fourth, in Ithaca, August 12-18, 1928, has been the largest in point of attendance, and surely has justified the hopes of those who advocated its meeting in the United States. Elsewhere in this number a brief account of the Congress is given.

As participants in the great gatherings on the campus of Cornell University, we wish to express thus publicly our thanks, appreciation and admiration for the manner in which our hosts at Ithaca planned and executed the manifold arrangements which made the Congress the great success that it was. We cannot conceive what more they could have done to make it better. Willard Straight Hall made an unique central meeting place and we shall not soon forget the breakfasts with congenial souls on the great stone terrace, the tete-a-tetes in the many reception rooms, the final banquet in its great memorial hall, the sunsets over Cayuga Lake seen from the same terrace. It is the personal contacts established or maintained by such meetings that are of the most value. Surely Ithaca has done much for these.

One voice was still that would have welcomed us, could it have done so. He to whom Cornell primarily owes its eminence in entomology lay helpless, unable to move or to speak, yet surely responding by the expression of his countenance, the varying pressure of his fingers to warm greetings of those friends privileged to see him. It is the great tragedy of his life that Professor Comstock could not participate in the Fourth Congress.

The Fourth International Congress of Entomology.

assembled at Ithaca, New York, in the buildings of Cornell University, from Saturday, August 11, to Sunday, August 19,

1928. Sessions began on the 13th and ended on the 18th. The grouping into sections was somewhat different from that given in the preliminary program, published in the NEWS for July, pages 220-222, and was as follows:

General Session, 4 meetings, M., Tu. and Th. a. m.; Fri. p. m. (16, 7).

Section of Nomenclature and Bibliography, 2 meetings, M., Tu. p. m. (16, 5).

Section of Systematic Entomology and Zoogeography, 5 meetings, Tu., W. & Th. p. m., F. & S. a. m. (31, 15).

Section of Ecology, 2 meetings, M. & Th. p. m. (7, 4).

Section of Morphology, Physiology, Embryology and Genetics, 3 meetings, Tu. & Th. p. m., F. a. m. (13, 5).

Section of Medical and Veterinary Entomology, 3 meetings, M., Tu. & Th. p. m. (4, 10).

Section of Apiculture, 4 meetings, M., Tu. & Th. p. m., F. a. m. (7, 7).

Section of Forest Entomology, 3 meetings, Tu. & Th. p. m., F. a. m. (5, 9).

Section of Economic Entomology, divided into the following subsections:

Cereal and Truck Crop Insects, 5 meetings, M.-Th. p. m., F. a. m. (21, 12).

Citrus Fruit Insects, 1 meeting, M. p. m. (3, 3).

Deciduous Fruit Insects, 2 meetings, Tu. & W. p. m. (5, 7).

Cotton Insects, 1 meeting, F. a. m. (4, 6).

Insecticides and Appliances, 1 meeting, Th. p. m. (1, 4).

The numbers in parentheses after the times of meeting of each section and subsection are those of the total number of titles of papers and reports listed on the program for that section or subsection, *a* by authors from outside the United States, *b* by authors residing in the U. S. The total number of papers accredited to authors from without the U. S. was 133, to authors residing in the U. S. 94; sum total 227, as compared with 178 papers at the latest convocation week meeting of the A. A. A. S. and its associated and affiliated societies at Nashville, in December, 1927, (see NEWS for February last, pp. 60-61).

At the opening general session of the Congress on Monday morning, addresses of welcome were made by Dean A. R. Mann, of the New York State College of Agriculture and Dean W. A. Hammond, of the University Faculty, following which Dr. L. O. Howard gave his address as President of the Congress. All three addresses have been published in full in the daily

Ithaca Journal-News for Aug. 13, and Dr. Howard's has also appeared in *Science* for Aug. 17. The *Journal-News*, for the week of the Congress, gives much information of the latter's activities and summaries of the following papers:

Dr. Karl Jordan's "Problems of distribution and variation of North American fleas," Dr. W. J. Baerg's "Some poisonous arthropods of North and Central America," Dr. W. E. Hind's "Can we increase the usefulness of the egg parasite, *Trichogramma minutum?*" Dr. Walther Horn's "On the splitting influence of the increase of entomological knowledge and the enigma of species," Prof. F. Silvestri's "The relation of taxonomy to other branches of entomology," Dr. W. J. Holland's "The mutual relations of museums of science and taxonomic specialists," Dr. C. L. Marlatt's "Restrictions enforced by the United States on entry of foreign plants and plant products for the purpose of excluding new and dangerous pests," Dr. W. E. Hind's "The development of a control program for the Mexican cotton boll weevil and some of its results," Mr. T. E. Snyder's "Termites modify building codes," Dr. E. P. Felt's "Insect inhabitants of the upper air," Prof. H. A. Eidmann's "Economic value of ants in the preservation of forests," Dr. A. D. Imms' "Insect control of noxious weeds," and its counterpart, Dr. R. J. Tillyard's "Biological control of noxious weeds." Still briefer abstracts are to be found in Science News Supplement of *Science* for Aug. 17 and 31. It is expected that all the papers on the program will be made accessible in the Proceedings to be printed later.

At the last general session, the invitation of the French entomologists to hold the next Congress in Paris in 1932, the centenary of the founding of the Entomological Society of France, was unanimously accepted. Prof. O. A. Johannsen, of Cornell University, American Executive Secretary of the Fourth Congress, was elected as the representative of the United States on the Permanent Executive Committee of the International Congresses of Entomology. He thus takes the place occupied by Dr. Henry Skinner until his recent death. The other members of this committe are Drs. Karl Jordan, secretary, and Harry Eltringham, England, Walther Horn, Berlin, Yngve Sjöstedt, Stockholm, and René Gabriel Jeannel, Paris. The President of the Fifth Congress will be elected by this committee.

The last gathering of the entire Congress was at a banquet in the beautiful memorial hall of Willard Straight Hall on Friday at 7 p. m. Dr. Howard, the toastmaster, said the occasion was an historic one as it marked the termination of the greatest Congress of entomologists ever held in the history of the civilized world, not less than 625 persons having registered as members and associate members. He called on Dr. W. J. Holland, who proposed a toast to the ladies, in the course of which he referred to Mrs. Anna Botsford Comstock, seated at the principal table, as "the queen of American entomologists." Dr. Howard then called on a speaker from each one of the nations represented at the banquet, who responded in his own language, or in English, or in both. These were the Consul General at New York City for Argentina; Dr. R. J. Tillyard, Australia; Dr. F. Heikertinger, Austria; Dr. A. Ball, Belgium; Dr. P. Tschorbadjieff, Bulgaria; Mr. A. Gibson, Canada; Senor Alberto Graf Marin, Chile; Sr. A. Merchan, Cuban; Dr. F. Rambousek, Czechoslovakia; Dr. M. Thomsen, Denmark; Dr. A. D. Imms, England; Dr. H. C. Efflatoun Bey, Egypt; Dr. U. Saalas, Finland; Prof. E. L. Bouvier, France; Dr. M. Schwartz, Germany; the Consul General in New York City, Guatemala; Rev. Dr. R. Streda, Hungary; Mr. J. Carroll, Irish Free State; Prof. F. Silvestri, Italy; Prof. S. Inomata, Japan; Dr. A. Dampf, Mexico; M. J. B. Corporal, The Netherlands; Hr. L. R. Natvig, Norway; Prof. B. Bledowski, Poland; Prof. M. N. Rimsky-Korsakov, Russia; Don F. Silvela, Spain; Prof. I. Tägårdth, Sweden; Mr. S. H. Skaife, Union of South Africa.

Excursions to places in the vicinity of Ithaca were a prominent feature and went to Buttermilk Creek and Lick Brook on Aug. 12, Enfield Gorge, Aug. 13, Taughannock Falls State Park, Aug. 14, Geneva, all day, with sessions as announced, Aug. 15, Lloyd-Cornell Wild Flower Preserve and Arnot Forest, Aug. 16, Lloyd-Cornell Ringwood Wild Life and Wild Flower Preserves, Six Mile Creek and Renwick, Aug. 17, Lloyd-Cornell Reservation at McLean, Enfield Falls and Watkins Glen, Aug. 18.

The main excursion after the Congress to Niagara Falls, Pittsburgh, Washington, Philadelphia, Boston and New York, outlined in the July NEWS, pp. 221-222, was, in so far as Philadelphia was concerned, participated in by Messrs. Adrinov (Moscow), Bledowski, Bogdanov-Katjkov (Leningrad), Dampf, Efflatoun, Kemner (Stockholm), Lathy (Paris), Loding (Alabama), Martinov (Leningrad), Regnier and Madame Regnier (Rouen), Rimsky-Korsakov, Roepke (Wageningen), Saalas and Madame Saalas, Miss Skwarra (Königsberg), Stellwaag (Neustadt Hdt.), Streda, Talbot (Witley), Thomsen, Vayssiére (Paris), Fox Wilson (London) and Zaitzev (Tiflis). Other foreign members of the Congress visited Philadelphia before or after the excursion.

The excursionists were met on their arrival in Philadelphia by members of the American Entomological Society and escorted to their hotel. On the following day, August 25, they visited, in parties, the Academy of Natural Sciences, the Wistar Institute, the Zoological Laboratory of the University of Pennsylvania, the Zoological Gardens, the Art Museum, or made sight-seeing tours of the city. The Academy of Natural Sciences was host at a luncheon at the Penn Athletic Club, at which the visitors were welcomed by Capt. Roswell C. Williams, Jr., President of the American Entomological Society, a response being made by Dr. F. Stellwaag. Most of the visitors took part in an all-day motorbus collecting trip, on August 26, to Chatsworth and the Plains, in the New Jersey Pine Barrens, under the guidance of Dr. Henry Fox and Mr. R. J. Sim. On August 27, the party inspected the Japanese Beetle Laboratory at Moorestown, New Jersey, where they were received by Mr. Lorin B. Smith and staff, and in the afternoon continued their journey to New York.

(Since this note descriptive of the Congress was written accounts by Prof. G. W. Herrick have appeared in *Science* for Sept. 14, and the *Scientific Monthly* (illus.) for October).

Personals.

The University of Pittsburgh, in June, 1928, conferred the degree of Sc. D. upon B. Preston Clark, of Boston, in recognition of his work on the Sphingidae of the world, and the honorary degree of L. H. D. on Dr. W. J. Holland, in recognition of his approaching eightieth birthday and his forty-year service as a trustee of the university, during ten of which he was its chancellor. (*Science*, July 6, 1928.) His birthday, August 16, occurring during the session of the Fourth International Congress of Entomology at Ithaca, New York, was further signalized by his election as an Honorary Fellow of the Congress, and by the presentation to him by Dr. Avinof, Director of the Carnegie Museum at Pittsburgh, of a beautifully illuminated scroll recounting Dr. Holland's honors and achievements.

Dr. James G. Needham, professor of entomology at Cornell University, has returned from spending a year in China with the China Foundation for the Promotion of Education and Culture. He lectured on biological subjects before Chinese universities in and around Peking, Tientsin, Tsinan, Shanghai, Hangchow, Soochow and Nanking. He was made an honorary member of the Entomological Society of China and of the Chinese honorary scholastic society of Phi Tau Phi and a corresponding member of the Peking Natural History Society. He gathered large collections of dragonflies and is preparing a monograph of the Chinese Odonata. (*Science*, July 27, 1928.)

Science for Sept. 7, 1928, announced the return of Prof. and Mrs. T. D. A. Cockerell to the University of Colorado after their journey around the world. Prof. Cockerell wrote from Honolulu, July 29: "Had four weeks in New Caledonia and found the island extremely interesting; many endemic snails, and a good lot of insects but few bees. Mrs. Cockerell and Miss Mackie stopped off at Pago Pago and went to Apia (British Samoa) for three weeks, while I came on here and have been working on my collections."

The C. W. Johnson Collection of Diptera.

The private collection of Diptera of Mr. C. W. Johnson, well-known to be one of the best in our country, has become the property of the Museum of Comparative Zoology at Cambridge, Massachusetts. It contains about 6,000 species, of which 542 are represented by types. Besides the North American collection, there is material from South America and Java, as well as a good European collection. The Nearctic collection will be kept separate from the general collections of the museum.—Nathan Banks.

The Trend of the Times

is shown by the following advertisement which appeared in the Philadelphia Public Ledger for June 1, 1928.

Proposals.

Insecticide dusting by airplane. U. S Department of Agriculture, Washington, D. C., May 28, 1928.—Sealed proposals for furnishing one airplane, with insecticide dusting attachments and personnel at Cherryfield, Maine, will be received at the Department until 2 o'clock P. M., Tuesday, June 12, 1928, and then opened. Specifications and blank forms for proposals can be had on application to the Chief, Division of Purchase and Sales, U. S. Department of Agriculture, Washington, D. C.

Another Way of Acquiring Yellow Fever.

While working on experimental yellow fever in rhesus monkeys at Lagos, Nigeria, West Africa, Professor Adrian Stokes was suddenly taken ill on Sept. 15, 1927, and died four days later of yellow fever. The circumstances of his illnes gave rise to the idea that the virus might pass through slightly injured, or even entirely unbroken, skin. To determine this question, Drs. J. H. Bauer and N. P. Hudson made experiments at Lagos, which they described in *The American Journal of Topical Medicine* for Sept., 1928. On Sept. 27, 1927, a single infected mosquito, *Aedes aegypti*, was allowed to bite a normal rhesus monkey, No. 370. The latter's temperature rose to 105.9° F. on Oct. 1. Two drops of its blood were on that day rubbed on the unbroken skin of normal monkey 381, on a shaved area of 382 and on a slightly scarified area of 383. Nos. 381, 382 and 383 died between Oct. 7 and 16. Both gross and microscopical post-mortem examination of all three monkeys gave a diagnosis of experimental yellow fever as the cause of death. Similar results in additional experiments led to the conclusion that the virus of yellow fever, when present in sufficient amount in the circulating blood of experimentally infected animals, can penetrate the intact skin and produce infection in rhesus monkeys.

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

GENERAL.—**Brown, F. W.**—Odors and insects. [40] 299: 1-9, ill. **Felt, E. P.**—Dispersal of insects by air currents. [N. Y. State Mus. Bull.] 1928: 59-129. **Felt, E. P.**—Observations and notes on injurious and other insects of New York State. [N. Y. State Mus. Bull.] 1928: 145-176, ill. **Fessard & Fessard.**—Recherches sur l'excitabilité du système nerveux des insectes. [77] 99: 305-307. **Fernald, H. T.**—Insects: The people and the state. [76] 1928: 193-205. **Gibson & Ross.**—Insects affecting greenhouse plants. [Canada Dept. of Agric.] Bull. 7:5-63, ill. **Handlirsch, A.**—Grösse und gestalt der insekten. Die trachten. [Schroeder's Hand. der Entom.] Lief. 38, 1: 1313-1332, ill. **Kolbe, H.**—Tiergeographie und morphologie, neue untersuchungen zur entwicklungsgeschichte der tiergattungen. [34] 77: 195-209. **Krausse, A.** — Zur terminologie der edaphischen biocoenosen. [18] 22: 110-111. **Lutz, F. E.**—Insects that erect tents. [15] 28: 264-268, ill. **Lutz, F. E.**—Wind and the direction of insect flight. [40] 291: 1-4, ill. **Möbius, M.**—Die bedeutung Linnés für die botanik und zoologie in heutiger beurteilung. [88] 16: 537-542. **Noé, A. C.**—The use of charts in the natural sciences. [68] 67: 571-574. **Poche, F.**—Ueber Stiles' eigenmächtige änderung der internationalen nomenklaturregeln. [48] 45: 23-27. **Rüschkamp, F.**—Neue stative der optischen werke Leitz. [2] 24: 6-8, ill. **Smith, R. C.**—Concerning the spelling of "Ypsilon." [19] 23:92. **Swaine & Hutchings.**—The more important shade tree insects of eastern Canada and their control. [Canada Dept. of Agric.] Bull. 63: 3-58, ill.

ANATOMY, PHYSIOLOGY, ETC.—Allard, H. A.—Specializations governing musical expression among insects. [76] 27: 81-88, ill. **Bartels u. Baltzer.**—Ueber orientirung und gedächtnis der netzspinne Agelena labyrinthica. [Rev. Suisse Zool.] 35: 247-258, ill. **Beattie, M. V. F.**—Observations on the thermal death points of the blow-fly at different relative humidities. [22] 18: 397-403, ill. **Brown, F. M.**—Enzymes and bacteria in the honey bee. [40] 304: 1-5, ill. **Dhéré, C.**—Sur quelques pigments respiratoires des invertébrés. [Rev. Suisse Zool.] 35: 277-288, ill. **Feige, E.**—Die geographische beeinflussung der pigmente. [Dr. A. Peterm. Mitteil. Erganz.-heft] 198: 107-117. **Felt, E. P.**—Insects and health. [N. Y. State Mus. Bull.] 1928: 3-57, ill. **Hirschlerowa, Z.**—Les composants plasmatiques des cellules génitales femelles de Phryganea grandis. (Trichoptera). [77] 99: 476-477, ill. **Hölldobler, K.**—Ueber einfache herstellung von gipsbeobachtungsnestern für ameisen. [Aus der Heimat] 41: 184-186, ill. **Ludwig, D.**—Development of cold hardiness in the larva of the Japanese beetle (Popillia japonica). [84] 9: 303-306, ill. **Mattes, O.**—Parasitäre krankheiten der mehlmottenlarven und versuche über ihre verwendbarkeit als biologisches bekämpfungsmittel. [Marburger Sitzungsberichte] 62: 381-417, ill. **Meisenheimer, J.**—Die flügelregeneration bei schmetterlingen. [Verh. Deut. Z. Gesel.] 1909: 174-182, ill. **Nalepa, A.**—Zur phänologie und entwicklungsgeschichte der milbengallen. [Marcellia] 24: 87-98. **Pictet, A.**—Le déterminisme des proportions numeriques entre les divers composants d'une population mixte de lépidoptères. [Rev. Suisse Zool.] 35: 241-246. **Schröder, C.**—Die psychischen fähigkeiten der insekten. Mit exkurs in die probleme der allgemeinen biologie. [Hand. der Entom.] 2: 1059-1138. **Spencer, W. P.**—New mutations in Drosophila funebris. [42] 51: 177-194, ill. **Voinov, V.**—La pigmentogenèse chez les larves de Simulium. [Arch. de Zool. Exp. et Gén.] 67: 223-255. **Weber, H.**—Die gliederung der sternopleuralregion des lepidopterenthorax, Eine vergleichend morphologische studie zur subcoxaltheorie. [94] 131: 181-254, ill. **Williamson, K. B.**—Mosquito breeding and malaria in relation to the nitrogen cycle. [22] 18: 433-439, ill. **Whiting, P. W.**—The production of mutations by X-rays in Habrobracon. [68] 68: 59.

ARACHNIDA AND MYRIOPODA.—Cooley & Kohls.—Egg laying of Ixodiphagus caucurtei in larval ticks. [68] 67: 656. ***Ewing, H. E.**—The scorpions of the western part of the United States, with notes on those occuring in northern Mexico. [50] 73: 1-24, ill. **Hofeneder, H.**—Ueber die larven der Blepharoceriden und ihren merkwürdigen anheftungsapparat. [Verh. Zool. Bot. Gesell. Wien] 77: 82-98, ill. **Leon, A.**—Spinnen auf der jagd. [Der Naturf.] 1928: 178-180, ill. **Nalepa, A.**—Probleme der eriophyidensystematik. [Marcellia] 24: 1-29. **Roewer, C. F.**—Weitere weberknechte II. [Abh. Naturw. Ver. Bremen] 26: 527-632, ill.

THE SMALLER ORDERS OF INSECTS.—Bromley, S. W.—A dragon fly ovipositing on a paved highway. [19] 23: 69. **Despax, R.**—Observation relative à l'action de la lumière sur la métamorphose des Trichopteres. [25] 1928: 154-156, ill. ***Handschin, E.**—Collembola from Mexico. (S.) [Jour. Linnean Soc.] 36: 533-552, ill. **K.** Die Buckelzikaden.—[Die Umschau] 32: 444, ill. **Krausse, A.**—Collembolen des Waldbodens [18] 22: 117-118. **Light & Sanford.**—Experimental transfaunation of termites. [Calif. Univ. Pub. Zool.] 31: 269-274, ill. **Moulton, D.**—The greenhouse thrips. [Calif. Dept. Agric.] 17: 366-367, ill. **Peters,**

H. S.—Mallophaga from Ohio birds. [43] 28: 215-228. **Priesner, H.**—Ein neuer Zeugmatothrips (Thysanoptera: Tubulifera) aus Costarica. [23] 20: 189-190.

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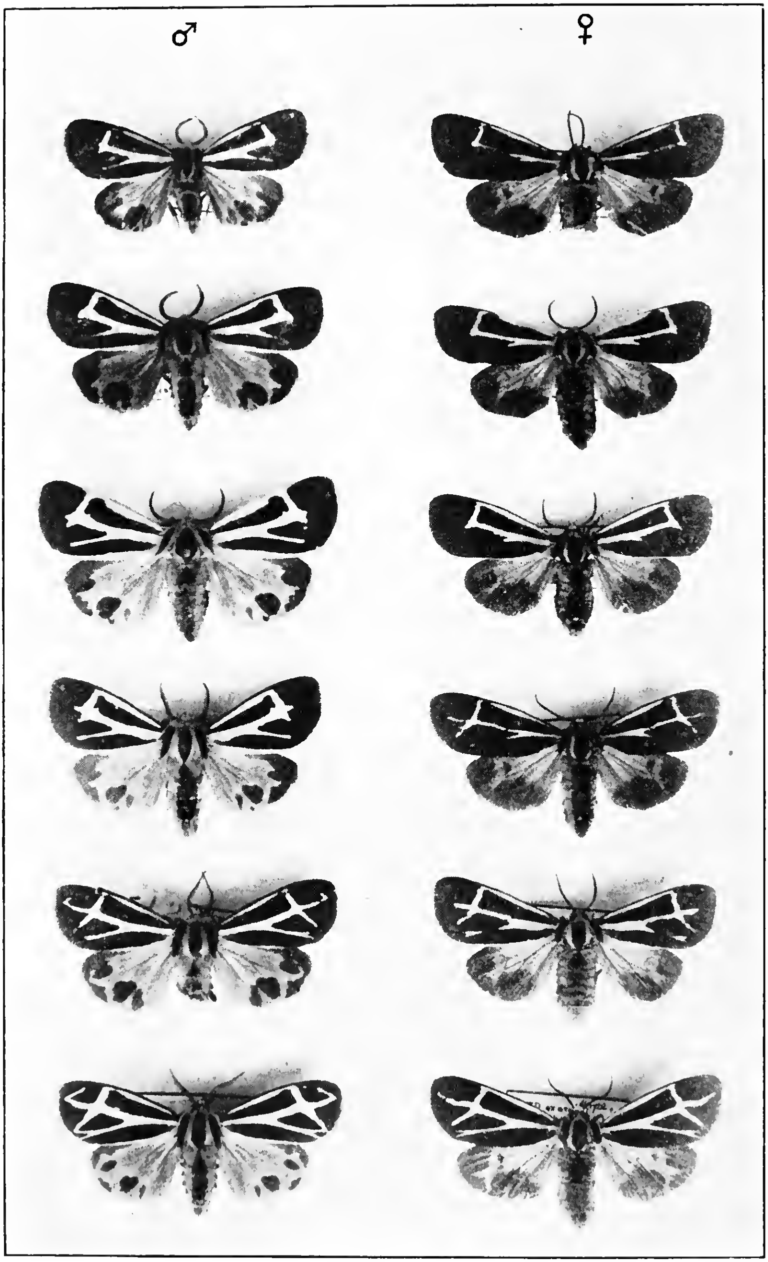

APANTESIS VITTATA.—LEARNED.

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The Early Stages of Apantesis vittata (Lep.: Arctiidae).

By Elmer T. Learned, Fall River, Massachusetts.

Plate XII.

This paper is offered as a contribution to the knowledge of *Apantesis vittata* (Fabr.) (=*decorata* Saunders) by describing the life history of the larva and recording certain variations in the imago.

There is little to be found in the literature on the larva of *A. vittata*. French published brief descriptions, but his determination of the species is doubtful. Hampson has regarded *phalerata* (Harris) as a synonym of *vittata*, and the references and notes on the larval stages found in his Catalog (Supplement, vol. II) under the name *vittata* actually refer not to this species, but to *phalerata* (save one reference to *radians*). *Phalerata* is very different from *vittata* structurally, and must be considered a distinct species. There remain the descriptions of the mature larva by Dyar and by Gibson as the only contributions on the preparatory stages to date.

The moth from which eggs were obtained was similar to the female figured at the top of the plate, but even more lightly marked, with faint costal fascia; the costal edge was black. This moth was taken in July at Hope, Arkansas, by Miss Louise Knobel. The eggs had just hatched when received.

In the description, Dyar's (1901) system is used for the setae or warts. The thoracic and abdominal segments are numbered separately, and designated by Roman and Arabic numerals respectively.

Stage I. Length 1.8 mm. Head 0.42 mm. wide. Head black with suture lines, front (frontal triangle) and mouth parts pale, except mandibles which are brownish. Body is grayish, tinged with yellow after eating. Warts brownish, shiny. Three setae from the cervical shield, those from ii and iii on thorax, the seta from ii and one from iii on abdomen, are black, the rest white. All setae are finely spinulate. Legs and prolegs concolorous with body. The first molt took place July 30.

Stage II. Head 0.60-0.64 mm. wide. Head shiny black, the front dull white with a brownish spot in its center; there is a pale brown area on each side of the head at the posterior edge. Body brownish, with a white dorsal line, widening on each segment opposite wart ii, so that it appears like a series of diamond shaped spots. Warts black; wart ii conspicuously larger than the others. All setae from ii, some from iii, and one from iv and v are black, the rest white. Some setae from ii on III, and all from ii on 1 to 7, are smooth; all others are spinulate except some small ones on legs and ventral warts. In this stage a seta makes its appearance on segments II and III just posterior to wart v. Legs black, prolegs like body. The second molt occurred August 3.

Stage III. Larvae 6 mm. long, head 0.96 mm. wide. Head shiny black; front now almost entirely brown. There is a white dorsal line, ill-defined on segment I; it is obscure at the incisures so as to appear interrupted. Viewed laterally the larva appears ochreous due to the large amount of this color between warts ii and iii, and iii and iv, the area so colored being shiny and slightly raised like a broad, low ridge between these warts. The ochreous between iv and v is less extensive, paler, and permits the pale grayish body color to appear on either side of it. There is pale ochre also between v and vi. The area before and behind ii is brownish contrasting with and evenly defining the upper limit of the ochreous patch between ii and iii. A similar brownish area behind iii serves to define the lower border of the ochreous patch and thus gives the appearance of an ochreous sub-dorsal line. On the thoracic segments in the subspiracular area the ochreous is replaced by an inconspicuous dull brown. On the abdomen posterior to wart v is a diffuse, dull brown color like that on the thoracic segments. Warts are black. Setae from i are white, from ii black; from iii black, with one or two white ones; from iv and v one black, the rest white. Setae from cervical shield are mixed black and white. Legs black; prolegs with an outer dark area and pale plantae, else like the body. Spiracles inconspicuous. The third molt came on August 6.

Stage IV. Length 9.5 mm. Head 1.3 mm. wide, black, shiny; front is now black and the former white markings reduced to dull yellowish along the suture lines, often obsolete. The lighter area previously present on the side of the head is obsolete; clypeus and bases of antennae are white. Larvae essentially as before, but the markings intensified, the grayish body color scarcely apparent between the markings of brown and ochreous. The white dorsal line is sometimes tinged with yellow near the edge of the segment. A white subdorsal line is more or less clearly indicated in different larvae. It is crossed by the ochreous color between ii and iii, which sometimes entirely obscures it and gives the effect of an ochreous subdorsal line. The ochreous at the bases of the warts is even more conspicuous than in the last stage, especially between iii and iv. Warts are black, and all, especially the base of ii, are polished. Setae from i, ii and iii on abdomen are all black; There are one or two black ones from iv, v and vi, the rest white. Spiracles are black, the first and last with orange center. The fourth molt occurred August 10.

Stage V. Length 1.5 cm. Head 2.3 mm. wide. Suture lines and base of front marked inconspicuously with dull brownish. Body black. The white dorsal line is variable and in some larvae obsolete. When well developed it begins faintly on segment II and extends through 9, beginning narrowly at the anterior edge of each segment, widening to just behind wart ii, then narrowing abruptly to the posterior edge where it may be tinged with yellow. Subdorsal line if present is even less clearly defined than before. There are no markings on segment I, few or none on II and III; none except the faint dorsal line on 9. Setae from i, ii and iii are black; the rest mostly pale or with a rusty tinge. Spiracles orange. The intensity and extent of the markings vary greatly in this stage, from larvae with sharp, white dorsal line and bright ochreous markings, to larvae which are almost entirely black. The fifth molt came on August 14.

Stage VI. Head 3.0 mm. wide (average specimen); suture lines not marked. There was considerable variation in the size of the head in this stage, though all larvae were known to have molted an equal number of times. Body black, dorsum darker than the lateral area. There is the same variation in coloration as in the preceding stage. In general those larvae with the best developed dorsal line also have the most conspicuous ochreous markings, and vice versa. In many, all markings are obsolete. The base of wart ii on abdominal segments is moderately polished anteriorly and laterally. Setae from i, ii and iii are black; those from iv mostly black, with a few like those of v and vi, which are straw colored or pale rusty; v with an occasional black one. Setae from cervical shield mixed black and rusty. In this stage, most of the setae from ii and iii on segments II and III, all setae from the three upper warts on all abdominal segments except the last, and a few setae from the lower warts, are smooth and needle-like; the rest are spinulate. The change from spinulate to smooth setae takes place progressively through the preceding stages, beginning in stage II.

Larvae began to spin cocoons on August 23 and the first ones pupated on the 25th. Most of the larvae chose the upper angles of the cage to spin their loose, thin cocoons; a few crawled under paper on the bottom. The larvae were fed on plantain and dandelion in the early stages, later on lettuce.

An average size pupa is 2.0 cm. long by 6.5 mm. at greatest width, clothed sparsely with very minute, short hairs. Color is black, without bloom. In some pupae the intersegmental membrane is dark chestnut, in others concolorous with body. Spiracles are concolorous. On each side of the vertex is a bunch of stiff bristles of two kinds: short, stout, sharp bristles, and others with the end rough and flattened similar to those of the cremaster. One or two minute spines at base of antenna. Cremaster with a longitudinal groove at base, and armed with about twenty stout spines of varying length, the two apical ones the longest, all with the ends slightly enlarged, somewhat cone shaped, and much roughened. The larval skin clings closely to the end of the pupa.

The brood of about fifty larvae seemed healthy, only two or three being lost, but there was a high mortality in the pupal stage. Twenty-eight moths emerged, however, between September 7 and 22.

All the moths varied from normal *vittata* in having the costal edge of primaries black instead of yellow, and also in peculiarities of the male genitalia which have been described and figured elsewhere[1]. The hind wings were red in all specimens, the abdomen ochre; the black dorsal stripe always even, never widening on the anal segments.

Eggs were obtained from these moths, laid in mats attached to the sides of the cage. Color pale yellow, surface finely shagreened. Diameter .76 mm. height .66 mm. The pale yellow changed gradually to pale, lustrous amber, and the shell became transparent.

The larvae of the second generation in the earlier stages were like those described, but with an increasing tendency as they grew older toward obsolescence of the maculation. In the last stage all larvae were entirely velvety black except for the

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[1] Psyche 1927, xxxiv, 141, Pl. IV.

orange spiracles. There was no dorsal line or ochreous marking. The setae of the two lower rows of warts, and some on the thorax, were rusty reddish. In a few larvae a faint whitish dash on the 5th or 6th segment represented the remnant of a dorsal line. The loss of color in the second generation larvae may have been due to temperature differences, as they were reared during October and November, and matured slowly. The moths emerged in December and January.

In this second generation four males and five females out of about thirty moths had the yellow costa normal to *vittata* (Plate: third male, second female). Otherwise they were all like those of the first brood. The same variations in the male genitalia were found in both generations.

The occurrence of the black costa is probably a mutation; its reappearance in the second generation suggests a Mendelian character. There is a possibility it may indicate hybridism, but as I have stated elsewhere[2], cross-breeding seems improbable.

Though the moths vary from the usual form, the pattern and color is in general that of *vittata* in the majority of specimens, and the genitalia, though aberrant, confirm the determination.

The plate shows the range of variation which may occur in these moths in one brood. The commonest variety was that most typical of the species, without any indication of the terminal band. At one extreme the species resembles *radians* as in the lightly marked female at the top of the plate, while the specimen at the bottom with more complete pattern and tendency to breaking up of the black border of secondaries, could easily be mistaken for *phalerata*.

It is interesting to compare the plate with Seifert's[3] illustrations of *nais* and *radians* to observe the similar range of variation in all these species; an equal range is found in *phalerata*. As Seifert says: "Each species is nevertheless bound to certain limits; and while the characters inclined to variation are the same in all, each species aims at a different ideal toward which the majority of its individuals develop."

[2] Psyche, 1927, xxxiv, 138.
[3] Jour. N. Y. Ent. Soc. 1902, x, 4, Pl. II; 82, Pl. XI.

Mark Catesby.

By Harry B. Weiss, New Brunswick, New Jersey.

"The Planters by the richness of the Soil, live after the most easie and pleasant Manner of any People I have ever met with; for you shall seldom hear them Repine at any Misfortunes in life, except the loss of Friends, there being plenty of all Necessaries here, and the Planters are the most hospitable People that are to be met with. . . ."

"The Country in general is adorned with large and Beautiful Rivers and Creeks, and the Woods with lofty Timber, which afford most delightful and pleasant Seats to the Planters, and the Lands very convenient and easie to be fenced in, to secure their Stocks of Cattle to more strict Boundaries, whereby with small trouble of fencing, almost every Man may enjoy to himself an intire Plantation."

"The Girls are most commonly handsome and well Featur'd, but have pale or swarthy Complexions, and are generally more forward than the Boys, notwithstanding the Women are very Shy, in their Discourses, till they are acquainted. The girls are not only bred to the Needle and Spinning, but to the Dairy and domestick Affairs, which many of them manage with a great deal of prudence and conduct, though they are very young."

"The Men are very ingenious in several Handycraft Businesses, and in building their Canoes and Houses; though by the richness of the Soil, they live for the most part after an indolent and luxurious Manner; yet some are laborious and equalize with the Negros in hard Labour, and others quite the Reverse; for I have frequently seen them come to the Towns, and there remain Drinking Rum, Punch and other Liquors for Eight or Ten Days successively. . . .

"This Colony boasts more Advantages than several others on this Continent, both for Pleasure, Ease and Profit: Were the Inhabitants as industrious as the Soil is bountiful they might supply themselves with all the Necessaries of Life. With little Industry they may have Wines, Oil, Silk, Fruits, and many sorts of Drugs, Dyes, &c. Here the Curious may have a large Field to satisfie and divert their Curiosity; here they may collect strange Beasts, Birds, Fishes, Insects, Reptiles, Shells, Mines, Herbs, Flowers, Plants, Shrubs, Trees, Gums, Tears, Rosin, Stones, and several other things that yield both Profit and Satisfaction." *

Such was the Carolina, where Catesby, who was probably the first illustrator of North American insects, lived for some

*The Natural History of North Carolina by John Brickell, M. D. (Dublin, 1737).

years, hunted with the Indians, and where he collected and painted specimens of natural history.

Born in England, probably in London, about 1679 or 1680, he came to America in 1712, landing in Virginia April 23 of that year. Catesby had relatives in Virginia, but in addition he wanted to explore the natural history of countries other than his own. He stayed seven years or until 1719, and according to his own statement, did little but observe and admire the fauna and flora. However, he took back to England with him, a collection of plants and specimens which excited the interest of Sir Hans Sloane and Doctor Sherard.

During the next several years he arranged and named his specimens, a number of which found their way into Sloane's museum. Dr. William Sherard, with whom Catesby became friendly through their mutual botanical interests, advised him to undertake a more serious study of the fauna and flora of Carolina and the neighboring areas with the idea of publishing his findings. And so after getting financial help from twelve "noble Persons and Gentlemen," including Sir Hans Sloane, Richard Mead, M. D., His Grace the Duke of Chandois, and the Honorable Colonel Francis Nicholson, Catesby, with this idea, left England in 1722 and landed in Carolina May 23 of the same year. Upon his arrival at Charles Town he immediately called upon General Nicholson, who was then governor of South Carolina. From then on until 1726 he was busy with his observations and explorations.

Upon his return to England in 1726, he found his work so favorably received that he was advised to publish it, but on account of the expense of engravings, this did not seem possible. However, Mr. Joseph Goupy advised Catesby to study etching and do the work himself. This he did and as a result there finally appeared, The / Natural History / of / Carolina, Florida and the Bahama Islands: / Containing the Figures of Birds, Beasts, Fishes, Serpents, Insects and Plants: / Particularly, the Forest-Trees, Shrubs, and other Plants, not hitherto described, / or very incorrectly figured by Authors. / Together with their Descriptions in English and French. / To which, are added / Observations on the Air, Soil and Waters: / With Remarks upon / Agriculture, Grain, Pulse, Roots, &c. /

To the whole, / Is Prefixed a new and correct Map of the Countries Treated of. / By / Mark Catesby, F. R. S. / Vol. I / London / Printed at the Expence of the Author, and sold by W. Innys and R. Manby, at the West End of / St. Paul's, by Mr. Hauksbee, at the Royal Society House, and by the Author, at Mr. Bacon's / in Haxton: / MDCCXXXI.

This is an imperial folio occupied almost entirely by plates of birds resting on trees and shrubs, with brief descriptive text, in English and French. Catesby gave the plants English and Indian names, and Doctor Sherard supplied the Latin ones. As for the birds he called most of them "after European Birds of the same Genus, with an additional Epithet to distinguish them."

Volume II, which appeared in 1743, covers fishes, crabs, turtles, snakes, plants, lizards, frogs, squirrels, rabbits, trees, etc., and the last part is devoted to the soil, weather, agriculture, the Indians and their manufactures and arts. Catesby was too busy with plants and birds to pay much attention to insects, concerning which he says. "As for Insects these Countries abound in numerous kinds, but I was not able to delineate a great Number of them." However, he did manage to figure twenty-six, all but three appearing in the last volume and almost half of them being lepidopterous. The insects appear only incidentally on the plates sometimes associated with the plants, and the entomological text is quite brief, dealing with colors and markings and sometimes the caterpillars and cocoons.

Allibone refers to Catesby's work as having been published in numbers from 1731 to 1748 and in Pulteney's "Sketches of Botany" it is noticed as follows: "In this splendid performance the curious are gratified with the figures of many of the most beautiful trees, shrubs, and herbaceous plants that adorn the gardens of the present time." According to Hagen,* a second edition revised by Edwards appeared in London in 1754, and a third edition with a Linnaean index in 1771. A German translation was published at Nüremberg in 1756. There also appeared at Nüremburg in 1750 and in 1777 his "Piscium Serpentum, Insectorum aliorumque nonnullorum Animalium nec non Plantarum quarundam Imagines."

*Bibliotheca Entomologica.

Of Catesby's insect illustrations, Walton states that his work is "rather crude as compared with that of contemporaneous illustrators of the better class, and does not approach the excellence of the artists of a slightly later period, such as that of Abbot, William Wood, Jr., or Peale." Of his own work Catesby says, "As I was not bred a Painter I hope some faults in Perspective, and other Niceties, may be more readily excused, for I humbly conceive Plants, and other Things done in a Flat tho' exact manner, may serve the Purpose of Natural History, better in some Measure than in a more bold and Painter like Way."

Catesby in 1747 read a paper "On the Migration of Birds," before the Royal Society, which was supposed to contain new facts on the subject, and under his authorship there was produced in London in 1737 (?) or 1767 (posth.), "Hortus Britanno-Americanus, or a Collection of 85 curious Trees and Shrubs, the production of North America, adapted to the Climate and Soil of Great Britain," with seventeen colored plates. He died at the age of seventy in his home on Old Street, London, December 23, 1749.

In volume II of his "Natural History of Carolina," Catesby printed a "List of the Encouragers" of his work, numbering about 158 subscribers, some of whom took two and three books. This list embodies "Her late Majesty Queen Carolina, Her Majesty the Queen of Sweden, Sir Hans Sloane, Henry Trelawney Esq., The Right Hon. the Lord Carteret, Richard Mead" and many others including the following who were identified with the colonial life of this country: "Mr. John Bertram of Pennsilvania, Alexander Hume, Esq., of Carolina, The Hon. Rob. Johnson, Gov. of S. Carolina, Hon. Lieut. Gen. F. Nicholson, Gov. of S. Carolina, Thomas Pen, Esq., Proprietor of Pennsilvania, Sir John Randolph of Virginia, Benj. Whitaker, Esq., of Virginia, and The Hon. Alex. Skene of S. Carolina."

"John Bertram of Pensilvania" is of course the Pennsylvania Quaker, John Bartram, first to describe the plants of the New World. Robert Johnson was governor of South Carolina under the Proprietors and again in 1730 under the first regular Royal administration. In 1718 he had been active in putting down piracy. He died in 1735 and never saw the second volume of

Catesby's work. General Sir Francis Nicholson was industrious and experienced in colonial affairs. In 1689 he was Lieutenant Governor of the Dominion of New York; in 1690, Lieutenant Governor of Virginia; in 1694 Governor of Maryland; then again to Virginia where he succeeded Andris; then Governor of Nova Scotia, ending as Governor of South Carolina in 1720. Nicholson was a strong friend and patron of the Church and education. He was instrumental in starting churches from Rhode Island to Virginia, in the foundation of William and Mary College, and had a reputation for quarreling and mixing his love affairs with business. Thomas Penn, one of the sons of William Penn, founder of Pennsylvania, succeeded to the share in the proprietary formerly held by his brother John, who died in 1746. He was interested in the college at Philadelphia, the hospital, library and various literary, charitable and religious societies. Benjamin Whitaker was a lawyer and one time Attorney General and Chief Justice of South Carolina, and Alextnder Skene was a member of the Council about 1731, and interested in political affairs.

With the exception of John Bartram it is doubtful if the other colonial subscribers took more than a passing interest in natural history, or more than a gentleman was supposed to take at that time. Nevertheless, credit should be given them for their support, when the settlers were busy subduing the land and the Indians.

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An Additional Annotated List of the Ants of Mississippi.

With a Description of a New Species of Aphaenogaster (Hym.: Formicidae).*

By M. R. Smith, A. and M. College, Mississippi.

(Continued from page 246.)

96.—Aphaenogaster fulva aquia var. picea Emery.

Boyle. Several colonies of this ant were found in the soil beneath logs at Boyle. The variety is characterized by being darker than the subspecies, the specimens being usually pitch-blacp; in other respects this and *aquia* are very similar.

97.—Aphaenogaster texana var. furvescens Wheeler.

A. and M. College. A worker of what I believe to be this species was taken from the soil around the base of a stump. At a superficial glance one might confuse the workers of *texana* and its various forms with that of *fulva* and its forms. The heads of the workers of the former species are rounder posteriorly than the heads of the workers of *fulva* and its forms. The scapes of the former are longer and more slender and there are other important differences. This variety is a very dark form of *texana*.

98.—**Aphaenogaster texana flemingi** subsp. nov.

☿. Length: 4.3-4.6 mm. Head, excluding the mandibles, much longer than broad, slender, and very strikingly constricted in the region posterior to the eyes, but especially so at the junction of the head and thorax. Eyes rather large and prominent, convex, placed at a distance from the mandibles equivalent to one and one-half times their greatest diameter. Antennae long and slender, scapes surpassing the posterior angles of the head by at least one-third their length, segments 3-8 of the funiculus subequal, segments 9-12 slightly enlarged and forming a rather indefinite, distal club.

Viewed laterally, the segments of the thorax appear as follows: the prothorax is rather gently and evenly convex dorsally; the mesothorax bears a noticeable transverse depression midway of its length, and there is a prominent constriction between the mesothorax and the epinotum; the base of the epinotum is hori-

*A contribution from the Mississippi Agricultural Experiment Station.

zontal, longer than the declivity, and bears a pair of prominent, acute spines, which are longer than broad at their bases. Postpetiole rather voluminous, approximately twice the width of the petiole.

Head, thorax, petiole and postpetiole punctate; frontal area, legs, and gaster smooth. Mandibles, clypeus, frontal area, posterior region of the head, prothorax, legs, petiole, postpetiole and gaster shining, remainder of body subopaque.

Hairs yellowish, erect, sparsely scattered over the body. Pubescence also yellowish, most easily discernible on the antennae and legs, on which it is abundant and appressed.

Color ferruginous brown.

Type locality: A. and M. College, Mississippi. Descriptions based on many cotype specimens which are in the collection of Dr. W. M. Wheeler, the author, and the Department of Entomology, of the Mississippi A. and M. College.

A colony consisting of 90 workers and many larvae were collected from the base of a rotten pine stump during mid-January, 1928. In this stump were numerous termites, none of which seemed to have been disturbed by the ants.

This new subspecies is named in memory of the late Mr. Andrew Fleming of Sibley, Mississippi, a man who made many important contributions to the knowledge of the ants of Mississippi.

The worker of this new subspecies, although allied to the worker of *Aphaenogaster texana* Emery and its varieties *furvescens* and *carolinensis* Wheeler, differs in an important number of respects, namely: that its head is more strongly constricted behind the eyes, its epinotal spines are larger and longer, and its sculpturing more feeble. The posterior region of the head, and the dorsum of the prothorax are so faintly sculptured that they appear glabrous. Future studies of this species may necessitate raising *flemingi* to specific rank; for the present, however, this subspecies has been referred to *texana* because the worker resembles that of *texana* in having a head with very much rounded posterior angles, long, slender antennae, a similar petiole and postpetiole and other such characters.

99.—Crematogaster minutissima Mayr.

A. and M. College, Sibley. On January 27, 1928, a colony of this exceedingly small, yellow ant was dug from the soil at the base of a stump in a wooded area here, near the college. The colony was composed of at least 6 deälated females, several hundred workers, and numerous larvae. Another colony from the same type of habitat was found in the earth about six inches from the surface. This colony contained at least 8 or more deälated females, about 150 workers, but apparently no larvae.

In this locality *minutissima* does not appear to be as common a species as *victima* subsp. *missouriensis* Pergande. It resembles this ant in many respects but is noticeably smaller. This species may prove to be a subspecies or variety of *victima,* as is *missouriensis.*

100.—Strumigenys pulchella Emery.

Columbus. Three workers and a deälated female were collected from beneath the bark of a pine log and a pine stump. The frass beneath the bark of both the log and stump was slightly moist. The deälated female which came from the stump was found there along with the following other species of ants: *Solenopsis molesta* Say, *Proceratium croceum* Roger, *Proceratium crassicorne* Emery and *Pheidole dentata* Mayr.

The worker of this species resembles the worker of *Strumigenys pergandei* Emery. It can be distinguished from the worker of that species however by its smaller size (1.5-1.66 mm.), by the presence of a prominent tooth near the base of each mandible, which is hidden by the edge of the clypeus, and also by the fact that the anterior edge of the clypeus only bears ten or twelve club-like or scale-like hairs.

Subfamily Formicinae.

101.—Lasius umbratus mixtus var. aphidicola Walsh.

Boyle, A. and M. College. In a wooded area at Boyle, a large colony of this ant was found beneath a log. Among the ants were many pinkish mealy bugs, which Miss Gladys Hoke determined as *Pseudococcus morrisoni* Hollinger. Wingless aphids in the same nest were tentatively determined by Mr. A.

L. Hanmer as *Pemphigus lactucae* (Fitch). The workers from this colony were much lighter in color and more glabrous than the typical form which was collected at A. and M. College in a rotten stump along the bank of a stream. A species of mealy bug near *morrisoni* was also found with this colony.

102.—Prenolepis arenivaga Wheeler.

Columbus. Many nests of this ant were found in the pure white sand in a locality near Columbus. The nests were small craters, each with a central entrance.

The workers of *arenivaga* are characterized by their pale yellow color, their glabrous bodies and by the fact that the hairs covering the body are dark at the base and light at the apex. The antennal scapes bear erect hairs.

103.—Prenolepis imparis var. testacea Emery.

A. and M. College. This pale yellowish variety of *imparis* can be found nesting in the woods here. The ants seem to like moist spots for their nests. Their habits are similar to those of the species.

104.—Formica pallide fulva var. succinea Wheeler.

A. and M. College. A nest of this species was found on the side of a hill very near the edge of some woods. The nest of the ants extended for a foot and one-half in the clay loam. From this nest were taken many workers, pupae, larvae and eggs. The workers were very timid and tried to hide beneath particles of soil. I noted that some of them had been bringing in for food, the bodies of a soldier beetle, *Chauliognathus pennsylvanicus* DeGeer, an undetermined species of membracid, and some flesh flies.

This variety is distinguished from the species in that the ants are of a deeper reddish tinge and a more glabrous appearance than those of *Formica pallide fulva* Latr. The workers bear a very striking resemblance to the lighter forms of *Formica pallide fulva* subsp. *nitidiventris* Emery.

105.—Formica pallide fulva subsp. nitidiventris Emery.

Boyle. A colony of this ant was found in the soil beneath a log in a dense woodland patch at Boyle. Beneath the same log were three other species of ants, but none of these was nesting in contact with *nitidiventris*. The ants which were found here were: *Camponotus castaneus* Latr., *Lasius umbratus mixtus* var. *aphidicola* Walsh, and *Aphaenogaster lamellidens* var. *nigripes* M. R. Smith.

106.—FORMICA RUFA OBSCURIPES var. MELANOTICA Emery.

A. and M. College. Last spring (1927) one of the students brought to the laboratory a small worker of what I believe to be this species. When questioned as to where he had collected it, the student stated that he took the specimen in the edge of a patch of woods near the college. At my request he later went back to hunt for more specimens but was unable to find any.

New Bees From the Miami Region of Florida (Hymen.: Andrenidae, Megachilidae).

By S. GRAENICHER, South Miami, Florida.

Triepeolus rufithorax n. sp.

♀ Length about 10.5 mm. Head and abdomen black, thorax dark red with the exception of a greater portion of the metathorax, which is mostly black.

Punctures on lower sides of face very delicate and close, coarser above the antennae. Vertex shining, coarsely punctured. Mandibles red with dark tips. Labrum, clypeus, supraclypeal area and first three joints of antennae red. Clypeus minutely sculptured with scattered punctures, and a median low smooth and shining ridge above. Supraclypeal area distinctly punctured, produced into a narrow black-tipped ridge between the antennae. Sericeous pubescence on middle portion of face.

Golden ornaments distributed as follows: band on pronotum, attenuated towards the middle and slightly interrupted; a semicircular patch back of tubercle; a small patch behind the tegula; two parallel narrow bands below the scutellum, running into a tuft of long hairs on each side; a comma-shaped, oblique band on each side of posterior face of the propodeum; two indistinct short longitudinal lines on the mesonotum in front; a short, hardly visible line on the mesopleura. Mesonotum finely roughened, the same as the sulcate scutellum with its conical blunt tooth on each side. Mesopleurae more coarsely sculptured than mesonotum. Tegulae reddish testaceous, smooth and shining. Wings dark, especially their outer margins. Nervures and stigma black. Legs entirely red, including the tibial spurs. Claws dark.

Bands on abdominal segments 1 to 3 golden yellow. Apical band on first segment narrow and interrupted, widened considerably along the sides. Bands on second and third segments slightly interrupted, widened toward the margins, that on fourth entire and more cinereous. Fifth with a triangular cinereous patch on each side, its middle portion striato-punctate, slightly shining, and its apex truncate. The first ventral segment reddish on its posterior half, with a distinct median triangular pit near the apical margin. Ventral segments 2 to 4 finely punctured, shining, with a reddish tinge near their apices. Segment 5 rounded and its apex turned downward to a slight extent.

♂. Agrees very closely with the female. More pubescence on the face below and around the antennae. Ornaments lighter, more cinereous. Bands on the third to sixth abdominal segments distinctly cinereous. Apical plate narrowed considerably towards the rounded tip, and surrounded by a black ridge. A cinereous band on apex of ventral segment 2, ventral segment 3 entirely covered with cinereous hairs.

Type: ♀, Miami, July 16, 1927. Allotype: ♂, South Miami, July 22, 1924. Of the 24 paratypes, 18 were collected by the author at Miami and South Miami, and the following 6 are in the collection of the American Museum of Natural History of New York. The labels on these give the following information: 1 ♀, F. 4666 B, Miami, Fla., April 11-21, 1923; 1 ♀ F. 4667, Royal Palm State Park, Fla., April 12-18, 1923; 2 ♀ ♀, F. 4671S, Royal Palm State Park, Fla., April 12-18, 1923; 2 ♀ ♀, F. 4675A, Miami, Fla., April 11-21, 1923.

Three of these were captured at Royal Palm State Park, about 44 miles southwest of Miami, and these records establish a more southern range than my specimens indicate. For the loan of this material for study, I am greatly indebted to the Entomological Department of the American Museum of Natural History of New York, and in addition I wish to thank Mr. Herbert F. Schwartz, a member of that Department, through whose kind efforts I obtained the loan.

This species varies in length from about 9 mm. to 10.5 mm. There is also some variation in color; the red extends in some individuals to the first abdominal segment, and in two (♂ and ♀) even to the second.

The most conspicuous character of this species is the predominant red color of the thorax. The following parts are also red: mandibles, labrum, antennae at base, large portion of face, and legs except the claws. The yellow hairy ornaments of the thorax and abdomen show in fresh specimens a golden tinge. This combination of characters separates the species from any species of our fauna described so far.

Males have been collected from March 31 to June 22. The females are on the wing throughout the warmer season, from about March 28 to October 26. They were visiting the flowers of the following species: *Vernonia Blodgettii, Bidens leucantha; Melanthera radiata, M. parviflora, Flaveria linearis, Borrichia frutescens, Sida carpinifolia, Poinsetta cyathophora* and *Sabal palmetto* *. The first six mentioned belong to the Compositae.

Heriades crawfordi n. sp.

♀ Length about 7.5 mm. Face distinctly longer than broad, clothed with sparse white pubescence, which is short in the middle, longer on the sides next to the antennae. Punctures small and very close on the clypeus, coarser on vertex and occiput. A very narrow, low, shining ridge on upper middle of clypeus. Lower margin of clypeus straight. Mandibles broad, ending in a strong, pointed tooth. Antennae black.

Mesonotum closely punctured in front, more coarsely and sparsely towards the scutellum. Scutellum flat and shining, with few strong punctures. Pleurae more coarsely sculptured than mesonotum. Disk of propodeum with a transverse row of deep pits, bounded by a posterior high ridge. Posterior face with moderately deep punctures laterally, and a median smooth and shining sulcus, which broadens out above. Wings dusky on outer half. Tegulae, nervures and stigma black. Legs black, with testaceous claws, and long whitish hairs on posterior basitarsi.

Abdomen with clean-cut white apical hairbands on segments 1 to 5. Punctures small and close on segments 1 and 2, stronger and more separated on segment 3, and gradually becoming finer on remaining segments. Concavity on base of first segment shallow, bounded by a distinct narrow rim. Surface of concavity shining, with punctures in upper half, and a short sulcus below. Ventral scopa white.

♂ Length about 6.5 mm. Face narrower, body, and especially face, more hairy, and punctures in general finer and closer than in opposite sex. Second antennal joint about as long as broad, third shorter.

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* Nomenclature according to Small's "Flora of Miami" or the same author's "Flora of the Southeastern United States."

Apical portion of abdomen bent downward and forward from third or fourth segment on. Sixth segment with a truncate apical margin, and a preapical depression on each side. First ventral segment produced considerably towards the middle of its apex. It forms a blunt projection covering the base of the second segment. The apical margin of the latter is slightly membranous in the middle. Segments 3 and 4 are thin and membranous to a greater extent. Segment 5 is split, forming 2 rounded membranous lobes. Membranous parts testaceous.

Described from 3 males and 12 females taken at South Miami, Miami and Hollywood, on the flowers of *Croton linearis*, *Pterocaulon undatum* and *Chrysopis Tracyi*. According to the records on hand, this bee flies during the cooler months, from about the end of October to the middle of April.

Type: ♀, South Miami, November 12, 1924. Allotype: ♂, Miami, December 4, 1924.

Large for a *Heriades*. The structures of the ventral segments in the male are very characteristic of the species. The ♂ of this species has the first ventral abdominal segment elongate medially, and agrees in this respect with *H. leavitti* Crawford, Can. Ent. 45, 270 (1913). In *H. leavitti* this elongation is pointed at the apex, according to the description, in *H. crawfordi* it is rounded. There is a distinct difference between the two in the puncturation of the dorsum of the abdomen. On the first 3 segments of *H. leavitti* the punctures are fine and close, "hardly half a puncture width apart". In *H. crawfordi* segment 2 has very close and fine punctures, on segment 1 the punctures are close but distinctly coarser, and on segment 3 coarse and mostly the entire width of a puncture apart.

H. leavitti is a smaller insect than *H. crawfordi*. The ♀ of the former has not been described.

The ♂ of *H. carinatus* Cresson, Proc. Ent. Soc. Phil. 2, 383, (1864) has the apex of the first ventral abdominal segment truncate, not elongate and a blunt tubercle on its disk. This separates it from either *H. crawfordi* or *H. leavitti*.

Stelis floridana n. sp.

♀ Length about 10 mm. Ground color black. Ornaments partly yellow, mostly red. Legs red. Head covered with short white hairs, especially around the antennae. Clypeus dull, closely and finely punctured. Rest of head shining with coarse punctures. A broad band on side of face yellowish on lower half, reddish above. A transverse red band behind the eyes. Antennae black, lighter on flagellum beneath.

Punctures on mesonotum distinct and crowded, coarser and more separated on scutellum and sides of thorax. Tufts of white hair beneath tegulae and wings. A red band on each side of mesonotum, curving forward, and becoming yellowish, broadly interrupted on the front margin. Scutellum red, broadly rounded on sides, and slightly truncate at apex. Axillae red with punctures smaller than on scutellum. Tubercles red, shining, finely punctured. Tegulae red and shining, with fine punctures, and a faint dark annulus on top. Upper anterior corner of mesopleura red as far as middle of tegula and half way down. Spot under hind wing and a smaller one in lower hind corner of mesopleura red. Wings sooty, darker along the outer two-thirds of the front margin. Stigma brown, veins black. Middle femora broader than the other ones. Legs red, including tibial spurs and claws. Hind coxa large and flat, blackish on the outer surface.

Abdomen shining, coarsely puntured on second segment, finer on basal and third segments, and gradually becoming finer and closer towards the sixth. A narrow, smooth apical space on segments 1 to 5. First segment red, black at base; second with a red scarcely interrupted band, narrowed medially. Third with a subapical yellow band, narrow and emarginate in the middle. Subapical yellow band on the fourth, with lateral indentations and a median emargination. Fifth with a short emarginate yellow band, about one-third as broad as the segment. Sixth entirely black. Much red on the first ventral segment, and a faint indication of the same color along the apices of ventral segments 2 to 5. Sixth black, flat and rounded at tip.

♂ Length about 9 mm. Very much like the female, but ornaments differing as follows: red triangular mark on basal two-thirds of clypeus. Band on second abdominal segment more narrowed medially, that on third reddish, broadened on sides. Fourth with reddish ornaments, consisting of a short narrow median band, widely separated from a triangular spot on each extreme side. Remaining segments black. Apex of sixth segment truncate with a semicircular emargination. Seventh with an apical tooth. The first five dorsal segments are turned inward on the sides, thereby overlapping the ventral segments. First ventral about one-half as broad as the abdomen, coarsely punctured at base, and shining on apical half with a hyaline apical margin. Second shining with coarse punctures, and a red smooth apex, which is turned upward, and considerably produced over the third. The latter split in the middle, forming two round, membranous lobes. Fourth black and punctured at base, ending in two very thin projecting membranes. Fifth flat, not membranous, incised in middle. Sixth black and shining, slightly rounded at apex, and with a median longitudinal furrow.

Described from 1 female and 4 males taken at Homestead (about 23 miles southwest of Miami) July 21, 1916. I have not come across it since.

Type: ♀, Homestead, Dade County, Fla., July 21, 1916. Allotype: ♂, Homestead, Dade County, Fla., July 21, 1916.

Its nearest relative is *S. costalis* Cresson (Texas), from which it differs in color, shape and distribution of its ornaments. Mr. J. C. Crawford, to whom I sent a ♂ specimen, compared it with specimens of ♂ *costalis* in his collection, and wrote to me, among other things, that he had never seen a *costalis* as big as the specimen (of *floridana*) sent to him, nor one with the marks red.

I take this opportuity to thank Mr. Crawford for the valuable information received from him lately, as also in previous years.

Personals.

M. P. Lesne, the well known Coleopterist, was elected an honorary member of the Entomological Society of France, December 14, 1927.

Dr. M. T. Smulyan is working on a revision of the genus *Perilampus* (Chalcidae) in No. America.

Prof. T. V. Ramakrishna Ayyar, the Indian Entomologist, has just returned from his world tour after visiting America, England, and the Continent, as announced in the NEWS for February, 1927. In America he spent about eight months at the Stanford University as a graduate research scholar. That University conferred on him the degree of Ph. D., in recognition of his past work in Zoology and Entomology in India and for a thesis on "A contribution to our knowledge of the Thysanoptera of India". Before leaving the States Dr. Ayyar visited a few Entomological Institutions including the U. S. National Museum. He then crossed over to Europe and after spending some time in the British Museum and other places of scientific interest returned to India after a short ramble on the Continent.

Dr. Ayyar with his 30 years' work at Entomology and his recent personal experiences with many eminent Entomologists in America and Europe and with the honor of a Doctor's degree will be a valuable asset to his country. In a recent lecture he delivered on the subject of his foreign tour Dr. Ayyar expressed his great admiration for the work of American Entomologists, and his sincere gratitude for the uniform and warm hospitality he received everywhere in America.

Dr. Ramakrishna Ayyar's special groups are Indian Thysanoptera, Coccidae, and Hymenoptera, especially parasitic forms. His address is Agricultural College, Coimbatore, Lawley Road P. O., S. India.

S. Manin, Madras Public Library, Madras, S. India.

Lepidopterorum Catalogus.

The *Lepidopterorum Catalogus* contains in Latin the names, references to the whole literature, the synonymy and the geographical distribution of all species of Lepidoptera, known today. Such a catalogue has not existed hitherto. For in the works of Staudinger-Rebel, Kirby, Cotes-Swinhoe, Dyar and others only some regions or groups are treated. It is unnecessary to dwell upon the necessity of the *Lepidopterorum Catalogus* for all students and collectors of butterflies and moths. The *Coleopterorum Catalogus* and the *Fossilium Catalogus* are issued by the same publisher.

The work is appearing in parts. Published till now: 33 parts; 3 others are in preparation. An index-volume will appear after completion of the catalogue. The literature on the biology and the development and that on the noxious species is listed with special care.

We now take the liberty to ask you to help us by treating one of the groups which are still unpublished. We address ourselves in all cases only to the first specialist. Kindly let us know your decision as soon as possible. We shall then inform you about the particulars (author's fee, free copies, etc.).

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Bequest to the Entomological Society of America.

Readers of Entomological News will be interested to know that the Entomological Society of America has received a bequeath of $1,000.00 left by the late Miss Mary E. Soule of Brookline, Mass. J. J. Davis, *Secretary-Treasurer.*

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

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SPECIAL NOTICES.—**Catalogue of Indian Insects.**—[Of this work parts 14—Palpicornia by d'Orchymont, 15—Cecidomyidae by Senior-White, 16—Cosmopterygidae and 17—Yponomeutidae by Bainbrigge Fletcher have just appeared].

On the male of Dixippus morosus, and some observations and experiments carried on with this species by Dr. Viktor Janda. Translated from the author's German resumé, published in Casopis, Vol. XXIII, pp. 27-42, 1926, with plates.

Casopis is a Czecho-Slovakian Journal, available to but few English-speaking people, and while the studies of the author have also been carried on by other investigators, yet, the literature on this subject is very meagre, and it appears to the translator that the article is of sufficient importance to interest the general English reader of biological literature.

"Among the parthenogenetic and bisexual reproduction of the Phasmids there are many transitional stages. There are species where males are great rarities, as *Bacillus algericus*, *B. gallicus*, *B. atticus*, *Dixippus morosus* and others, and some unknown, but also such in which the males predominate, as *Leptynia attenuata*. Among 1000 *D. morosus* specimens, there is but one male, while among 100 *L. attenuata* there are but 35 females. Gynandromorphs in all possible combinations of male and female characters have been observed. The *Dixippus* males and females are diploid; two polar bodies are formed in the eggs of *D. morosus;* they retain however their full chromosome number. According to Sinety the spermatozoe determine the male sex in some of the Phasmids, the males of *D. morosus,* however, can generate from unfertilized eggs.

In the following lines I will give my conclusions, based upon observations and experiments which I have carried on.

In the beginning of May, 1925, I found among my parthenogenetic rearing of *D. morosus* a male (imago), which lived until the end of June (same year). It was 6 cm. long, nearly flat, olive color. The form of the abdominal segment and copulatory apparatus of this male is figured on plate II, ff. 1, 2, 3 (l.c.), I did not observe a copula.

From a female isolated in the larval stage, I received eight parthenogenetic generations; the vitality of the last generation was not in the least impaired.

The length of the life of the parthenogenetic females was 9½ to 10 months.

One isolated female laid 264 eggs during its whole life, among them 4 a trifle smaller than normal, and 8 dwarfed; from another isolated female I received 322 normal eggs, of medium size and two dwarfed; the egg-laying process required about six months; among 2220 eggs from different females were 11 medium-sized, 17 dwarfed, and one with two micropyles, and without opercule. The dwarfed eggs as well as the egg with the two micropyles, were sterile; average length of my females was 7.4 cm., two were but 6.1 and 6.2 cm., respectively.

The eggs of the dwarfed females were of quite normal dimensions.

On March 19th, 1919, I placed freshly laid *Dixippus* eggs in the following temperatures, one directly after the other: 44°C (20 minutes), 42°C (20 minutes) and 35°C (15 minutes). On August 5th, 1919, the first larvae appeared.

Long exposure to ether-fumes produced the falling off of the elliptical shields and micropyles.

When the temperature falls to 0°C (zero) or below, one can often observe the larvae in the cage falling to the floor, and lie there with outstretched legs in a stupified condition. At 36°C there is a noticeable activity in the movement of the larvae; at 39°-40°C, after a half hour's exposure, a stifling takes place, which however after 2-10 minutes in normal temperature, fully restores the larvae; after 15 minutes exposure to a temperature of 45°C, all the larvae of *Dixippus* died.

In warm water 40°-45°C, laming of the legs took place, but when brought to normal requirements, they recovered in about two hours and became lively.

If ether-fumes are injected into the cage, there is no noticeable change in the behavior of the larvae for about five minutes, when they begin to move their front legs; these movements last about five minutes, and then one after another they fall to the floor with outstretched legs. The larvae and imagos can endure ether fumes fairly well. Specimens of *Dixippus* from which the brain ganglia had been entirely removed, did not change in color, nor did they exhibit any disturbance in their movements, save that they moved faster; only after the destruction of the oesophagus with a needle or after decapitation, do they first show signs of the loss of coordinate walking power, and the decapitated specimens lie without moving, even if attempt is made to force them to move (compare Schleip and Buddenbrock); contrary to this I have found with *Nepa cinerea* and some other Rhynchota, that beheaded specimens retained to the last degree the complicated coordinate walking, grasping, and swimming movements.

If the head of a decapitated *Dixippus* is tied on with a fine thread, so that not much loss of blood takes place, the specimens can live 12 to 15 days, and lay a number of eggs.

The autotomy, especially of the hind legs, followed from a preformed fracture, when the leg in the proximal quarter of the femur was cut or injured, and the leg rested in a splint. At times the throwing off of the remainder of the leg took place only after moulting. The autotomy occurs but seldom after an injury of the leg, and the remainder of the tibiae often remains connected at the fracture, if the stumps of the feet assist in moving, thereby producing pressure against the splint. Cast off legs were again regenerated; the development of regenerated legs is the more complete the younger the individual is.

Also the eyes of *D. morsus* may, after entire extirpation, become regenerated. The regenerated eyes are much smaller than the normal. The regeneration is the more complete, the more moultings the operated individual undergoes. In cases where the regeneration of the totally removed eyes does not take place, the wound heals completely. The regeneration of operated eyes in *Tenebrio molitor, Periplaneta orientalis*, and *Nepa cinerea* proved successful experimentally. The inheritance of the dark and green colors of parthenogenetic females of *Dixippus* did not take place under ordinary experimental conditions. A change of color from the touch before and after the ether narcotization as also by the dipping of the larvae and imagos of *Dixippus* in warm water (44°), I have not observed." FRANK HAIMBACH.

OBITUARY.

Deaths of the following well-known entomologists have been reported in recent numbers of various journals, but have not been noticed in the NEWS hitherto.

ENRICO BRUNETTI died in London, January 21, 1927, at the age of 63 years. Of Italian ancestry, a Londoner by birth, a musician by occupation, he devoted many years to the study of the Diptera, fifteen of which he spent in India. (*Ent. Mo. Mag.*, Oct., 1927.)

JOHN HARTLEY DURRANT, born at Hitchin, Herts, England, Jan. 10, 1863, died at Putney, Jan. 18, 1928. Interested in the Microlepidoptera from an early age, he became curator for Lord Walsingham in 1886. The Walsingham collection was transferred to the Natural History Museum at South Kensington in 1910 and Durrant accompanied it there, becoming a member of the scientific staff. He was associated with Lord Walsingham in the preparation of the volumes on Microlepidoptera of the *Biologia Centrali-Americana* and the *Fauna Hawaiiensis*, as well as of articles on these moths in various journals, and of the Merton Rules of entomological nomenclature. (*Ent. Mo. Mag.*, March, 1928.)

Lt.-Col. J. W. Yerbury died Nov. 10, 1927, in Charing Cross Hospital, London, as the result of being knocked down by a motor car. He was born March 30, 1847, at Cerampore, Bengal, and served in the Royal Artillery from 1868 to 1892 in various parts of the world. He made extensive collections of insects of all orders which he distributed to friends and museums. From 1895 onward he was especially interested in Diptera. (*Ent. Mo. Mag.*, April, 1928.)

Gervase F. Matthew died on Feb. 10 at Dovercourt, Essex, England, on the eve of his 86th birthday. In 1861 he entered the Royal Navy as a clerk and retired in 1902 as Paymaster-in-Chief. "Throughout his long period of active employment, which included prolonged commissions on the Pacific, Australian and Mediterranean stations, he availed himself to the full of such opportunities for the study of Natural History as came in his way, though he concentrated mainly on the Lepidoptera of which he made large collections on every voyage. . . . On his retirement he settled at Dovercourt. . . . and continued to work this highly productive district until well past his eightieth year, as well as devoting much time and skill to the rearing of Lepidoptera. . . . At the time of his death [he] was one of the two Senior Fellows [of the Entomological Society of London], the Rev. A. E. Eaton, happily still with us, having been elected on the same day" [in July, 1865]. (J. J. W. in *Ent. Mo. Mag.*, April, 1928.)

The death of Marquis Henri du Buysson, known for his work on Elateridae, was announced at the meeting of the Entomological Society of France held on Oct. 12, 1927, but without further particulars.

As we go to press we regret to read in *Science* for Oct. 26, the announcement of the deaths of Dr. Eugene Amandus Schwarz, of Washington, on Oct. 15, 1928, and of Dr. Jean Brethes, of Buenos Aires, on July 2, 1928.

DECEMBER, 1928

ENTOMOLOGICAL NEWS

Vol. XXXIX No. 10

CHARLES ROBERT OSTEN SACKEN,
1828–1906

CONTENTS

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

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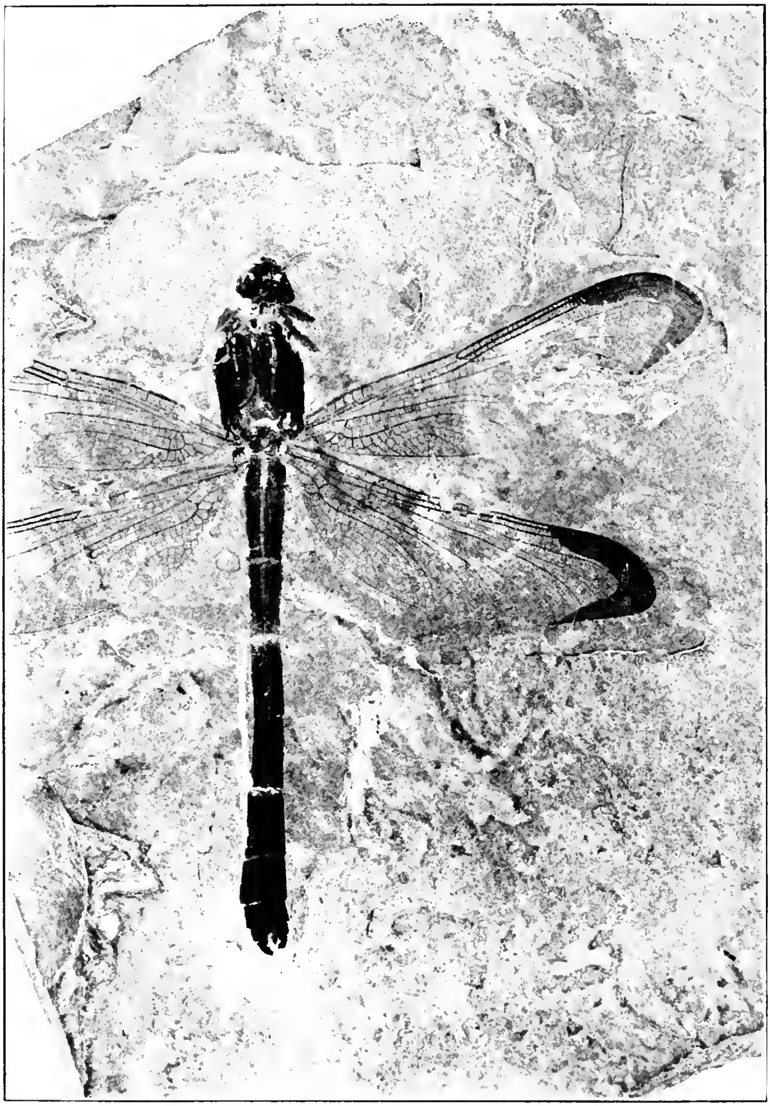


ZACALLITES BALLI—COCKERELL.

ENTOMOLOGICAL NEWS

Vol. XXXIX DECEMBER, 1928 No. 10

A Remarkable New Dragon-fly from the Eocene (Odonata).

By. T. D. A. Cockerell, Boulder, Colorado.

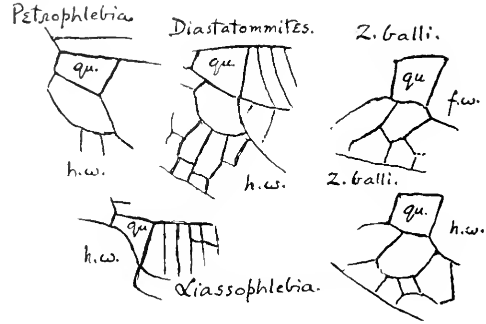
(Plate XIII.)

I am indebted to Professor O. M. Ball, of the Agricultural and Mechanical College of Texas, for the opportunity to describe one of the most magnificent fossil insects which has ever been discovered. It is a large dragon-fly, with the wings outspread as if set by an Entomologist, showing characters which appear to me to place it in a new family of the Anisozygoptera. Professor Ball writes: "It came from an assessment hole above the rim rock in Brushy Creek Canyon about twenty-five miles northwest of DeBeque, Colorado, and was collected by a miner who was at that time working for me." The horizon is Green River Eocene. Professor Ball thinks, but is not quite certain, that the actual discoverer of the specimen was Mr. A. P. Hawxhurst, then of Colbren, Colo.

ZACALLITIDAE new family.

Large Anisozygoptera, apparently related to the Archithemidae of Handlirsch, and perhaps directly descended from them. In Tillyard's work on the British Liassic Dragon-flies, published by the British Museum in 1925, there is a key to the families, in which the new fossil runs straight to Archithemidae, but differs from *Diastatommites* by a number of important characters, such as the lack of a definite specialized anal vein and anal area, the division of the cells beyond the quadrilateral or discoidal (after the first cell), and the form of the subquadrangle. Yet the quadrilateral is strikingly similar, with its upper apical angle acute. From *Selenothemis* our fossil differs in having nearly three times as many cross-veins between nodus and pterostigma, the discoidal not expanding on the apical side, and other features. *Archithemis* has a quite different discoidal, resembling that of *Liassophlebia*. The base of the wing is unknown in *Heterothemis*, *Liadothemis* and *Oryc-*

tothemis, but the parts preserved show no close affinity.* Tillyard questions the reference of those genera in which the discoidal is similar in upper and lower wings to the Anisozygoptera, thereby differing from Handlirsch. The genus now



described shows no important difference in the discoidals, but in other respects so closely resembles undoubted Anisozygoptera of the Mesozoic, that I do not think it can be excluded from that group. It is however not at all closely allied to the living *Epiophlebia*, though there is more affinity with the Oligocene *Sieblosia* of Bavaria. In *Sieblosia* however the subquadrangle is standardized in the manner of modern forms. The abdomen of *Sieblosia* is proportionately longer than in our insect, but the terminal appendages appear to be about the same. Since Tillyard has described (Trans. Ent. Soc. London, 1928) a typical Zygopteran from the Permian of the Falkland Islands, it is evident that these Anisozygopterous groups had no connection with the Zygoptera during the Mesozoic, and must be thought of as a once wide-spread type now almost entirely extinct. The more modern Anisoptera took their place, beginning with the Gomphidae.

ZACALLITES new genus.

Large insects with the aspect of Anisoptera, the wings probably held horizontally in repose, but the discoidal cell is undivided, and supratriangle and subtriangle are not represented. Head small; thorax stout but rather long; abdomen slender, ordinary for Anisoptera, the anal appendages stout and curved.

[**Zacallites* differs, *i. a.*, from the recently described *Karatawia* (Martynov, Bull. Acad. Sci. Russia, 1925, p. 587, fig. 9), from the Jurassic of Turkestan, in that the latter has the "triangle," or "quadrangle," confluent with the "basal," or "median," cell, as in the case of *Tarsophlebia*. —P. P. CALVERT.]

Nodus before middle of wing; pterostigma well developed, very long. Region beyond the nodus to the apex, and down to the radial forks, essentially as in the Zygopterous *Climacobasis*, though the stigma is considerably longer and the strong sector is conspicuously arched below the stigma. Discoidal cells or quadrilaterals similar in both pairs of wings, the upper apical angle acute, an approach to the Anisopterous type. In the Anisopterous series it approaches nearest to the Gomphidae, and a specially noteworthy feature is the straight (not zigzag) vein dividing the cells after the first beyond the discoidal, that is to say between MA and Cu2 (following Tillyard's revised nomenclature). This feature is observed in the Liassic *Heterophlebia*, except that there it begins four cells away from the discoidal. There is also such a vein in *Liassophlebia*, beginning after three cells from the discoidal. For other details see the description of the species.

The black at the wing-tips recalls species of *Orthemis*, *Thermochoria* and *Eleuthemis*, not otherwise related.

Zacallites balli n. sp.

Head, thorax and abdomen dark, the basal half of abdomen somewhat paler. Head and thorax about 17 mm. long, head 5.7 mm. wide, thorax 8 mm. wide; abdomen 47mm. long, 3 wide in middle, and 4 subapically. Anterior wing 39 mm. long, about 11 wide in middle, nodus 17 mm. from base; pterostigma 5.3 mm. long. Posterior wing 36 mm. long, 9.7 wide in middle, nodus 14.5 mm. from base, pterostigma 5 mm. long. Wings clear, with the apical margin black or dark brown, the dark color sharply defined, beginning on costa about 12 mm. from apex, and ending in a sharp point about 10 mm. from apex on lower margin; the width of the black in apical region about 3 mm. on anterior wings and nearly 4 on hind. The stigma is enclosed in this dark area, which also includes 7 or 8 costal cells before stigma. The detailed description of the venation is from the anterior wing.

Fourteen or fifteen cross-veins before nodus, and thirty between nodus and stigma, the more apical cells very small. Before the nodus, the cross-veins are not continuous with the next series below, but after the nodus they frequently, though by no means always, are. There are seventeen cells below the stigma, these being very small, and higher than broad. Beyond the stigma the cells are numerous, in two rows. Subnodus very oblique, with R3 separating just below its end, but with a short basal bend, which prevents it from being in a line with the subnodus. In the fork of R2-R3 are four cells before the doubling begins, but on one side the second cross-vein is divided above, making a Y. In the upper division, between R2 and R3, above the strong sector, the cells are very irregular, with three rows below the stigma, the upper two invaded by the black, while on the margin are six rows of very small cells, greatly crowded. In the lower division, below the sector, are twelve cells from the doubling to the further subdivisions, and then about four until there are three rows of cells, and at the widest part (2 mm. wide or high), below the middle of the stigma, are five rows of cells, while on the apical margin are six rows of small cells.

In the apical area there are three rows of cells between R1 and R2. Vein 1R3 arises in the usual manner 12 cells basad of end of subnodus, the last three cells above 1R3 much higher than broad. Beyond the level of the subnodus it runs close to R3, but apically rapidly diverges from it, curving downward, so that the interval forms a broad fan, with five rows of cells in subapical region. The fan is much broader than in *Climacobasis*. R4+5 is a very weak vein, arising at a sharp angle, and bounded below by three and a half square cells before level of origin of 1R3. In its course before the level of the nodus it has one row of square cells above and one below, about 16 below from its origin to level of nodus. In the apical field there is a broad fan above, as in the interval above 1R3. Vein MA is very strong, originating in the usual manner at the arculus, and having a straight course as far as level of nodus, with 19 or 20 cells below it between discoidal cell and level of nodus. Discoidal cell (quadrilateral) diamond shaped, with the upper apical and lower basal corners acute angles, the others obtuse angles; a strong straight vein, beginning in the second cell beyond discoidal cell, running close below MA, with one row of cells between, until the subapical spreading. Basal space not crossed. Subquadrangle not differentiated, merely an elongate (high) oblique cell below discoidal. No supratriangle (such as occurs in the Anisoptera). Vein Cu2 leaves the lower corner of the discoidal cell, at first downward, but rapidly curving and arching upward before the level of the nodus, and reaching the margin 21 mm. from the base of the wing. In the region below the arculus it is separated from the margin by two rows of cells, but at the widest part are about seven cells between it and the margin, and below it are two quite distinct curved sectors. Anal zigzag. The cubitoanal area in front wing is 4 mm. across at widest, in hind wing 5 mm.; a character of Anisozygoptera.

According to present estimates of geological time, the interval between the Lias and Upper Eocene must be over fifty million years. It is evident that in the evolution of insects new types have arisen without necessarily displacing the old, and this has happened more easily because the great multitude of situations occupied by insects affords opportunities for success to innumerable diverse species. Among the discoveries possible to entomologists, few are more interesting than surviving relics of nearly extinct groups, and these may be found either as fossils or in the living fauna.

The figures of the discoidals and adjacent cells of Liassic genera are copied from Tillyard. The beautiful photograph (Plate XIII), enlarged rather more than one half, is the work of my colleague, Mr. Paul F. Shope.

The specimen will be placed in the collection of the A. & M. College of Texas, College Station, Texas.

A New Species of Oedematocera with Notes on Schistocercophaga Townsend (Dipt.: Tachinidae).

By J. M. Aldrich, National Museum, Washington, D. C.

Besides *Hypostena flavcola* Coquillett, the type species, this genus contains *Hypostena gilvipes* Coquillett and the recently described *Oedematocera dampfi* Aldrich (Proc. Ent. Soc. Wash., vol. 29, 1927, p. 17). The last is a widespread and common parasite of the tropical Migratory Locust, *Schistocerca paranensis* Burmeister. *Gilvipes* has been reared from a cricket in Kansas (sent for identification by Professor S. J. Hunter). The host relations of *flavcola* are unknown, as are those of the new species here described.

Oedematocera striata new species.

Female.—Front at vertex .30 of head width, the eyes diverging very gradually and uniformly, so that just above the vibrissae they are separated by .48 of the head width. Pollen of head distinctly yellow on parafrontals and posterior orbits, silvery on parafacials; cheek about one-eighth of eye height, reddish; palpi and proboscis yellow; parafacials narrow, on lowest part only one-third as wide as third antennal joint. Antennae red at base, gradually infuscated on third joint, which is of ordinary width and four times the third; arista bare, reddish at base, thickened on about the basal fourth, basal joints short; facial ridges sharp, with some small hairs below. Ocellars proclinate, divergent; the usual two pairs of orbitals.

Thorax black in ground color, heavily overlaid with yellowish white pollen, but with two well-defined dark brown stripes, which include the dorsocentrals and reach nearly to the scutellum; a diagonal brown area behind and above the front coxae, and the scutellum bordered with brown; acrostichal 2, 2; dorsocentral 3, 3; sternopleural 1, 1; scutellum with three lateral, a smaller non-decussate apical, and small discal. Prosternum bare.

Abdomen shining brownish-black above, basal half or less of second and third segments with silvery-white pollen, which is wider on venter; fourth segment almost covered with pollen, the tip reddish; first segment without median marginals, second with discal and marginal pair, third with discal pair and marginal row of six; fourth with discal row and a few smaller marginals.

Legs yellow on coxae and base of femora, the rest brown. Mid tibia with one bristle on outer front side, front tibia with two on outer hind side.

Wings yellowish brown, first posterior cell open at apex; third vein curving backward near tip; fourth with rounded oblique bend, concave near tip. Hind crossvein joining fourth at three-fifths of distance from small crossvein to bend; several stout spinules at base of third vein; no costal spines. Calypters pale yellow. Length, 5.6 mm.

Described from one female, collected at Cabima, Panama, May 22, 1911, by August Busck.

Type.—Female, Cat. No. 41109, U. S. N. M.

The species differs very little from *Oedematocera dampfi* Aldrich except in the strikingly vittate thorax.

Townsend (Ent. News, xxxix, 1928, p. 152) has proposed the new genus *Schistocercophaga*, with *Oedematocera dampfi* as type. His description is in the form of a comparison,—"Differs from *Hypophorinia* as follows," etc. Unfortunately, he does not give a reference to the description of *Hypophorinia;* it was described by him in Revista Museo Paulista, vol. xv, 1926, p. 279. The term "described" can be used only in a qualified sense, as the student, after tracing down the reference, will find the name proposed in a key with no description except the couplets of the key, which are composed in a jargon of Portugese and Latin abbreviations*. The genotype (of course

*Townsend's abbreviations were discussed in the taxonomic section of the International Zoological Congress at Ithaca last August and it was voted unanimously (about twenty-five entomologists being present, representing several countries) that such abbreviations should be prohibited.

there is only one species) is *hyphena* new species, from the vicinity of Sao Paulo, Brazil, which is described in seven lines of the same composition. Nothing could be more hopeless than the effort to identify the genus; hence the description of *Schistocercophaga*, for those who do not have specimens of *dampfi* at hand and identified, can have no meaning. It is apparent that Townsend had no such specimens when he drew up his generic characterization, as he cites none and mentions only characters used by me in describing the species. How much simpler for other dipterists if he had made his comparison with *Oedematocera*. Even if one had a correctly named specimen of *Hypophorinia* as a basis, the statements regarding differences cannot be relied on, as I have many times found by comparing Townsend's genotypes, that in a paragraph of this kind he begins with differences, but at some point he changes to resemblances without indicating the fact.

Referring to the relationships of *dampfi*, Townsend says, "It evidently belongs in the tribe Phoriniini and is far removed from *Oedematocera*."

There is no definition of a tribe Phoriniini in literature, but we may assume that the genus *Phorinia* at least would be a member of it. The genotype of *Phorinia* is the European *aurifrons* Robineau-Desvoidy, of which the National Museum possesses two males determined by Villeneuve. On comparing *dampfi* with *aurifrons*, it is clear that I made a complete failure in describing the former, or else that Townsend knows nothing about *Phorinia*. I note the following principal differences: (1) *aurifrons* has the first posterior cell ending far before the tip of the wing, *dampfi* in the tip; (2) *aurifrons* has the facial ridges bristly almost to the level of the arista, *dampfi* has only small hairs on lower fourth; (3) *aurifrons* has the penultimate joint of the arista conspicuously elongated, several times as long as thick, while *dampfi* has it short; (4) *aurifrons* has the eyes densely hairy, *dampfi* has them bare; (5) *aurifrons* has the frontals descending below level of arista, in *dampfi* they reach only to the base of the antennae.

On the other hand, *dampfi* agrees well with the genotype of

Oedematocera (*flavcola* Coquillett) and I have no doubt of the correctness of the generic reference. The male of *flavcola* has abnormally large antennae, changing the shape of the head considerably; in a case like this it is the female which should be relied on for the generic character, and it is the female which agrees with *dampfi*.

Key to Species of Oedematocera.

1. Mesonotum with two distinct, broad blackish stripes, which include the dorsocentral bristles......*striata* new species.
   Mesonotum only very narrow, inconspicuous stripes, if any ....2.
2. Prosternum with a pair of delicate, hairlike bristles *gilvipes* Coquillett
   Prosternum bare ....3.
3. Abdomen wholly yellow ....*flavcola* Coquillett.
   Abdomen with broad median blackish stripe, connected with blackish posterior margins on the segments..*dampfi* Aldrich.

New Butterflies (Lepid.: Nymphalidae).

By J. D. Gunder, Pasadena, California.

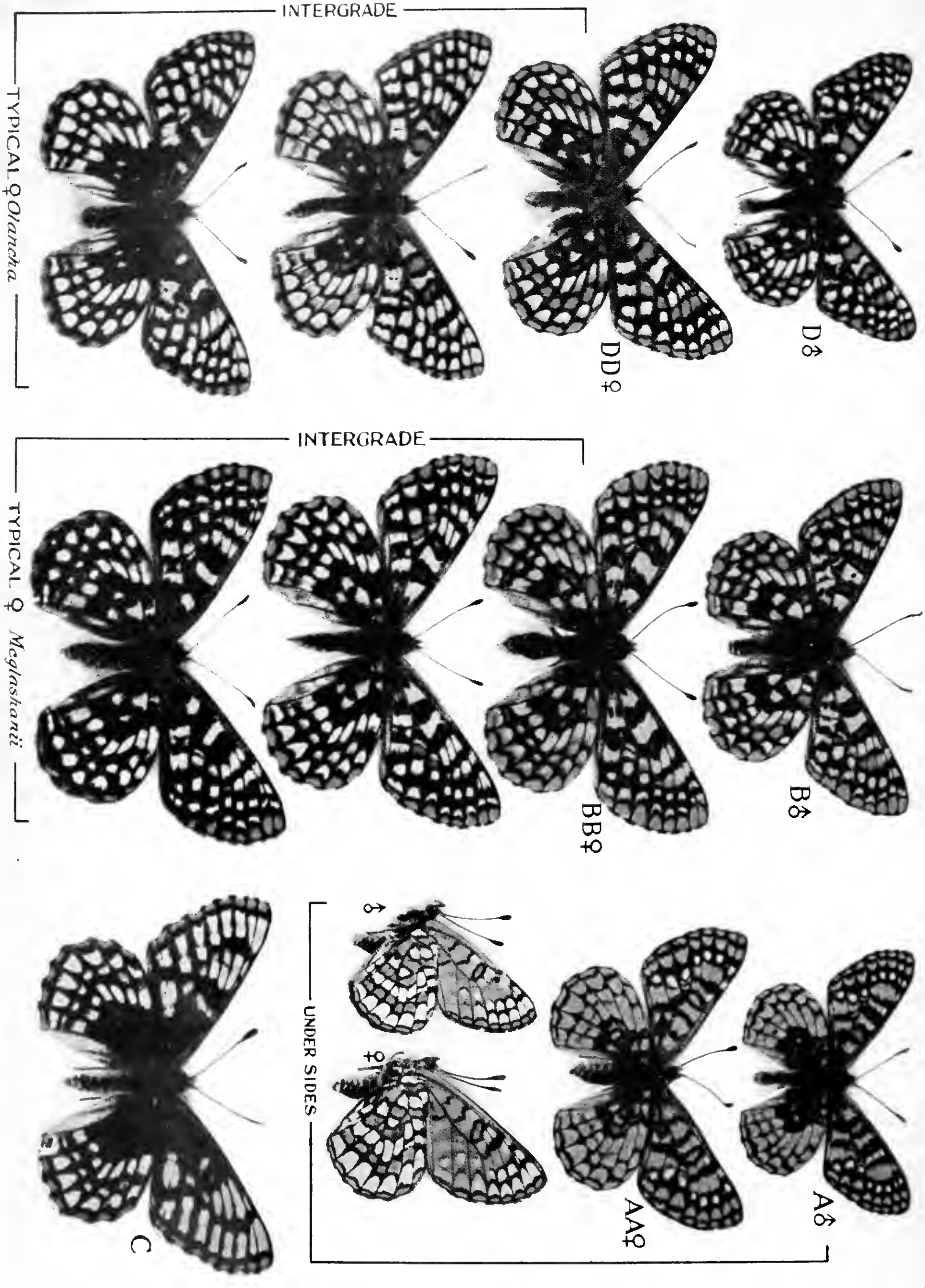
(Plate XIV.)

Euphydryas morandi n. sp. Fig. A ♂ and AA ♀.

Sexes similar. Constant in size and wing-shape to *Euphy. maria* (Skin.) and to *Euphy. wheeleri* (Hy. Edw.). The ground color of the former is dull brick-red and that of the latter is a peach-pink tint. This new species differs from both and from all other typical American *Euphydryas* in being a yellow-brown or dark ochre shade and has no suggestion of a red or pink tinge. In this respect it is unique, except for the tr. f. *omniluteofucus* Gun. of *Euphy. chalcedona* (Dbldy. & Hew.)—(see Ent. News, July, 1925).

Regarding the upper surfaces. A distinguishing peculiarity is the dark heavily marked basal and cell areas of the secondaries with no rectangular white bars or flares extending outward therefrom; also no white spotting. On the primaries, there is a single submarginal row of round white spots well in and heavily black guarded. The usually expected white dashes or marks occurring within or near the cell are absent or quite inconspicuous.

On the under sides, the arrangement of the white maculation, black lines and ochre ground color is similar to most of the related group. The under sides are shown on the accompanying plate also in both sexes.



NEW BUTTERFLIES—GUNDER

Occasional specimens in a series of this species show a tendency towards heavier black maculation which gives to those grading individuals a much darker appearance. This is in no sense a fusion, but simply a uniform broadening of all the dark design.

Classification: For the time being and because of the status heretofore accorded *maria*, *alena*, *wheeleri*, etc., I am describing this colony as a species. It is nearest *wheeleri* (Hy. Edw.).

Data: Average expanse—♂, 35-40 mm.; ♀, 40-46 mm. *Holotype* ♂ (fig. A), expanse 37 mm. *Allotype* ♀ (fig. AA), expanse 42 mm.; July 12, 1928; Kyle Canyon only at 10,500 to 11,000 feet on Mt. Charleston Peak in Spring Mountain, Clark County, Nevada. Types in author's coll. *Paratypes* 18♂ and 9 ♀, July 10 to 16, same locality. One pair paratypes deposited in Barnes coll., Decatur, Ill., and one pair in National coll. at Ottawa, Can. All specimens collected by Mr. Frank Morand, of Los Angeles, Calif., after whom they are named.

Notes: Mt. Charleston is in the extreme southern part of Nevada and only about 20 miles from the California line. Las Vegas is the nearest town and a desert village. The ascent to near the summit where these specimens were taken is quite difficult and none were seen at a lower altitude. No other *Euphydryas* was reported on the mountain.

EUPHYDRYAS CHALCEDONA (Dbldy. & Hew.), race MCGLASHANII (Riv.), forma **truckeensis** nov. Fig. B ♂ & BB ♀.

Differs in both sexes from typical *mcglashanii* (Riv.) by the spread and domination of the red color over the outer portion of the wings on the upper sides. The red areas of the under sides remain about the same. Usually the outer marginal red spots on the upper sides become broadened or fuller at the expense of the black. The first and second submarginal rows of white spots on the secondaries become red or take on a decided redish tinge. The black cell spots of both wings also show flushes of red.

The plate illustrates the sequence or intergrade of red color graduating from a typical ♀ *mcglashanii* up to the designated ♀ allotype form. Truckee specimens do not show a further advance of red color at least. The males also grade like the females.

Classification: Form *truckeensis* is the connecting link between *mcglashanii* and *sierra* (Wri.).

Data: *Holotype* ♂ (fig. B), expanse 47 mm., July 18, 1925, Truckee, Calif. (Dodge); *Allotype* ♀ (fig. BB), expanse 52 mm., June 28, 1928, Truckee, Calif. (Cottle). Types in author's collection. *Paratypes*: 1 ♀, same date and locality as allotype in James Cottle collection, SF. 2 ♀ in author's collection, dated July 18, '26? Truckee (Cottle) and July 18, 1916, Truckee (Dodge).

EUPHYDRYAS CHALCEDONA (Dbldy. & Hew.), race MCGLASHANII (Riv.), forma transit. **hilli** nov. (Fig. C.)

All rows of white spotting on both upper and under sides tending to join together with the gradual disappearance of the transverse black lines. This fusing of the white maculation through the interspaces is after the fashion of *Euphy. chalcedona fusimacula* (Barnes) and others.

Classification: transition form; albifusism—primaries well developed, secondaries not so much so.

Data: *Holotype* ♀ (fig. C), expanse 53 mm.; Auburn, Calif. (nr. Truckee), July 12, 1928 (Hill). In author's collection and named after Chas. Hill of Glendale, Calif.

EUPHYDRYAS CHALCEDONA (Dbldy. & Hew.), race OLANCHA (Wri.), forma **georgei** nov. Figs. D. ♂ & DD ♀.

White maculation of both sexes similar to typical *olancha*, but having the second submarginal row of white spots on the upper side secondaries broadly suffused with red. This red also fuses over the 3rd. rectangular mixed row on the primaries. The primaries show more red tinting than the secondaries. Also the internal black spots of the cells of both wings have red centers. The under sides record little change in disposition of red color. Both sexes intergrade to typical *olancha*; only that of the female is shown on the plate.

Classification: A form of race *olancha* (Wri.) approaching what is at present termed *wheeleri* (Hy. Edw.) of the Mono Lake region. Taken with *olancha* (Wri.).

Data: *Holotype* ♂ (fig. D), expanse 40 mm.; *Allotype* ♀ (fig. DD), expanse 47 mm.; Casa Diablo Hills, Mono Co., Calif. (Malcolm), June 23, 1925. In author's collection. *Paratypes*—2 ♂ and 2 ♀, same date and locality in collection of Geo. Malcolm and author. Named after Mr. George Malcolm, of Los Angeles, our veteran collector of the High Sierras of California.

Notes on Chilopods and Diplopods from Southeastern Utah.

By RALPH V. CHAMBERLIN, University of Utah.

During April of the present year a field party from the Departments of Zoology and Botany of the University of Utah, consisting of twelve students and staff members, spent ten days in south-eastern Utah, chiefly in San Juan County. Incidentally to other work, the myriopods listed below were taken. The types of the new species herein described are in the author's collection.

CHILOPODA

Scolopendridae

SCOLOPENDRA POLYMORPHA (Wood). In San Juan County, specimens were taken at Bluff, between Bluff and Blanding, Blanding and Devil's Canyon; in Grand County at Moab; in Emery County at Straight Wash; and in Wayne County at Fruita.

The specimens from these southern localities are notably larger and more brightly colored than those from northern localities, such as in Salt Lake County.

Henicopidae

LAMYCTES PINAMPUS Chamberlin. Specimens of this species, described originally from Nevada, were taken on a previous expedition in Zion National Park (1923).

Gosibiidae

GOSIBIUS ARIZONENSIS Chamberlin. Many specimens taken also on the previous expedition at Lake Navajo, Iron County. The species has not previously been reported excepting from Arizona.

Ethopolidae

Archethopolys gosobius sp. nov.

A species strongly related to *A. bipunctatus* (Wood), which occurs in the northern section of the state and in Nevada. The present species in comparison with *bipunctatus* is readily distinguishable in having the ventral spines of the anal legs uniformly 1, 1, 3, 2, 0 instead of 1, 1, 3, 2, 1; the claw single. Ventral spines of penult legs 1, 1, 3, 3, 2, an accessory claw present. Coxae of antepenult legs not ventrally armed, the last three pairs dorsally armed. Claw of female genital forceps tripartite; basal spines 3 + 3, with the innermost on each side often much more slender than the others. Prosternal teeth mostly 3—6+6—3 or 4—6+6—4, occasionally with only two teeth ectad of diastema and with seven mesad of it on one side, thus differing from *bipunctatus* in which the teeth ectad of the diastema are normally two, and from *parowanus* in which normally but one. Ocelli mostly in three longitudinal series; e. g., 1 + 5, 5, 2. Antennae long, reaching to eighth segment. Anal legs long and slender. Color in general light brownish yellow with head and caudal segments of orange cast. Length, up to 27 mm.

Locality.—San Juan County, at Devil's Canyon, between Blanding and Monticello. Ten specimens collected April 18 by R. V. Chamberlin and W. J. Gertsch. The *holotype* is a female.

Lithobiidae

TIDABIUS TIVIUS Chamberlin. Many specimens were taken at Moab, Grand County.

LOPHOBIUS SOCIUS Chamberlin. Specimens were taken in San Juan County, at Blanding, Monticello, between Monticello and Bluff, Verdure and Devil's Canyon; in Emery County at Woodside and in Sevier County at Salina.

LOPHOBIUS COLLIUM Chamberlin. Taken in San Juan County at Bluff; in Grand County at Green River; in Wayne County at Fruita; and in Carbon County at Price.

LOPHOBIUS ARIZONAE Chamberlin. Taken in San Juan County at Devil's Canyon, Verdure and LaSal Junction. Not recorded previously from the state.

POKABIUS UTAHENSIS Chamberlin. Several specimens of this form, common in the more northern canyons of the Wahsatch and Uintah Mts., were taken at Fruita, Wayne County.

Oabius sanjuanus sp. nov.

Body, head and antennae light brown, the legs more yellow. Agreeing with *decipiens* Chamberlin and *ineptus* Chamberlin in having the anal legs armed with two claws but differing from those species in having none of the posterior coxae laterally armed. Ventral spines of anal legs, 0, 1, 3, 2, 0. Ventral spines of penult legs, 0, 1, 3, 3, 1. Ventral spines of thirteenth legs, 0, 0, 1, (2), 1, 1. Prosternal teeth 2+2, small, the line of apices straight or a little recurved. Antennae composed of the usual 20 articles; the ultimate article about equalling the three preceding taken together. Anal leg of male a little inflated but bearing no special lobes or other modifications. Ocelli 5 in two series; thus, 1 + 3, 2. Length, 6.5 mm.

Holotype, a male, taken at Bluff, San Juan County, April 16, by H. P. Critchlow.

JUANOBIUS gen. nov.

Similar to *Simobius* in having in the male a conspicuous subdorsal process at distal end of the fifth joint of the penult legs. It differs from that genus in having the posterior angles of the ninth, eleventh and thirteenth dorsal plates produced and in having the articles of the antennae numerous, typically 32, instead of being fixed at 20. Characters of anal legs not known.

Genotype.—Juanobius eremus sp. nov.

Juanobius eremus sp. nov.

Dorsum light brown, the antennae similar, the legs lighter but caudal pairs darker than the others. Antennae moderate, consisting of 32 articles. Ocelli in three series; e. g., 1, 3, 3, 2. Prosternal teeth 2, 2, or with trace of a third tooth on one side. Coxal pores small, uniseriate, 2, 3, 3 (4), 3. Ventral spines of first legs, 1, 3, 1. Ventral spines of thirteenth legs, 0, 0, 3, 3, 2; dorsal, 0, 0, 3, 2, 2. Ventral spines of penult legs, 0, 1, 3, 3, 2; dorsal, 1, 0, 3, 2, 1. Last pair of coxae armed laterally and dorsally; penult pair armed dorsally only. Fifth article of penult leg in the male obliquely excised on the inner side of the distal and above and there bearing a process a little constricted at base and with distal face oblique. Length, 12 mm.

One male taken at Devil's Canyon, San Juan, April 18, by W. J. Gertsch. The specimen lacks the anal legs.

Anobius centurio (Chamberlin). Many specimens taken in San Juan County at Devil's Canyon and in Grand County at Big Indian Rock, April 18 and 15 respectively. Previously known from New Mexico.

Himantariidae

Haplophilus hesperus sp. nov.

Body slender, gradually attenuated cephalad, more strongly caudad. Yellow in color, with the head light chestnut, the antennae yellow. Cephalic plate about equal in length and breadth, widest across caudal end. Antennae more nearly cylindrical than usual in this family, all joints excepting the ultimate very short. Claws of the prehensors when closed not reaching anterior margin of head; all joints unarmed. Spiracles all small and circular. Ventral pores in a transversely oblong series on plates of anterior half of body. First legs shorter and more slender than the second. Last ventral plate of moderate width, the sides straight and converging caudad; caudal margin straight. Last coxae with numerous small pores over entire surface excepting a caudal area on lateral surface. Anal legs in female slender, a little longer than the penult. Length, 35 mm.

The *holotype,* a female, was taken at Devil's Canyon in San Juan County, April 18, 1928.

Linotaeniidae

LINOTAENIA CHIONOPHILA (Wood). One specimen taken at Devil's Canyon, San Juan County, April 18.

Chilenophilidae

GNATHOMERIUM XENOPORUS (Chamberlin). Many specimens of this form, widespread in Utah and New Mexico, were taken in San Juan County at Verdure and Devil's Canyon.

WATOPHILUS UTUS Chamberlin. A male and female taken between Moab and LaSal Junction by the author and a female taken at Bluff by W. J. Gertsch.

Unlike the other species as previously known, the number of pairs of legs in the present species seems to be subject to considerable variation. The female holotype, from the La Sal Mts., has 65 pairs of legs, that from between Moab and La Sal 73, and the one from Bluff 81. The male from between La Sal and Moab has 69 pairs of legs.

Geophilidae

Geophilus fruitanus sp. nov.

Cephalic plate without frontal suture. Prebasal plate not exposed. Prehensors when closed not surpassing anterior margin of head; joints short, all unarmed. Spiracles all circular, rather small, the first a little larger than the second. Last ventral plate very wide, the sides strongly converging caudad;

two coxal pits on each side covered by the ventral plate. Anal pores indistinct. Anal legs of female slender, ending in well-developed claws. Pairs of legs 57. Length, 38 mm.

The *holotype,* a female, was taken at Fruita, Wayne County.

This species is related to *G. mordax* Meinert, in having on each of the last coxae two large pits covered by the last ventral plate, but differs in not having the frontal plate discrete and in not having the prebasal plate exposed.

DIPLOPODA.

Craspedosomidae

TINGUPA UTAHENSIS Chamberlin. Two females were taken in Devil's Canyon, San Juan County.

Callipodidae

SPIROSTREPHON UTORUM Chamberlin. Specimens taken in San Juan County at Bluff by Emory Soule and the author and in Emery County at Straight Wash by A. M. Woodbury, W. J. Gertsch and the author.

Parajulidae

PARAJULUS VENUSTUS (Wood). Specimens taken in San Juan County at Devil's Canyon, Verdure and Blanding by A. M. Woodbury, W. J. Gertsch, E. Soule, J. R. Chamberlin and the author.

Verbose Descriptions of Insects.

By W. L. McATEE, U. S. Dept. of Agriculture,
Washington, D. C.

There are differences of opinion on most subjects, and the topic of long, compared to brief, descriptions of insects, given space in the May, 1928, ENTOMOLOGICAL NEWS*, certainly is no exception to this rule. Since a paper of which I am joint author is used as an example of short descriptions, unsatisfactory to the critic concerned, a reply by me is in order.

In the paper† referred to, the policy as to descriptions is set

* Blatchley, W. S., Vol. 39, No. 5, pp. 146-150.

†McAtee, W. L. and J. R. Malloch, Revision of the American Bugs of the Reduviid subfamily Ploiariinae. Proc. U. S. Nat. Mus., Vol. 67. No. 1, 1925.

forth on pp. 7-8, in a paragraph beginning, "The keynote of descriptions in this paper is avoidance of repetition", and this policy which economizes in writing, typing, editing and printing, and which saves time and expense at every stage of preparation and utilization, would seem to be in little need of defense in these days when the demand for entomological publishing space so clearly exceeds the supply.

The instances of what our critic considers inadequate descriptions as cited in the May, 1928, ENTOMOLOGICAL NEWS are presented in a very misleading way. For instance, there are for *Empicoris orthoneuron* n. sp. on the page cited 84 words of description. There are also two figures illustrating the fore wing, and the male hypopygium. For *Empicoris reticulatus* n. sp. there are 99 words of description on p. 20. For *E. culiciformis* De Geer there are 95 words of description on p. 23, and 2 figures. For *E. errabundus* Say there are 118 words of description and 3 figures.

These statistics include only descriptive matter on text pages. In the key to the species there are the following numbers of words of description applying to the respective species concerned: *E. orthoneuron* 125, *E. reticulatus* 141, *E. culiciformis* 200, and *E. errabundus* 126. In the key to genera are 217 words and in the general description of the genus some 230 words which apply to all of the species, and various descriptive matter in the discussion of characters of the family total more than 300 words of similar application.

The species we are charged with having inadequately described, therefore, have the following totals of words used in describing them in the paper criticized:

Name	Number of descriptive words under				
	Family	Genus	Key	Species	Total
orthoneuron	300	447	125	84	986
reticulatus	"	"	141	99	1,017
culiciformis	"	"	200	95	1,072
errabundus	"	"	126	118	1,021

The writer is rather shocked to learn that on the average more than a thousand words of description have been devoted to each of these species and feels that the accusation of inadequate description is entirely refuted. The real difficulty more probably was unwillingness of our critic to use our paper according to the principle upon which it was planned, and to expect it to follow, to him, familiar lines. We have no apologies to offer for failing in this respect. The objection to descriptions that refer to other species for comparative purposes seems of no great weight. One cannot safely use any key without having some of the species in hand so that he can be certain he understands the characters mentioned. The tyro cannot expect to grab a bug from a weed and a book from the shelf from which he can get the correct name in a jiffy. Regardless of the questionable desirability of such an achievement, it is and ever will be impossible.

Our critic has scored brief descriptions so we may be allowed to comment on wordy ones. It is self-evident that there is no intrinsic virtue in verbose descriptions. An author may describe an insect by the page, or for that matter by the ream, and still utterly fail to mention characters some later reviser needs to know about before he can place the species. The idea that the "description of every species, new or old, should 'stand on its own bottom' i. e., should be complete within itself," is fallacious, for none but a prophet could foresee what characters will be used by future students and thus be able to mention them in his descriptions.

There is nothing more wearisome and unprofitable than reading long-winded descriptions of insect species which include characters common to the genus, family, or order, and among which it is impossible to discover contrasting passages without the most careful comparison. Such descriptions waste the time of all students, impede progress in the science, and are no less than a taxonomic crime.

A synoptic key alone would be far more useful than wordy descriptions for the purpose our critic exalts, namely, enabling tyros and busy economic entomologists "to find out as quickly as possible the name of some insect at hand." In fact the persons referred to would soon lose themselves in the maze of verbose descriptions and arrive nowhere so far as making a determination is concerned.

It is not entirely out of place to doubt the feasibility of enabling the classes of individuals mentioned to make satisfactory identifications. Everyone who has done any specialized work in insect classification realizes the danger of making determinations in a group with which one cannot claim special acquaintance. Experience in thorough taxonomic work reveals how little we know any of the groups. After every reaccumulation of material any of the groups may prove to be in need of revision, which means that all previous determinations are subject to possible correction. The best course for the nonspecialist is to appeal to specialists for names and not to rely on cure-all manuals. Regardless of verbosity no insect manual is of even reliability throughout, none is free from numerous errors, and none is even approximately complete.

Descriptions of Two New Species of Acmaeodera (Buprestidae) with Notes on other Coleoptera (Cleridae, Cerambycidae, Platystomidae, Curculionidae).

By J. N. Knull, Pennsylvania Bureau of Plant Industry, Harrisburg, Pa.

The types of the new species here described are in the author's private collection.

Hydnocera unifasciata Say. Reared from *Ulmus* branches infested with *Magdalas* and *Psenocerus supernotatus* Say collected at Hummelstown, Pa.

Corinthiscus leucophaeum Klug. Several adults reared from cypress (*Taxodium distichum*) branches infested with *Curius dentatus* Newn., *Oeme rigida* Say and *Chrysobothris chrysoela* Ill., collected at Cape Henry, Va.

Acmaeodera flavinigrapunctata n. sp.

Form and size of *A. hepburni* Lec., color piceous, distinctly bronzed, thorax with side margin yellow for basal two-thirds, elytra yellow, with base, umbone, suture and forty small irregular areas which resemble dots to the naked eye, piceous. Head feebly impressed, densely punctured, joints five to eleven of antennae much broader than joints one to four. Thorax about twice as wide as long, sides feebly arcuate, gradually divergent to base, side margin not visible from above except in front, dish with median impression in front of scutellum, a strong lateral oblique impression on each side near base, surface coarsely densely punctured, punctures becoming more numerous at sides, base margined with a corrugated strip, surface densely pubescent. Elytra at base as wide as thorax at that point, sides sinuate, broadly rounded posteriorly, side margins serrate near apex, surface coarsely punctured, intervals flat, uniseriately punctate, each of the smaller punctures containing a short stout hair. Prosternum in front slightly trisinuate, last ventral with a thick subapical plate which is truncate at the end. Length 10 mm., width 4 mm.

Type: ♂ labeled Raymondville, Texas, June 29 and presented to me by Mr. F. M. Hull. This species should stand next to *A. hepburni* Lec. in our list. The new species can be separated from the latter by the markings and shorter pubescence on the elytra and by the more prominent subapical plate.

Acmaeodera hulli n. sp.

Robust, size and shape of *A. squamosa* Van D., color piceous, bronzed, each elytron with four irregular yellow spots, one back of humerus, another median, one back of middle and one near apex. Head coarsely punctured, front convex, densely pubescent, antennae with fifth and following joints broader than first four joints. Thorax wider than long, widest in middle, convex, sides more strongly constricted at base than at apex, side margins not visible from above, surface coarsely punctured, punctures more numerous and confluent laterally, posterior margin with a narrow corrugated strip, surface moderately pubescent with short hair-like setae. Elytra at base as wide as base of thorax, wider than widest part of thorax slightly back of base, sides sinuate, obtusely rounded at apex, strongly serrate on sides near tip, dish convex, with rows of moderately large impressed punctures, each interval with an irregular row of fine punctures, each bearing a squamiform hair. Prosternum truncate, dentate on each side, last three ventral segments densely finely punctate, clothed with long fine hairs which curve forward, no trace of a subapical crest on last ventral segment. Length 8 mm., width 2.5 mm.

Described from one ♀ collected at Mesilla Park, New Mexico, June 27, by Mr. F. M. Hull. This species is probably the same which Professor Fall* referred to from Texas in his discussion of *A. guttifera* Lec. Professor Fall has kindly examined this species and the one preceding.

The new species can be separated from *A. guttifera* Lec. by its more robust form and the vestiture of the dorsal surface. From *A. squamosa* Van D., it can be separated by being more elongate, the lack of convex intervals, the different dorsal markings and vestiture. In our list it should be placed between *A. guttifera* Lec. and *A. squamosa* Van D.

CYLLENE CARYAE Gahan. Larvae of this species were collected in mesquite at Marfa, Texas, by Dr. J. Eyer. Adults were reared by injecting the living larvae into black locust, *Robinia pseudo-acacia,* branches which were used as a host plant for the partly grown larvae.

CYRTOPHORUS VERRUCOSUS Oliv. A living adult was found in a pupal cell in dead tulip poplar, *Liriodendron tulipifera,* wood at Inglenook, Pa., on March 12.

LEPTURGES FACETUS Say. Reared from dead black oak, *Quercus velutina,* branches collected at Harrisburg, Pa.

ECYRUS DASYCERUS Say. Reared from the branches of a dead honey locust, *Gleditsia triacanthos,* collected at Rockville, Pa.

ORMISCUS SALTATOR Lec. Reared from dead willow, *Salix,* branches collected at Harrisburg, Pa., by Champlain and Knull.

EUSPHYRUS WALSHI Lec. Reared from the branches of dead elm, *Ulmus,* collected at Hummelstown, Pa.

ACALLODES VENTRICOSUS Lec. Adults were found numerous at Inglenook, Pa., on June 7, feeding on the foliage of *Steironema ciliatum.*

Personal.

Mr. S. W. Frost is leaving New York, January 10th, 1929, for Panama where he will spend six months collecting and studying leaf-mining insects. He may also go into Costa Rica and Guatemala.

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* H. C. Fall, Jour. N. Y. Ent. Soc., V. 7, p. 33, 1899.

Request for Letters of Dr. E. A. Schwarz.

I would like to assemble (borrow) all available letters from the late Dr. E. A. Schwarz with a view to publishing a selection of the most interesting ones as a memorial to him. JOHN D. SHERMAN, JR., 132 Primrose Avenue, Mount Vernon, New York.

Ophion chilensis (Hym: Ichneumonidae).

Hail, *Ophion chilensis* Spin! You have evidently come from far off Chili to live in North America and we gladly welcome you! When we first laid eyes upon you three years ago near San Diego, California, we were indeed surprised! We never thought that you would migrate quite so far from your South American aboriginal home! We could hardly believe our eyes when at last you were identified as being *Ophion chilensis* Spin!

Just how long you have been in North America (Calif.) we do not know, but probably only a few years. *Chilensis* has evidently come to stay. He is only an inch long, yet is a real Ichneumon aristocrat—delicate, refined! He is a night flier—at least we have never so far seen him in the daytime. He keeps company with moths and lace-wings and other nocturnal insects around electric lamps, hiding in the shade during the day. His flight is unsteady, bumping against this and that and never failing to take a sly bite at one's fingers, if he can do so! We have sent him to Stanford University, to the San Diego Natural Hist. Soc., and to the National Museum, Wash., where he is being studied by Mr. Sumner, specialist in Ichneumons.

Chilensis loves hot weather and disappears when days and nights grow too cool for him, as it so often does in Southern California. In the warm evenings of early Spring this year he was quite plentiful on our porch, but the long spell of cold evenings and cloudy days has driven him to cover.

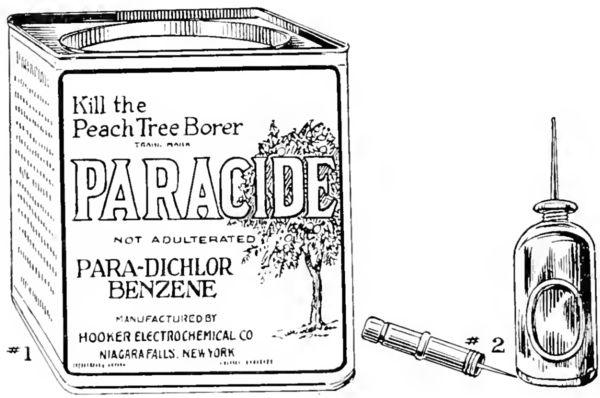
The wings of *chilensis* are so characteristic of him that even an amateur can always readily identify him by their venation, even if not so easily by other specific marks. A glass of 6-8 diameters is needed in order to see clearly the venation. *Chilensis* is a very fascinating Ichneumon!

ALFRED K. GLOVER, San Diego, California.

[On sending proof of this note to the author, we were shocked to learn from Mrs. Glover that her husband passed away on September 16, 1928. We tender her our respectful sympathy.—EDITOR.]

Pest Control in Insect Drawers.

Even the best made insect boxes do not for ever keep out harmful insect pests. Every collection, no matter how well it is housed, needs attention now and then to preserve it from the ravages of *Dermestes* (a beetle) in its larval stages. The cheapest thing to use in boxes as a preventive is crushed moth-balls, although these have not a very great fumigation strength. Naphthaline flakes (sold by druggists) are much better. The snowy white kind, not the pinkish stuff, should be demanded.



I find the best and strongest disinfective to use continually is Paracide (para-dichlor benzene), a trade marked product made by Hooker Electrochemical Co., of Niagara Falls, New York. The substance looks like crushed moth-balls, but has a far greater fumigation value. It is put up in one or five pound tins as shown by fig. 1. It sells for about 35 cents a pound tin and your local druggist can order it for you from his wholesale house. To quickly kill *Dermestes* in a badly infected box use bi-sulphide of carbon, U. S. P., (poison and inflammable), a clear, ill-smelling liquid sold by druggists. This may be poured over a piece of cotton and then pinned in the corner of the box. I have found that I can apply this liquid directly to the bodies of butterflies without harm. Fig. 2 shows a small oil can which is handy for this purpose as it allows a drop or two to come out at a time. These small oil cans are sold by any Woolworth or Kresge store for 10 cents each. They keep the liquid from evaporating when not in use. Do not apply bi-sulphide directly to the bodies of moths or other hairy insects, or to type specimens.—J. D. Gunder, Pasadena, California.

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

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A CLASSIFICATION OF THE HIGHER GROUPS AND GENERA OF THE COCCID FAMILY MARGARODIDAE. HAROLD MORRISON. United States Department of Agriculture, Technical Bulletin No. 52, 239 pp., 116 text figs., 7 plates, July, 1928. I have in earlier reviews and in various other papers expressed a full measure of criticism of the methods that have quite generally prevailed in the systematic work on the scale insects and of the results that have been pre-determined by those methods. It is consequently a most genuine pleasure to come at last upon a piece of systematic work dealing with this group and concerning which nothing can be offered save words of praise and commendation.

Here is a study that approaches about as closely as anyone is likely to come to an ideal expression of what systematic work should be, not only as such work involves insects of the type of the sternorhynchous Hemiptera but as it applies to any group. It is as such a paper, as a contribution demonstrating the possibilities inherent in the combination of a thoroughly qualified student and proper methods of work, even more than as a highly important contribution to the knowledge and understanding of a particular group, that it is especially notable.

As a contribution to the literature on the scale insects it will stand as—up to the present time—the best detailed study dealing with an extensive range of material that we have. There have been papers dealing with individual species or small groups or miscellaneous material—such as some of Morrison's own papers, Herbert's papers on *Matsucoccus,* and a few others—that have been equally well done, but they represent no such sustained effort as this treatment of a large and important group. As such a treatment, it is approached only by Chamberlin's work on the Lacciferidae (Tachardiidae).

The details of the paper are of interest only to special students, but a general statement may be made that will convey to non-specialists some conception of what has been accomplished.

Here is a group of insects that had shared equally with the rest of the Coccidae in the mistreatment to which this family—or super-family or sub-order, call it what you wish—had been subjected at the hands of systematists. It is a group as difficult as any to study because of the problem of obtaining good preparations. Added to this are the remarkable transformations through which some of the species pass in the course of their development and the difficulty of securing adequate material with which to work these out. And there are a fair share of nomenclatorial difficulties. Fortunately, Morrison had at hand type material of a great many species and was able to secure material representing many others.

The classification of the group as a whole was in a very serious tangle. Most of the genera were but vaguely defined. These genera had been aggregated into a series of so-called sub-families that were based upon a very slight knowledge of the actual structures of the insects. But little had been done in the way of determining what are the actual bases for generic and group classification.

Out of this there has been brought order and—in the light of present knowledge—a reasonable classification. The genera have been clarified and their type species made positively identifiable. Everything that could be done with the available material has been done to take into account the various developmental stages and to consider and weigh the value of all structures that can be found upon the bodies of the insects in good preparations. The illustrations are as numerous, as intelligently worked out, as carefully arranged and lettered and technically as good as can be desired. The lists of genera and species showing synonymy and present disposition of all names within the group are exceedingly useful. The bibliography is in all probability complete.

More than this, what could be asked of any author?

That there are still deficiencies, the author himself realizes. Actually we probably know but a small part of the species that exist and the discovery of new forms may possibly change some of the conceptions as to classification. There are some important species that are still known only from inadequate material. There are some of which the highly important life histories are still to be worked out. But these are not defects of method and they are not a basis for criticism. Only time can remedy these deficiencies.

With some of the author's conclusions there is a possiblity of disagreement. The points, however, are largely academic and have to do chiefly with the rank to be assigned to various groups. For example, I still hold that if the scale insects as a whole be regarded as a super-family the two families Margarodidae and Otheziidae should be placed as subfamilies of a single family, which would necessarily shift the rank of the groups below them. Also there may be disagreement as to the use of the family name Margarodidae. Morrison has accepted the "oldest genus" principle and has rejected priority which would have required the use of the name Monophlebidae. In this particular case, however, it is possibly better to follow Morrison's procedure, for we still know nothing of the genus *Monophlebus*, other than that it belongs to this group.

When such treatments as this exist for all the groups of the scale insects we shall really have a foundation upon which to build the enormous and complex structure that will eventually be necessary to house systematically the thousands of species that still remain to be discovered. And with such a treatment as this available as an example of what can be done by the application of proper methods, there no longer exists any excuse for the type of work that has prevailed in the past. The study of the scale insects is changing. It is coming of age.

G. F. Ferris, Stanford University, California.

OBITUARY

In the Annals of the Scientific Society of Argentina for July-September, 1928, pages 73-79, is an account of JUAN BRÈTHES, with portrait and partial bibliography. Brèthes was born at Saint-Sever, France, February 24, 1871, and died at Buenos Aires 2nd July, 1928. The account does not state how or when he went to South America, but apparently he was in Buenos Aires at the time of the death of Carlos Berg in 1922. At the time of his death, Berg was Director of the Museum of Natural History of Buenos Aires. He was succeeded by F. Ameghino, who considered that it was necessary (since Berg was gone) to have a competent entomologist in the Museum. And so Brèthes was appointed, and remained with the Museum until the time of his death.

The bibliographical list published in connection with this article comprises only those papers published in the Annals of the National Museum and in the Annals of the Argentine Scientific Society. It comprises 62 titles, but Brèthes published many of his papers under other auspices, notably in the Annals of the Agricultural Society of Argentina, in the Magazine of the Museum of La Plata, in *Physis*, and in Carlos Porter's *Revista Chilena*. A complete list of his writings will appear in the *Revista* of the Argentine Entomological Society.

While Brèthes' writings covered a large field in entomology, he wrote especially upon Diptera and Hymenoptera and seemed rather especially attracted to parasitic Hymenoptera. He was, however, more or less of a student of Coleoptera and Lepidoptera, and published certain papers relating to insects of these orders.

While his early writings were justly subject to criticism mainly based on his insufficient knowledge of the literature, his work steadily improved and he achieved a position of some distinction. As a consequence of this, shortly before his death, Dr. Walther Horn had sent him, to work over, certain groups of South American Aculeates from the Deutsches Entomologisches Institut.

L. O. HOWARD.

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ENTOMOLOGICAL NEWS

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The North American Sitarine Blister Beetles (Coleop.: Meloidae).[1]

By Clarence E. Mickel, University of Minnesota.

Mr. Warren Knaus has recently called my attention to the fact that there is a possibility of *Leonidia anthophorae* Mickel (Entomological News, 39:38-41, 1928) being the same species as *Hornia gigantea* Wellman. This possibility also occurred to me when *L. anthophorae* Mickel first came to my notice and before I wrote the manuscript describing it as a new species. At that time I examined the type of *Hornia gigantea* Wellman but dismissed the possibility of my specimens being the same as that species for the following reasons: The antennae of the type specimens of *H. gigantea* Wellman are eleven-segmented and this character has been considered diagnostic of the genus *Hornia* Riley, while the antennae of all of my specimens are ten-segmented, and ten-segmented antennae have been considered as a diagnostic character of the genus *Leonidia* Cockerell; the male type specimen of *H. gigantea* Wellman has the head distinctly wider than the thorax, so much so that Wellman stated "head almost a third wider than the pronotum", while the one or two specimens of *L. anthophorae* Mickel which I compared with the type had the head scarcely any wider than the pronotum; and the scutellum of the type specimen of *H. gigantea* Wellman is acutely angulate at the apex, while the scutellum in my specimens is roundly or bluntly angulate at the apex.

Since the description of *L. anthophorae* Mickel was published, Mr. Knaus has sent me five male specimens and eight female specimens which were all collected at Roxbury, McPherson County, Kansas, in June, 1922, and which he identified as *H. gigantea* Wellman. Upon examination I find that one male

[1] Published with the approval of the Director as Paper No. 788, of the Journal Series of the Minnesota Agricultural Experiment Station.

specimen of this lot has the antennae eleven-segmented, two female specimens have ten-segmented antennae with a remnant of a suture on the tenth segment, while three males and seven females have the antennae definitely only ten-segmented. The specimens with the ten-segmented antennae are identical with the holotype and paratypes of *L. anthophorae* Mickel, excepting minor variations. This of course raised the question as to whether the McPherson county specimens were correctly identified as *H. gigantea* Wellman. To settle this point it was necessary to compare these specimens with the types of Wellman's species which were made available to me through the courtesy of Dr. H. B. Hungerford, University of Kansas.

Upon examination I find that the McPherson county specimen with eleven-segmented antennae is identical with the male type of *H. gigantea* Wellman. The other specimens from McPherson County and all of the specimens of *L. anthophorae* Mickel are very similar to Wellman's types with the exception of the number of segments in the antennae and the comparative widths of the head and pronotum. This result led me to suspect that possibly the material collected at the same time and place as the types might show a variation in the number of antennal segments and in the comparative widths of the head and pronotum. Dr. Hungerford has generously placed at my disposal eleven males and twelve females collected at the same time and place as the type specimens of *H. gigantea* Wellman, Gove County, Kansas, June 20, 1910 (F. X. Williams). In addition to the above material I have before me six specimens of *H. gigantea* Wellman collected at Logan County, Kansas, June 27, 1910 (F. X. Williams). Six males and four females of the Gove County material have eleven-segmented antennae, three males and five females have ten-segmented antennae, and two males and three females have the antennae more or less intermediate between a ten-segmented and eleven-segmented condition.

Since the number of the segments in the antennae, and the comparative widths of the head and pronotum have been thought to have considerable significance as diagnostic characters I have examined all of the fifty-nine specimens before me very carefully with reference to these two characters. The following table gives the results of my examination with reference to the number of segments in the antennae:

	Specimens with antennae eleven-segmented.	Specimens with antennae ten-segmented	Specimens in which tenth antennal segment has remnant of a suture indicating possibility of eleven segments.
Hornia gigantea Wellman. Type material.	1♂, 1♀.		
Hornia gigantea Wellman. Material collected at same time and place as types	6♂, 4♀.	3♂, 5♀.	2♂, 3♀.
Hornia gigantea Wellman. McPherson County specimens determined by W. Knaus.	1♂.	4♂, 6♀.	2♀.
Hornia gigantea Wellman. Logan County specimens	1♂.	4♂.	1♂.
Leonidia anthophorae Mickel Type material		6♂, 7♀.	2♂.

Since I can find no other characters in the specimens with eleven-segmented antennae which can be used to distinguish them from those specimens with ten-segmented antennae, and since there are five male and five female specimens with antennae more or less intermediate between a definite eleven-segmented condition and a definite ten-segmented condition, it appears that the number of segments in the antennae is a variable character within a species and that it has no significance as a diagnostic character.

Wellman stated in his paper describing *H. gigantea* Wellman that his species had the "head one-third wider than the pronotum", and the male type does have the head distinctly wider than the pronotum, although by actual measurement it is only one-fifth wider than the pronotum. Some of the specimens in the type material of *L. anthophorae* Mickel have the head no wider than the pronotum. The following table gives the results of my examination of the material before me with reference to this character; the measurements were made in units of a micrometer scale in the eyepiece of a binocular microscope:

Males, antennae eleven-segmented.	Width of head	Width of pronotum	Excess of head over pronotum
H. gigantea Wellman, type, Gove County, Kan.	55	46	9
" " " Gove county, Kan.	54	45	9
" " " " " "	51	43	8
" " " " " "	53	47	6
" " " " " "	61	49	12
" " " " " "	47	40	7
" " " " " "	47	42	5
" " " Logan county, Kan.	57	49	8
" " " McPherson county, Kan.	56	48	8
Males, antennae ten-segmented			
H. gigantea Wellman, Gove county, Kan.	52	44	8
" " " " " "	51	44	7
" " " " " "	53	47	6
" " " " " "	56	48	8
" " " " " "	50	45	5
" " " Logan county, Kan.	59	48	11
" " " " " "	51	45	6
" " " " " "	53	48	5
" " " " " "	55	45	10
" " " " " "	57	48	9
" " " McPherson county, Kan.	54	48	6
" " " " " "	54	49	5
" " " " " "	52	48	4
" " " " " "	50	44	6
L. anthophorae Mickel, holotype	57	51	6
" " " paratype	54	49	5
" " " "	54	49	5
" " " "	49	46	3
" " " "	55	52	3
Females, antennae eleven-segmented.			
H. gigantea Wellman, type.	46	43	3
" " " Gove county, Kan.	46	42	4
" " " " " "	45	42	3
" " " " " "	49	45	4
" " " " " "	42	41	1
Females, antennae ten-segmented.			
H. gigantea Wellman, Gove county, Kan.	44	42	2
" " " " " "	46	43	3
" " " " " "	45	42	3
" " " " " "	48	47	1
" " " " " "	47	43	4

	Width of head	Width of pronotum	Excess of head over pro-notum
H. gigantea Wellman, Gove county, Kan.	45	43	2
" " " " " "	46	42	4
" " " " " "	45	39	6
" " " McPherson county, Kan.	35	31	4
" " " " " "	40	37	3
" " " " " "	43	42	1
" " " " " "	41	40	1
" " " " " "	46	42	4
" " " " " "	44	40	4
" " " " " "	42	40	2
" " " " " "	42	37	5
L. anthophorae Mickel, allotype.	44	42	2
" " " paratype.	42	42	0
" " " "	35	35	0
" " " "	44	45	-1
" " " "	45	45	0

From the above data it appears that the comparative widths of the head and pronotum is a highly variable character and that it has no significance as a diagnostic character for distinguishing the species *H. gigantea* Wellman and *L. anthophorae* Mickel.

An examination of the *H. gigantea* Wellman material collected at the same time and place as the type showed that there was also a great variation in the shape of the scutellum, in some specimens being acutely angulate at the tip, in others roundly or bluntly angulate, so that the shape of the scutellum has no value as a specific or generic character. It must be concluded then, that on the basis of the above comparison *L. anthophorae* Mickel and *H. gigantea* Wellman are the same species, and the former will have to fall as a synonym.

Williams and Hungerford (ENTOMOLOGICAL NEWS, 25:1, pl. 1, 1914) have pointed out that *Hornia gigantea* Wellman has the claws armed with a long, basal spine and my examination of the type verifies this. The presence of this basal spine on the tarsal claws as described for the genus *Leonidia* Cockerell, the fact that a large number of specimens have only ten segments in the antennae, together with the fact that the abdomen is subcorneous as in *Leonidia* Cockerell show that *H. gigantea* Wellman is much more closely related to *L. neomexicana* Cockerell, and *L. rileyi* Dugès, than it is to *H. minutipennis* Riley. In fact the only differences by which *L. neomexicana* Cockerell and *H. gigantea* Wellman can be separated is in the length and form of the last segment of the antennae and of the last segment of the maxillary palpi. On account of the variation existing in the terminal segments of the antennae of *H. gigantea* Wellman, the form and length of the terminal segment is not a valid character for separating it from *L. neomexicana* Cockerell; the same may be said regarding the maxillary palpi. An examination of the type of *L. neomexicana* Cockerell showed no other characters by which the two could be separated; therefore, *Hornia gigantea* Wellman and *Leonidia neomexicana* Cockerell must be regarded as the same species, and the former name will become a synonym since Cockerell's name has priority.

The genus *Leonidia* Cockerell was originally erected as the genus *Leonia* Dugès. The name *Leonia* Dugès was shown by Cockerell to be preoccupied by *Leonia* Gray, a genus of molluscs, and Cockerell proposed *Leonidia* to replace it. Dugès separated *Leonia* from *Hornia* on the following characters: antennae ten-segmented, prothorax cordate; elytra larger than in *Hornia;* metasternum less visible than in *Hornia;* abdomen subcorneous; claws with a long basal spine. The antennal character is a variable one, as shown above, there being ten segments in the antennae in some specimens and eleven in others; the prothorax in *Hornia minutipennis* Riley is more elongate than in *Leonidia neomexicana* Cockerell, but there is no fundamental difference in form; the elytra are slightly larger in *L. neomexicana* Cockerell than in *H. minutipennis* Riley; the metasternum is less visible, and the abdomen is more corneous in *L. neomexicana* Cockerell than in *H. minutipennis* Riley, and the basal spine on the tarsal claw is absent in the latter species.

After a comparison of representatives of the two genera, and a consideration of the differences which distinguish them, it seems to the writer that these differences are not of generic value, that they are only specific in nature, and that the genera *Hornia* and *Leonidia* should be united as one genus, the former name having priority. Accepting this conception of the genus *Hornia* Riley, the history of the genus and its species is as follows:

GENUS HORNIA Riley.

Hornia Riley, Trans. St. Louis Ac. Sci., 3:563-565, 1877.—Wellman, Ent. News, 22:15-17, 1911.—Williams and Hungerford, Ent. News, 25:1-2, 1914.

Leonia Dugès, Insect Life, 1:211-213, 1889.—Cockerell, Psyche, 8:416, 1899.

Leonidia Cockerell, Psyche, 9:11, 1900.—Wellman, Ent. News, 22:15-17, 1911.—Mickel, Ent. News, 39:38-41, 1928.

HORNIA MINUTIPENNIS Riley.

Hornia minutipennis Riley, Trans. St. Louis Ac. Sci., 3:563-565, 1877.—Cockerell, Psyche, 8:417, 1899.—Wellman, Ent. News, 22:17, 1911.

HORNIA RILEYI (Dugès).

Leonia rileyi Dugès, Insect Life, 1:211-213, 1889.—Cockerell, Psyche, 8:416, 1899.

Leonidia rileyi Mickel, Ent. News, 39:40-41, 1928.

HORNIA NEOMEXICANA (Cockerell).

Leonia neomexicana Cockerell, Psyche, 8:416-417, 1899.

Hornia gigantea Wellman, Ent. News, 22:16-17, 1911.—Williams and Hungerford, Ent. News, 25:1-2, 1914.

Leonidia anthophorae Mickel, Ent. News, 39:38-40, 73, 1928

Leonidia neomexicana Mickel, Ent. News, 39-41, 1928.

At the End of the Season with Polistes rubiginosus (Hym.: Vespidae).

By PHIL RAU, Kirkwood, Missouri.

We are told in the wasp literature that at the end of the summer season, queens and males hatch from the nests; that the workers and the males die off, while the fertilized queens seek shelter and hibernate. This would lead one to believe that when the various forms emerge from the nest, they fly away and somehow meet those of the opposite sex from other nests to perform the function of mating. However, we have no definite statement to this effect.

In the autumn of 1919, I had the opportunity of observing the behavior of a colony of *P. rubiginosus.* This was entirely concealed in between the outer and inner board walls of an old building, and ingress and egress was gained through a knot-hole about two and one-half inches in diameter. This opening was very conspicuous because it was surrounded by a hundred or more wasps, which just idly sat about for hours, occasionally engaging in conflicts the nature of which puzzled me. With the ubiquitous Sunday pleasure-seekers about, it was impossible on that day to solve the puzzle, so we were forced to await another opportunity to get the details of their behavior.

On September 15 I returned with the express purpose of studying the group. At dusk many of them were to be seen in the dim light around this opening in the wall, and the following morning at 8:30, masses of wasps were present, in some places three deep, clustered about this opening. At one point there was a compact cluster of about a dozen wasps, and this mass was moving as a unit, slowly walking out of the hole. When they had reached the outside, where I thought that at any moment the mass would lose its hold and drop to the ground, they slowly extricated themselves and walked back to join the throng at the margin of the hole. The sex of the wasps was noted as they walked away singly; all were males but one, which was a queen; her trim and fresh appearance indicated that she was newly emerged. This of course gave the first indication that this waiting behavior was in anticipation of mating. I have often wondered why one sees in the literature no record of the mating of *Polistes.* Furthermore, seeing adults of both *P. annularis* and *P. pallipes* clinging to the nests long after all the cells were empty has caused me to suspect that mating does not take place on the wing, but upon the nest. This of course would indicate that inbreeding occurs, and possibly it does. At least, with this hypothesis in mind, I spent a whole day in watching this mass for clues to the meaning of this behavior.

The clusters or compact knots of moving wasps appeared only at intervals. The entire waiting congregation kept its place constantly about the hole, some on the inside and some on the outside of the wall. Sometimes these wasps would grow restless, walk a short distance and back again, or crawl over one another; occasionally one would fly out in the sunshine, and at great intervals one would return to the group on the wing, at which times the others were usually eager to gather any refreshment they could from its mouth. Sometimes some of those waiting in the crowd would get their mouths together as though effecting an exchange of saliva, and occasionally one was to be seen biting at the wood as though trying to scrape something off the surface. Since only a few, perhaps five, were seen at the golden-rod that entire morning and few were seen to leave, I decided that the majority of them must be desperately hungry, but were too lazy or too fearful of losing their place, to leave the nest and seek their own food. This was proven by the panic which was precipitated by my smearing a little apple jelly from my lunch on the wall near the opening, and later by placing a piece of ripe persimmon there. The mass of wasps at the persimmon became so thick and the struggle so intense that soon the entire mass rolled to the ground. This excitement was especially significant in consideration of the fact that under the persimmon tree scarcely fifty feet away lay similar morsels aplenty, but to these no wasps came.

As I have said, they usually waited quietly at the periphery of the opening, but I failed to make clear the prettiness of their positions. Almost all of them were facing the light; the circle of pale,* serious faces, watching so intently, through the ragged hole, was indeed a pretty sight. The chief disturbance to break the ominous silence was caused by the appearance of new ones coming down from the unseen nest above. Sometimes these new arrivals would crowd in among the throng; sometimes they would simply walk over the top of the mass until they settled into it and became a part of it.

One might easily suspect from this conduct that they were only seeking the sunshine, but in this case, this hypothesis is quickly discarded by the fact that they stopped short of actually reaching the sunshine; they persistently lingered at the hole

* Males have white faces.

here near the nest, a place where the sun could not reach them until after one o'clock. Furthermore, it was soon evident that influences other than light were at work in prompting this behavior, because they were out just the same at deep twilight and even a few were there at 9 p. m., and in the deep shadows of the morning hours. I wondered whether these might be guarding the nest, but since, when they were awakened by my lantern, they moved slowly and clumsily up toward the nest, I soon decided that they had been sleeping and not performing sentry duty.

At 8:30 a. m., I saw a second slowly moving mass come out of the opening and move downward on the outside of the wall. There was great confusion and display of emotion as the ball-like mass moved. It stopped at a point four inches below the opening, and while I was trying to decipher the meaning of it all, a fine large female extricated herself from the mass and slowly walked away. A male followed her, and a moment later another, and the two struggled for her possession while she was trying to escape; she seemed unfriendly to their advances, threateningly manipulated her sting, and eventually succeeded in breaking away, and then quickly climbed up the wall. While this was going on, the number of males had increased from two to six, and as the queen fled up the wall she left in her wake a string of six emotional suitors, who eventually returned and made their way back to the mass at the hole.

The problem of the mass of waiting wasps now began to take form; certain definite questions began to arise in my mind. As the males stand thus, two or three deep in places, all with their heads out, waiting, alert, are they quietly lingering there for new queens to emerge? Do they wait for queens which have gone out into the sunshine to return for the purpose of mating? Is it possible that queens from other nests come here? Are the queens fertilized more than one time? If inbreeding occurs, does it in any way affect the vigor or sex of the offspring?

Even as I was pondering thus I looked up and saw a pair in copulo walking over the mass of their fellow-creatures. After some seconds they accidentally severed, but in this the female showed her perfect willingness to resume the relation;

this was quite in contrast to the behavior of the first female, which threateningly used her sting in making her escape. Probably, however, this was after abundant fertilization had been effected in the case of the first.

A little later a third mass was seen; this seemed the largest yet, and from cursory examination seemed to be an all-stag affair. Male was atop male, with much agitation of the antennae and bodily movements denoting intense sexual excitement. So the struggling among the seething mass continued while as a unit it slowly moved on; their sexual excitement was wild, and their attacks even upon each other were now unmistakably of this nature. It was impossible not to suspect that somewhere within the ball was a female, yet I watched their maneuvers carefully for five minutes without being able to detect her. Suddenly she appeared on the surface, extricated herself, or really tore herself free from the teeming mass and dashed away on the wing into the sunshine. I had time only to see that her wings were badly frayed, which usually indicates age, but it was obvious that even a new queen could not have gone through this melee without being badly torn. It was interesting to observe the conduct of the mass of followers after the escape of this queen. Their movements and agitation continued the same, to such a degree that I suspected the presence of a second female among them. In this idea I was in error; the fact was that in their extreme excitement, none of the males observed her escape and in their madness none of them even missed her until long after her disappearance. To be exact, it took just three minutes for them to discover her absence, and one by one they disentangled themselves and walked solemnly back to the hole in the wall and took their places among the other watchers. The queen was gone, leaving me pondering perplexing problems; would she ever return to the nest from this first flight, or with the function of fertilization accomplished would she seek a place a place for hibernation?

In the course of the next ten minutes, there was no particular activity other than the departure on the wing of two of the males, and the return of two others from the field to the nest. This gave rise to the questions: How do these males find their way back to the home nest when once they venture out afield? Is it possible that some of the males thus wander out and return to nests other than their own, and that the resultant mixing of the strain tends to offset the injuries of inbreeding?

As it neared noon and the temperature rose, more and more wasps ventured to the opening, and among the crowd I saw two newly-emerged queens. I knew from their fresh and unscarred condition that they were young, but since the males paid no attention to them, I thought that perhaps they were only newly-emerged workers of large size or newly hatched queens which were physiologically too immature for mating. While the males paid no attention to these two, which looked every bit as though they were queens (and at that date one would suspect all newly emerged adults to be either queens or males), an incoming queen just at that time precipitated the greatest commotion of the morning. As this queen alighted she gathered a group of males about her which, like a rolling snow-ball, increased in size as the mass slowly moved while clinging with many legs to the wall. With legs in motion, antennae moving, abdomens pulsating and all the wasps struggling pell-mell, the mass looked like a tangled ball of twine. The weight of the cluster was too great, and after a few seconds the whole mass fell to the ground below. For six minutes the same struggle continued on the ground, when slowly one by one they freed themselves and either flew or walked up the wall to the nest, leaving the contest to the last three, two males and one queen. All told, this lot contained fourteen individuals, three females and eleven males. The behavior of the two younger females in the lot was difficult to explain; their very entry into the struggle was not due to mob psychology, or a "follow-the-crowd" attitude, but was probably deliberate, for on another occasion a little later, when a group of three males and one queen were in the struggle for copulation about four inches below the opening in the wall, a second queen, likewise a wall-flower and unsought, left the group by the opening and walked down to the scene of commotion four inches below and joined in the competition.

This behavior continued all day, in sunshine or in shade; even at twilight at 6:20 p. m., a mass of twelve, in all of their excitement fell to the ground, and even when it was nearly dark they extricated themselves and flew or walked back to the group at the hole in the wall.

Thus one sees that their behavior at this time teems with emotion, that they indulge in likes and dislikes, and that light, heat and darkness are not primary influencing factors in this conduct.

That these males occasionally fed at the flowers during their sojourn here was actually observed. Two wasps from this colony were seen refreshing themselves at the goldenrod below the nest. Since they so seldom leave the mass, however, I suspect that their meals are few and far between, and that the great majority of them are ravenously hungry most of the time. This was indicated by their onslaught upon the jelly and persimmon placed near enough for them to get it without leaving the spot where they kept eager and incessant watch. Frequently also a returning male created much excitement, but I could not tell whether this was because they suspected it to be a female or whether it had some food or nectar about its face.*

I have data to show that in the laboratory the male *Polistes pallipes* also remains on the nest long after emergence, and observations show that the same is true for them in nature, although the length of time that they linger there is not accurately known. Their food problem also, under these circumstances, is of interest. On one nest of *P. pallipes* in autumn, I observed, among four workers and two males, that a worker and one male appeared to be "kissing" each other to so prolonged an extent that I suspected that the male was imbibing some food from the mouth of the worker. In fact, this worker was for the same reason attractive to others, for soon a second male pushed the first one aside and secured for himself the treat, whatever it may have been, from the lips of the worker. Presently a second worker (or possibly it was the queen) forcibly pushed both of these aside, put her own lips to those of the popular one and repeated their performance. From my position I could not actually see any substance pass from the mouth of one to the other, but the evidence seemed to justify my strong suspicions in the case.

* The second year this behavior was repeated at the same place, and elsewhere I show that on the warm days in February the same hole in the wall harbored many queens. They probably hibernated in the space between the two walls, or came back to their childhood home for nest-building, having retained memory of it.

Hancock's Studies of Inheritance in Green and Pink Katy-Dids, Amblycorypha oblongifolia DeGeer (Orthop.: Tettigoniidae).

By ROBERT K. NABOURS

Kansas State Agricultural College and Agricultural Experiment Station, Manhattan, Kansas.

In the ENTOMOLOGICAL NEWS, Vol. xxvii, pp. 70-82, the late Dr. Joseph Lane Hancock, of Chicago, gave a preliminary account of his extraordinary experiment in crossing a male green Katy-did with a pink female of the species *Amblycorypha oblongifolia*. There is an historical sketch, an account of the finding of the pink female and a description, in considerable detail, of the methods of breeding and the general biology of these Katy-dids. Then there is a summary, in part as follows:

1. A green male was mated to the pink Katy-did, and the eggs were oviposited in the summer of 1912. Hancock was the first to observe that the females of this species oviposited in the ground. He was also first to discover that some of the eggs required two, and others three years before hatching.

2. There were thirteen F_1 progeny, eight pink and two green hatched two years (1914), and one pink and two green hatched three years (1915) after the eggs had been oviposited, a ratio of 9 pink: 4 green. There were approximately as many males as females.

3. In June, 1914, four pairs of the F_1 pink, and one pair of the green Katy-dids were mated. Three of the pink and the one green female oviposited in the ground of their respective cages late in the summer and early autumn.

4. In the summer of 1915, a green female, of the one pink and two green individuals which hatched that year from the 1912 mating, was mated to a green male from the field. Later in the summer she oviposited.

5. Hancock concluded that the pink color, as well as the green, was hereditary, and that the idea of these colors in Katy-dids being dependent on the absorption of the coloring matter taken in with the food was erroneous.

At the time of the publication of this paper, February, 1916, Hancock was looking forward to the hatching of the F_2 progeny in the summers of 1916, 1917 and 1918.

THE F_2 AND F_3 PROGENY FROM THE FURTHER BREEDING OF THE OFFSPRING OF THE GREEN x PINK MATING OF 1912.

Circumstances prevented Dr. Hancock from publishing his further observations and records. On January 5, 1919, the main results were wrtten down as Dr. Hancock verbally related them to me. Since his death Mrs. Hancock has generously furnished his complete notes, composing more than forty type-written pages of the unpublished part of the observations and experimental results.

Most of the notes refer to observations of the habits of the Katy-dids such as feeding (they were cannibalistic to some extent), mating, ovipositing, hatching of the offspring, growth, molting, effects of temperature and moisture, and enemies (mostly spiders). The males were much less viable than the females. They ate best a mint common in the region of Lake-side, Michigan, where the experiment was carried on. Among the green ones, the males were yellowish green while the females were bluish green. Among the pink individuals the males had a touch of yellow while the females were bluish red. There were some variations in patterns. One male had strikingly blacker hind tibia than the others. Some had the thorax marked with a black line on each side which was in contrast with others.

Beginning where Dr. Hancock left off (loc. cit.), the one pair of F_1 green individuals gave 21 all green offspring in 1916, and two green ones in 1917 (see diagram p. 16). The one surviving F_1 green female which hatched in 1915, mated to a male from the fields, gave 58 all green ones in 1917, and "A number of green young with no pink", in 1918. From the three F_1 pink females, mated to pink brothers, in 1914, 32 green and 75 pink individuals were hatched in 1916; six green and fifteen pink were hatched and recorded in 1917, making a total F_2 progeny of 38 green: 90 pink. Several of the F_2 pink males and females of the 1916 hatching were inbred, and they gave 35 green and 209 pink in 1918, and 1 green and 1 pink in 1919 (see diagram p. 5). Obviously, among the parents of the F_3 progeny there were some which were homozygous for pink.

Hancock states that he bred green males and females, from the field, aside from the green x pink stock, as controls, and that they were parallel in respect to the two-and three-year periods required for the eggs to hatch, and all the progenies were green.

Miss Isabel Potter has aided in checking the figures used with Dr. Hancock's notes.

CONCLUSIONS.

1. The eggs of the Katy-did, *A. oblongifolia*, oviposited in the ground in the late summer and early autumn, hatch in the early summer, some of them two, and others three years afterwards.

2. Since the green individuals bred true consistently, and the F_1 pink males and females gave green and pinks in F_2 in a ratio of 38:90, it appears that the green and pink of *A. oblongifolia* compose a pair of Mendelian characters, with the pink color dominant. The original pink female parent was heterozygous for pink and green, respectively.

3. The assiduousness of Dr. Hancock in carrying out this most arduous experiment, over a period of seven years, will be appreciated and admired by all.

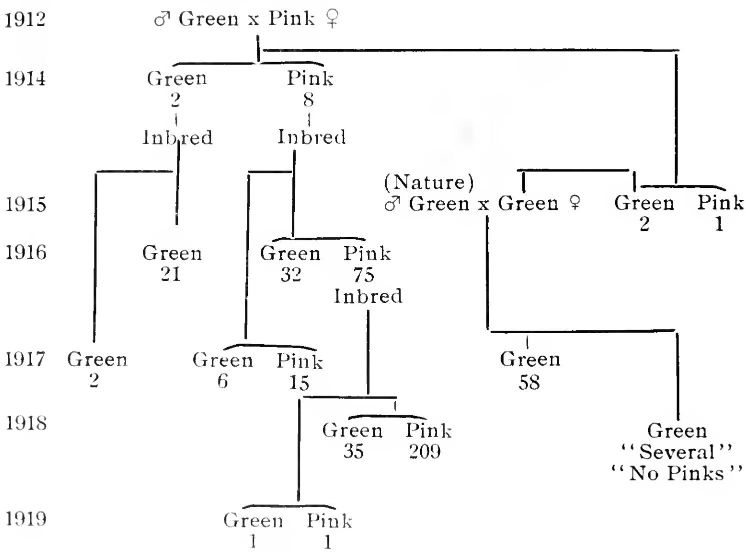
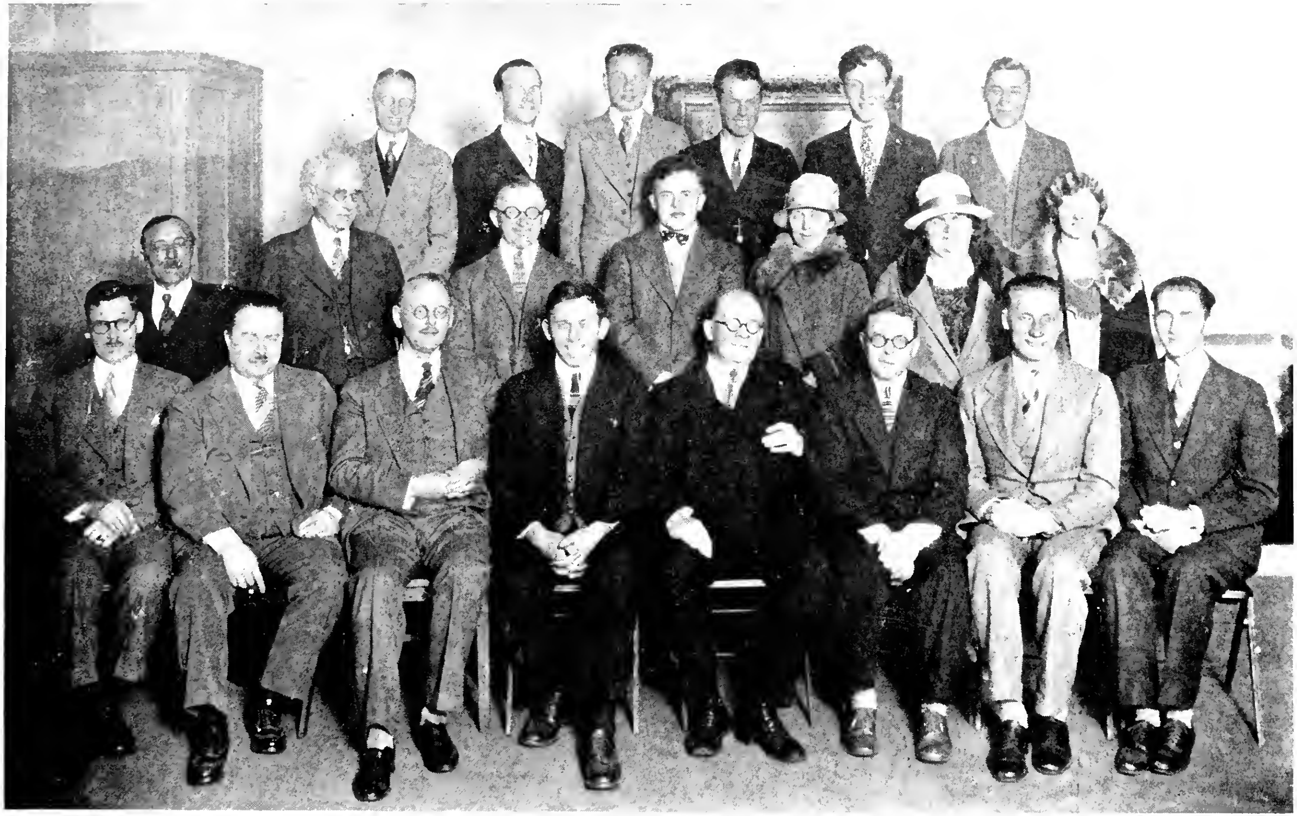


Diagram Showing the Inheritance Results from the Crossing of a Green Male Katy-did with a Pink Female Katy-did (*Amblycorypha oblongifolia*). From the notes of Dr. Joseph Lane Hancock. (There were approximately equal numbers of males and females.)



Active members of the Lorquin Entomological Society photographed Feb. 24, 1928, to commemorate the opening of the Seventh Annual Butterfly Show held at the Los Angeles Museum, Exposition Park, Los Angeles, Calif. Reading from left to right, *Top row*—Ryder, Engholm, Schlobohm, Iverson, Comstock Jr., Friday. *Middle Row*—Wingfinger, Muchmore, Morand, Minahan, Mrs. Minahan, Mrs. Friday, Mrs. Engholm. *Bottom Row*—Lawrence Kerr, J. D. Gunder, J. A. Comstock, Geo. Malcolm, Hal Newcomb, Chas. Hill, Charley Ingham, John Garth.

On Three New Spiders of the Genus Oxyopes (Araneina).

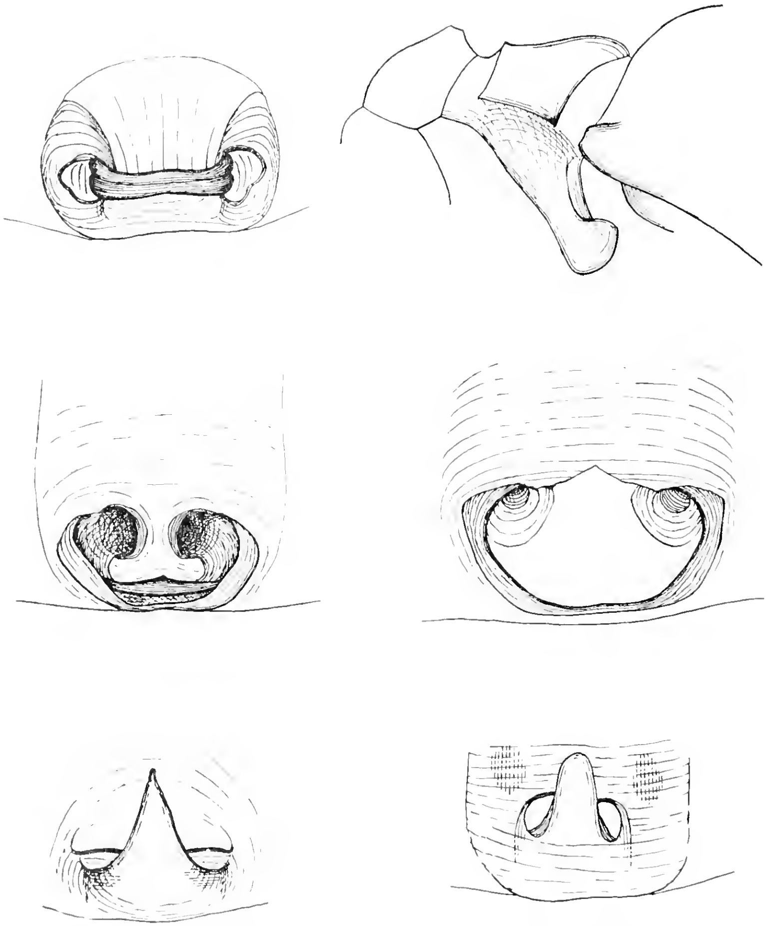
By Ralph V. Chamberlin,
University of Utah.

The three new species of *Oxyopes* here described were noted in the course of a study of material in the Cornell University collection, where the types are deposited. They are described through the courtesy of Prof. C. R. Crosby. They may be placed with reference to the commoner North American species by means of the following key to females.

a. Femora of legs lined with black beneath.
  b. Epigynum with a pronounced, forwardly-directed, distally acute process (fig. 5).............. *O. salticus* Htz.
  bb. Epigynum with no such forwardly-directed process.
    c. Spermathecal openings not widely separated; the transverse caudal ridge or plate with its anterior margin obtusely angular at middle (fig. 3)... *O. acleistus* n. sp.
    cc. Spermathecal openings widely separated; the transverse ridge farther forward, its anterior margin not angular at middle (fig. 1)........... *O. aglossus* n. sp.
aa. Femora of legs without longitudinal black lines beneath.
  b. Epigynum with a conspicuous, forwardly-directed, apically rounded process or finger.
    c. Line of cephalothorax seen in profile nearly straight; finger of epigynum narrower (fig. 6)... *O. scalaris* Htz.
    cc. Line of cephalothorax in profile rising decidedly in head region; finger of epigynum broader *O. rufipes* Banks
  bb. Epigynum with no such conspicuous finger, at most obtusely angular in front (fig. 4).......... *O. helius* n. sp.

Oxyopes aglossus n. sp.

♀.—Coloration much as in *O. salticus*. Carapace with integument yellow, or brownish yellow, clothed with dark scales on the sides and with white scales on middle band, a black line extending from each anterior lateral eye and down the front face of the chelicera, the lateral margins lined with black. Sternum yellow, typically with marginal black dots. Legs yellow, the femora each with a ventral black line and often some small scattered black spots on coxae, femora, patellae and tibiae, especially at bases of the spines. Abdomen dorsally light yellowish grey or somewhat silvery, sides brown with darker maculations, the venter with a median black band between epigynum and spinnerets, this band often broken into spots. Characterized especially by the form of the epigynum which presents a strongly chitinized transverse plate behind a cavity, bearing no forwardly-directed process or finger. (Fig. 1.) Length, 6 mm.



1 Epigynum of *Oxyopes aglossus* n. sp. 2 Lateral view of portion of right palpus of male of *Oxyopes aglossus* n. sp. showing tibial apophysis.
3 Epigynum of *Oxyopes acleistus* n. sp. 4 Epigynum of *Oxyopes helius* n. sp.
5 Epigynum of *Oxyopes salticus* Hentz. 6 Epigynum of *Oxyopes scalaris* Hentz.

♂.—Coloration in general as in the female. Palpi darkened, the tarsus and palpal organ black or nearly so. The abdomen, which is more slender and pointed than in the female, with dorsal light band narrower, pointed behind, commonly enclosing a dark, subsagitate area anteriorly. Tibia of palpus with a low, dorso-ectal angular process as in *salticus* but with ventral process of the form shown in fig. 2. The cymbium posteriorly cornuate, but the process rather small, rounded, and close to the tibia. Length, 4 mm.

Localities.—Georgia: Okefenokee Swamp, Billy's Id. (C. R. Crosby, June, 1912), Honey Id. and Mixon's Hammock; Tennessee: Beersheeba (one ♂, Fox Coll., June, 1888); Louisiana: Chestina (2 ♂, K. R. Schmidt, May, 1915). *Holotype*, a female, and *allotype* from Billy's Id.

Likely to be confused with *salticus* because of the similar lineation of the legs but easily distinguished by the very different epigynum. The male is most easily distinguished by the larger, differently formed ventral apophysis of the tibia of the palpus (fig. 2). The posterior process of the cymbium is shorter and less salient than in *salticus*.

Oxyopes acleistus n. sp.

♀.—Color pattern of this species also suggesting that of *salticus*. The vertical black lines down clypeus are broader, extending over space between anterior median and anterior lateral eye on each side, narrowing from eyes gradually to edge of clypeus. Black lines along antero-ventral face of femora wider, often with edges irregular; a broader band along ventro-caudal face mostly broken into spots; a stripe along antero-dorsal face complete on first legs but on third and fourth legs showing only distally; the stripes on femora tending to spread laterally and to unite with each other distally. Median dorsal light area of abdomen enclosing a dark sagittate mark; sides dark, and venter with the usual median longitudinal dark band. The spermathecal openings not concealed; caudal rim of epigynum angled at middle but with no forwardly-directed finger (fig. 3). Length, 6 mm.

Locality.—Florida: Stanford (1 ♀ taken by Stone, 27 July, 1927).

Oxyopes helius n. sp.

♀.—Contrasting with the two preceding species in showing no longitudinal dark lines on the femora of legs; these are dusky with a tendency to show a paler annulus at middle and at distal end; patellae and tibiae also dusky; posterior legs paler than the anterior. Clypeus and chelicerae with no vertical black lines, the clypeus with three sub-vertical lines of white hair, a median one and a lateral one on each side from between posterior lateral and anterior lateral eyes to ventro-lateral corner. Sternum and coxae of legs yellow, not spotted. Light area of dorsum subdivided by a median brown line which sends off oblique lines on each side behind; sides very dark; mid-ventral band broad but not so deeply colored as the sides. The cephalothorax is very high in front of the posterior declivity, the dorsal line in profile a little convex. The epigynum presents a marginal rim laterally and caudally which is narrower behind than in other species and presents neither median tooth nor finger from the rim (fig. 4). Length, 5 mm.

Locality.—Georgia: Okefenokee Swamp, Mixon's Hammock (Crosby coll., 16 June, 1912). 1 ♀ taken from a nest of *Pelopoeus.*

The epigynum of this species separates it at once from other species. The abdomen is proportionately broader and shorter than usual, and the caudally high, broad cephalothorax is also characteristic.

A New Riodinid from Louisiana (Lepid.).

By W. J. HOLLAND, Carnegie Museum, Pittsburgh, Pennsylvania

Calephelis louisiana n. sp.

Upper side:—The prevalent color of the wings is dull brown, interrupted on the fore wing by a band of dark luteous, which extends from the base parallel with the costa to the outer margin; a similarly colored light transverse band crosses the hind wing about its middle, parallel to the outer margin, sending an outward ray-like projection about its middle toward the outer margin. The thorax and abdomen on the upper side are concolorous.

Under side:—The ground-color of this side of the wings is pale red, much paler than in *C. virginiensis* Gray, and in tint like that of *C. perditalis* B. & McD. The metallic spots and dark markings disposed much as in *C. virginiensis* and *C. borealis*, but with the post-median band of metallic spots relatively larger, and widening toward the costa of the fore wing, in certain lights showing dark reflections. Thorax and abdomen on the under side concolorous. Legs testaceous; tibiae whitish. Expanse: .75 in.

Type (♂) in the Holland Collection, taken at Opelousas, Louisiana, by G. R. Pilate.

Hoplothrips karnyi Hood (Thysanoptera).

By Dudley Moulton,
San Francisco, California.

Numerous specimens of this interesting *Hoplothrips* have been forwarded to me for identification during the last two years, with host plant, locality and collector records as follows: "Tree fungus", Newark, New Jersey, (Wm. Trager), *Chrysanthemum leucanthemum*, Hamden, Connecticut, (W. E. Britton), Northern Spy Apple, Fair Haven, Vermont, (H. N. Bean), Fungus on dead Beech stump, Kingsville, Ohio, (J. C. Pallister), Fungus on dead log, Cold Spring Harbor, Long Island, (H. Friedman), under bark, Amherst, Massachusetts, (A. H. Salmon), on cherry and peach stumps, Indianapolis, Indiana, (H. F. Dietz), under bark of cherry tree, Brooklyn, New York, (W. E. Smith).

The confusion that has arisen in the proper identification of this species has been brought about partly because there are two distinct forms of male, and a noticeable variation in size of the female. Dr. H. Priesner, of Austria, has given the name *oedymer* for male specimens having greatly enlarged prothorax and forelegs, and *gynacoid* for those having prothorax and forelegs normally developed. I have recently named a species in another genus, *Haplothrips biformis*, from Abyssinia, Africa, which shows the same type variation.

I have selected eighty ♀♀ for the purpose of comparison and measurement from among the collections above listed, 48 macroptera, 32 brachyptera and 34 ♂♂, 5 macroptera *gynacoid*, 5 brachyptera *gynacoid* and 24 brachyptera *oedymer*. Macroptera *oedymer* forms have not been observed in this species. Macropterous males are equally as common as brachypterous males in the *oedymer* form of *Haplothrips biformis*, Moulton.

There is a marked variation in total body length, from 2 mm. to 4 mm., especially among the females, with prevailing size 2.5 to 3.5 mm. Much of this variation is due to a contracted or distended condition of the abdomen. The connecting tissue between the segments in a distended specimen is as long, if not longer, than the tergites themselves, while in a contracted specimen the segments are more or less telescoped, connecting tissue is folded and largely concealed and length of abdomen is much less than half of that in a normally distended specimen.

All of the characters which have been used heretofore in an attempt to designate two different species are insufficient, and are overcome by the normal variation within the species itself when we recognize the *oedymer* and *gynaecoid* forms.

HOPLOTHRIPS KARNYI Hood.

Trichothrips karnyi Hood, Insecutor Inscitiae Menstruus, ii, No. 2, 20, 1914.

Trichothrips karnyi major Hood, Proc. Biol. Soc. Wash., xxvii, 153, 1914.

Trichothrips karnyi karnyi Hood, Proc. Biol. Soc. Wash, xxvii, 153, 1914.

Hoplothrips karnyi major Hood, The Ent., xlviii, 105, 1915.

Hoplothrips karnyi karnyi Hood, Insec. Insc. Mens., v, Nos. 4-6, 61, 1917.

Trichothrips drakei Watson, Bull. Brooklyn Ent. Soc., xvi, 78, 1921.

Trichothrips ulmi Weiss & Lott, Bull. Brooklyn Ent. Soc., xviii, 94, 1923.

Hoplothrips major Weiss, Ent. News, xxxvii, 84, 1926.

Hoplothrips major Hood, Ent. Americana, vii, 226, 1927.

Hoplothrips karnyi major Hood, Ent. News, xxxviii, 113, 1927.

The Choice of Bees by Absolute or Relative Characteristics (Hymen.: Apidae).

In the great majority of experiments made by Köhler upon chicks, the chick's choice between two shades of grey was determined by the *relative* characteristics of the training brightness. Bees if trained to choose with regard to the difference of two shades of greys determine their choice by the *absolute* brightness of the training paper. If in a transference in positive direction the training paper remains visible, they go to that paper as before; if in a transference in negative direction the training paper is absent, they do not choose the paper that has the same relative place in the new combination as the training paper had in the old one, but sit down about equally on both papers and in a smaller number than they did when the training paper was present. J. A. BIERENS DE HAAN (in *Tijdschrift der Nederlandsche Dierkundige Vereeniging* (3) 1, 2, Leiden, Sept., 1928).

ENTOMOLOGICAL NEWS

Philadelphia, Pa., January, 1929.

On the Accrediting of Illustrations.

When a man, like C. V. Riley for example, with a genius for illustration, worked industriously to produce a striking and extremely competent drawing, he was naturally rather proud of it, and he expected and deserved scientific credit for his work. Riley was very insistent on this point, and his wonderful illustrations in the famous Missouri Reports have been used again and again in bulletins and books by other authors. Owing to Riley's original insistence, the credit has almost invariably been given to him, whoever the author of the article or book in which the illustration has been used. After he left Missouri and came to Washington, he did comparatively little personal drawing, but he trained George Marx and Lily Sullivan, and the early drawings of these two were done under his eye and under his constant and severe criticism.

Since the use of photography for insect illustration has come in very generally—and it was first used most successfully by Slingerland—there has been a reduction in the number of original drawings; but nevertheless many skilled draftsmen of entomological subjects have appeared. It is generally understood that an illustration should be accredited to the author of the paper which it originally illustrated, and this should be the careful aim of all writers. I think that this idea is universally accepted. In later years, however, there has been an output of bulletins and books in extraordinary number. In spite of the new photographs and new drawings, old figures have been used again and again. In the course of this use and reuse, the original source of many of these illustrations has been, through lack of care, disregarded, and later works using some of these illustrations for the second or third or tenth time credit the illustration to the second or third or ninth author in whose publication they appeared.

My early years with Riley, perhaps, cause me to notice this fact more quickly than do others, and to feel more keenly about it; and I am wondering whether it is too late to correct this tendency. We are very careful in matters of scientific credit in other directions. Should we not be equally careful in this? Some day, perhaps, some careful and inquisitive bookworm will look into this illustration credit and will prepare for publication a list that will suprise many of us and cause some authors who have been a bit careless in this direction a certain amount of chagrin.—L. O. HOWARD.

Personal.

Dr. E. D. Ball has been appointed Dean of the College of Agriculture and Director of the Experiment Station, of the University of Arizona, at Tucson, Arizona.

Must "Konowia" be Discontinued?

Dr. L. O. Howard has sent to the Editor of the NEWS some correspondence he has lately had with Herr Fritz Wagner, of Vienna, publisher of *Konowia*. Herr Wagner writes from Haizingergasse 4, Wien XVIII, in part as follows: It is a question of to be or not to be with *Konowia*, the continuation of which is seriously questioned. Up to the present time I have endeavored to meet the expense of *Konowia* out of my own pocket, but the deficit has now reached an amount (3200 Austrian shillings or $500) which renders it impossible for me to make further sacrifices and I see myself before the alternative either to apply for aid to some well-to-do entomologists or scientific institutions or to discontinue publication. The latter would certainly be regrettable, as *Konowia* is the only German journal dealing neither with Coleoptera nor Lepidoptera. All attempts to obtain some financial aid in this city have been unsuccessful, because our country is too poor, and there is no other way left to me than to apply to foreign countries to ask for help in the interest of *Konowia* and of the science in general. It is pretty certain that the present deficit can never be covered by the relatively small number of subscribers, if no helpers are found who, by special contributions of larger sums, will balance this deficit and enable *Konowia* to start life over again. (Translated from the original German and condensed.)

[*Konowia* is a journal of taxonomic entomology excluding the two orders mentioned above. It publishes about 20 sheets of letter press, with figures and plates, each year, the subscription price being 12 Gmk. Perhaps those entomologists in the United States who know and use *Konowia* can suggest directly to Herr Wagner, or to Dr. Howard, some means by which this useful journal may be saved and re-established.—EDITOR.]

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

GENERAL.—Britton, W. E.—The Fourth International Congress of Entomology. [12] 21: 651-661, ill. **Fulton, B. B.**—Sound perception by insects. [76] 1928: 552-556. **Heikertinger, F.** — Wie ordnet der spezialist gattungen und arten nach einem natürlichen system? [79] 14: 129-150. **McAtee, W. L.**—A two-word code of nomenclature. Stability in nomenclature. [10] 30: 150-151; 151-152. **Myers, J. G.**—Insect exploiters of animal secretions. A chapter of insect behavior. [19] 23: 157-173. **Poos, F. W.**—An annotated list of some parasitic insects. [10] 30: 145-150. **Schwarz, E. A.**—Obituary. [68] 68: 443. **Turner, H. J.**—Nomenclature. [21] 40: 164-165. **Wainwright, C. J.**—Mr. Charles H. T. Townsend's descriptions. A protest. [48] 45: 96-99. **Watson, J. R.**—Effect of the hurricane on the abundance of some insects. [39] 12: 40-41, ill. **Williams, C. B.**—Collected records relating to insect migration. [36] 76: 79-91.

ANATOMY, PHYSIOLOGY, ETC.—Abbott, C. E.—Some experiments on the nervous physiology of dragon-fly larvae. [5] 35: 182-185. **Cappe de Baillon, P.**—Embryogenie teratologique chez les Phasmides. (Menexenus semiarmatus et Clitumnus artemis.) [78] 62: 378-387, ill. **Legendre, M. J.**—Psychologie animale.—La psychologie de Culex pipiens. [69] 187: 774-776. **Lévy, R.**—Fonctionnement du vaisseau dorsal de la larve de mouche en milieu artificiel. [69] 99: 1482-1485. **Maziarski, S.**—Sur le tissu musculaire des insectes. II. Les éléments contractiles dans les couches musculaires du tube digestif des Tipulines. [Bull. Acad. Polonaise des Sci.] 1927, B: 785-822, ill. **Sikes, E. K.**—The external morphology and life-history of the coccid bug, Orthezia urticae. [93] 1928: 269-305, ill. **Snodgrass, R. E.**—The mind of an insect. [Smiths. Report] 1917: 387-416, ill. Morphology and evolution of the insect head and its appendages. [Smith. Misc. Coll.] 81: 1-158, ill. **Weyer, F.** — Untersuchungen über die Keimdrüsen bei Hymenopterenarbiterinnen. [94] 131: 345-501, ill.

ARACHNIDA AND MYRIOPODA.—Crosby & Bishop.—Revision of the spider genera Erigone, Eperigone and Catabrithorax (Erigoneae). [N. Y. State Mus. Bull.] 1928: 5-96, ill. **Hodson, W. E. H.**—The bionomics of the bulb mite, Rhizoglyphus echinopus. [22] 19: 187-200, ill. **Seeley, R. M.**—Revision of the spider genus Tetragnatha. [N. Y. State Mus. Bull.] 1928: 99-150, ill.

THE SMALLER ORDERS OF INSECTS.—*Carpenter, F. M.—A new Protodonatan from the Grand Canyon. [5] 35: 186-190, ill. ***McDunnough, J.**—Ephemerid notes with description of a new species. [4] 60: 238-240. **Stitz, H.**—Die Neuropteren des arktischen Gebietes. [Fauna Arctica, Jena] 5: 636-638.

ORTHOPTERA.—Ramme, W.—Die Orthopteren des arktischen Gebietes. [Fauna Arctica, Jena] 5: 641-646. ***Hubbell & Walker.**—A new shrub-inhabiting species of Schistocerca from Central Florida. [Oc. Pap. Mus. Zool.] 197: 1-10, ill. **Uvarov, B. P.**—Locusts and their control. [Nat. Hist. Mag.] 1: 298-306, ill.

HEMIPTERA.—*Ball, E. D.—A supplemental review of the genus Ophiola (Conosanus) in N. A. (Cicadellinae.) [19] 23: 185-190. **Blatchley, W. S.**—The Mexican chicken bug in Florida. [39] 12: 43-44. ***Drake, C. J.**—Some Tingitidae (Heteroptera) from Honduras. [Oc. Pap. Mus. Zool.] 190: 1-5, ill. ***Drake & Harris.**—Concerning some North American water-striders with descriptions of three new species. [43] 28: 269-276, ill. **Ferris, G. F.**—Observations on the Chermidae (Homoptera). Part V. (S). [4] 60: 240-245, ill. ***Hungerford, H. B.**—Some South American Corixidae. [19] 23: 174-180, ill. ***Knight, H. H.**—New species of Labopidea and Macrotyloides (Miridae). [4] 60: 233-236. ***Myers, J. G.**—Some Cuban Cicadidae, Cercopidae and Membracidae.—A correction. [5] 35: 190. **Myers, J. G.**—The morphology of the Cicadidae. [93] 1928: 365-472, ill. ***Schmidt, E.**—Die Cicadellinen des Stettiner museums. (S). [48] 45: 53-90. **Watson, S. A.**—The Miridae of Ohio. [Ohio Biol. Sur.] 4: 3-43, ill.

LEPIDOPTERA. — ***Dyar, H. G.** — Notes on cactus moths allied to Melitara, with two new genera and one new species. [10] 30: 133-137. ***Walter, E. V.** — Some new moths from Arizona. [10] 30: 137-41. ***Dyar, H. G.**—Description of a new genus. [10] 30: 138. **Eltringham, H.**—On the abdominal glands in certain North American Argynnids (Nymphalidae). [36] 76: 97-99, ill. ***Mc-Dunnough, J. H.**—A new Euphydryas. [4] 60: 248-249. **Philpott, A.** — On the systematic position of Anomoses (Homoneura). [36] 76: 93-96, ill. **Stichel, H.** — Die Veröffentlichungen über Erycinidae von A. Seitz im spiegelbild der kritik (Rhopal.). [11] 1928: 146-160, cont.

DIPTERA.—Aldrich, J. M.—Notes on synonymy of Diptera. [10] 30: 142-145. **Balduf, W. V.**—Notes on the habits of Aphiochaeta aletiae. [43] 28: 237-245, ill. ***Brues, C. T.**—A new species of Coniceromyia from Cuba (Phoridae). [5] 35: 157-159, ill. **Brues, C. T.**—Some Cuban Phoridae which visit the flowers of Aristolochia elegans. [5] 35: 160-161. ***Curran, C. H.**—Revision of the American species of Archytas (Tachinidae). [4] 60: 249-256, ill., cont. ***Mann, W. M.**—II. A new Microdon from Panama. [5] 35: 168-170. ***Taylor, R. L.**—A new species of Lonchaea (Lonchaeidae). [19] 23: 191-194, ill.

COLEOPTERA. — **Arrow, G. J.** — Polymorphism in horned beetles. [36] 76: 73-77, ill. ***Barber, H. S.** —I. A new Bolivian silvanid beetle from the myrmecodomatia of Cordia. [5] 35: 167-168. ***Benick, L.**—Amerikanische Steninen (Staph.). [4] 60: 33-52, ill. ***Blake, D. H.**—A new species of Luperodes from Mt. Mitchell, North Carolina.

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Elementary Lessons on Insects. By James G. Needham, Professor of Entomology, Cornell University, Ithaca. Charles C. Thomas, publisher. Springfield, Illinois, and Baltimore, Maryland. 1928. 22 x 15.5 cm. pp. viii, 210; 72 figs. Price $2.00, by mail $2.12.—As indicated by the title this book is intended for use by rather immature students who know very little about insects. Its plan embraces, for each topic, first, a description of some insect or group of insects;

second, a "work program" in which pupils as well as teacher participate in the collecting and preparation of material for study; and third, a "laboratory program" of study of both living and preserved specimens. The first topic is "What an insect is like—outside", illustrated by a description of an adult stonefly, followed by directions for gathering, mounting and making balsam slides of the insects used in a comparative study of the exterior of nymph and adult stonefly, grasshopper (nymph and adult), adult dragonfly, beetle and wasp. The second topic is "What an insect is like—inside"; the internal organs of a stonefly nymph again afford the basis of the description, and a comparison of transparent aquatic insect larvae (those of mayfly, dragonfly and midge) comprises the laboratory work. It will be seen that the approach to entomology is made chiefly through aquatic insects instead of such terrestrial forms as cockroach, grasshopper or cricket. Why should there not be many avenues of approach?

The two topics above mentioned, with III, How an insect grows up, constitute Part I, Introductory (pp. 3-36). Part II (pp. 37-136) deals with the Principal groups of insects, Part III (pp. 139-174) with Injurious insects and their control, Part IV with Collecting, preserving and rearing insects (pp. 177-206). There is a list of 22 reference books (p. 206) and an index of 4 pages.

Special features are, as the preface states, "a new selection of material for elementary instruction and some new plans for its use." Very compact are the "Clues for recognition of the commoner orders of winged insects" (p. 135), the "Condensed list of injurious insects" (pp. 151-153) and the list of "Insect enemies of principal crops" (pp. 157-159).

The book is attractively bound and is printed on unglazed paper—with praiseworthy lightness of weight.—P. P. CALVERT.

DESTRUCTIVE AND USEFUL INSECTS by C. L. METCALF and W. P. FLINT. 918 pp., 561 fig., McGraw-Hill Book Co., New York, 1928.

Many who were familiar with the mimeographed issues of 'Destructive and Useful Insects' have awaited the first printed edition impatiently. A cursory examination is sure to leave a good impression with the biologist, and when the book is carefully investigated it is not likely that this credence will be altered. Obviously the authors are capable of accepting the commission of writing such a book as this one proves to be. Mr. Flint has had wide experience in insect control, while Professor Metcalf has been connected with a number of our leading higher institutions. From this we expect a book of value to both teacher and economic entomologist, and so it is.

The strongest feature of the book is probably the introductory portion, consisting of ten chapters. The chapters following are of equal value, but are less unique. Most books on applied entomology have, perhaps of necessity, slighted the discussion of the relation of insects to mankind, the structure, development, classification and control of insects. Here we find these in great detail, 297 pages in all. Probably for this reason we have no right to call this a book on practical entomology, though that is its general tendency. The introductory chapters alone are sufficient for a small textbook, and many teachers cover no more than this in their beginning course. The order of the first chapters is slightly different from the usual: Insects as Enemies of Man, The Value of Insects to Man, The External Morphology of Insects, The Internal Anatomy and Physiology of Insects, The Mouth Parts of Insects, Development and Metamorphosis, The Place of Insects in the Animal Kingdom, The Order of Insects, Insect Control, and Apparatus for Applying Insecticides. Following these chapters are thirteen on insect pests of the various economic groups of crops, stored products, domestic animals, and man.

Teachers may notice that the discussion of the biological position of insects is delayed until after the chapters on structure and development. After teaching many classes in elementary entomology Professor Metcalf has deemed it wise to give the student a clear idea of what an insect is before he is taught the relationship of insects to the remainder of the animal kingdom. Probably it is also an opportune introduction to the orders and chief families of insects. Useful outlines are frequent, there are a number of well selected quotations from noted entomologists, and references are given. Scientific names and references are given in footnotes, which adds to the clarity of the text.

Each chapter on insect pests opens with a field key for identification, similar to those prepared by Lochhead in his *Economic Entomology*, but more complete. Where accurate figures on depredations and cost of control are available these precede the tables and discussion. A surprising amount of information has been concentrated in these thirteen chapters, yet it is not compacted to the point of being useful only for reference. A small but well selected list of references is given for each insect. It is safe to say that the great majority of the economic pests of America are treated, though of course equal weight is not given to all.

The authors have borrowed freely from many sources, as it is necessary to do in a work covering such broad range. The cuts have been well selected, and many of them are not sufficiently familiar to breed contempt. Special mention is due several drawings by A. M. Paterno, and the figures from the files of the State Natural History Survey at Urbana.

The directness of approach and the lucid style of writing are not the least features of the book. The reviewer has used the mimeographed edition as a reference for his students, who have found it very easy to read. The authors go a little beyond the field of entomology at times, and this will detract nothing from the usefulness of their work. This is shown in the general treatment of taxonomy, in the comparison of the insect body with that of the vertebrate, and in many other places.

A book has never been written that was favorably reviewed by all critics. Here the teacher or field worker will find modifications necessary, but these are due less to mistakes than regional or institutional differences. To the writer of this review the good points are so replete, and those he would change so minor that he hesitates to say anything in this direction. Let the worker decide for himself, he will find the book exceedingly interesting. No pains have been spared by authors or publisher in making this one of the most important books in the McGraw-Hill trade list. Its physical features befit its technical makeup. The actual writing of the book has been in process more than five years, and most of the mistakes have been combed out through the influence of the temporary editions. It will be useful to all entomologists. It gives an unsurpassed short account of the fundamentals of entomology, and should prove a valuable textbook. Its size and consequent expense ($7.50) will prevent its adoption by teachers having a limited time for their elementary course, but it is safe to say that it will take its place beside Comstock's 'Introduction' and Folsom's 'Entomology.' It is not unreasonable to expect it to exceed in use all books on practical general entomology.

PAUL KNIGHT, University of Maryland.

OBITUARY

DR. E. A. SCHWARZ.

Pneumonia, following serious injury from a fall, resulted in the death of Dr. Schwarz in Washington, D. C., on the 15th of October, 1928. As an entomologist few were more broadly known or more highly respected than this kindly man. Few are there in this country or abroad but knew of him or his works, for though not at all a profuse writer, his extensive knowledge of entomology in general and of Coleoptera in particular exerted an influence felt in one way or another all over the entomological world. Being a classical scholar of Old World training, he knew well several tongues and was able and willing at all times to help less able workers to arrive at the correct meaning of involved Latin phrases or to construct technical names from the Greek and Latin languages. He possessed an intimate knowledge of the biology and taxonomy of the beetles of all faunas, especially of the United States. For years he spent much time in field observations and thus knew his subjects, both at home in nature and pinned in collections. In general, he was a most learned entomologist, but his retiring disposition served to obscure all outward evidence of this, as he studiously shunned publicity. A few words of conversation would, however, serve to reveal an accurate and intimate knowledge of almost any subject and almost invariably shed light on questions under discussion.

Dr. Schwarz was a most kindly man, and a friend to all. More than one professional entomologist owes allegiance to him as the one who long ago encouraged his incipient interests in the study of insects and directed and helped him along the path to professionalism.

The untiring zeal of our late friend was an inspiration to all, and his refusal to relinquish his work until within a few days of his death, at the advanced age of eighty-four, shows to what an extent he was absorbed in his chosen work. A more zealous worker, a more helpful friend, or a more worthy man never lived than good old Dr. Schwarz.

A. N. CAUDELL, U. S. Department of Agriculture.

[Dr. L. O. Howard has contributed a short biographical notice of Dr. Schwarz, with dates and localities, to *Science* for Nov. 9, 1928, page 443, and a longer one from the same pen will appear in the *Proceedings of the Entomological Society of Washington*.—EDITOR.]

ENTOMOLOGICAL NEWS for December, 1928, was mailed at the Philadelphia Post Office on December 17, 1928.

List of the Titles of Periodicals and Serials Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annals of the Carnegie Museum. Pittsburgh, Pa.
4. Canadian Entomologist. London, Canada.
5. Pysche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology. Concord, N. H.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Entomologische Zeitschrift. Frankfurt a. M., Germany.
15. Natural History, American Museum of Natural History. New York.
16. American Journal of Science. New Haven, Conn.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Internationale entomologische Zeitschrift. Guben, Germany.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
20. Societas entomologica. Stuttgart, Germany.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bollettino del Laboratorio di Zoologia generale e agraria della R. Scuola superiore d'Agricultura in Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
26. Entomologischer Anzeiger, hersg. Adolf Hoffmann. Wien, Austria.
27. Bolletino della Società Entomologica. Genova, Italy.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. The Maine Naturalist. Thornaston, Maine.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janiero. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles.
34. Zoologischer Anzeiger, hrsg. v. E. Korschelt. Leipzig.
35. The Annals of Applied Biology. Cambridge, England.
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37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
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41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chileña de historia natural. Valparaiso, Chile.
45. Zeitschrift für wissenschaftliche Insektenbiologie. Berlin.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
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49. Entomologische Mitteilungen. Berlin.
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52. Archiv für Naturgeschichte, hrsg. v. E. Strand. Berlin.

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54. Annales de Parasitologie Humaine et Compareé. Paris.
55. Pan-Pacific Entomologist. San Francisco, Cal.
56. "Konowia". Zeit. für systematische Insektenkunde. Wien, Austria.
57. La Feuille des Naturalistes. Paris.
58. Entomologische Berichten. Nederlandsche ent. Ver. Amsterdam.
59. Encyclopédie entomologique, ed. P. Lechevalier. Paris.
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64. Zeitschrift des österr. entomologen-Vereines. Wien.
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72. Revue russe d'Entomologie. Leningrad, USSR.
73. Quarterly Review of Biology. Baltimore, Maryland.
74. Šbornik entomolog. národniho musea v Praze. Prague, Czechoslavokia.
75. Annals and Magazine of Natural History. London.
76. The Scientific Monthly. New York.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
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82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
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88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
96. La Cellule. Lierre, Belgium.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
99. Mélanges exotico-entomologiques, Par Maurice Pic. Moulins, France.

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FEBRUARY, 1929

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Vol. XL No. 2

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1838-1926

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TO CONTRIBUTORS. All contributions will be considered and passed upon at our earliest convenience and, as far as may be, will be published according to date of reception. The receipt of all papers will be acknowledged. Owing to the limited size of each number of the News, articles longer than six printed pages will be published in two or more installments, unless the author be willing to pay for the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

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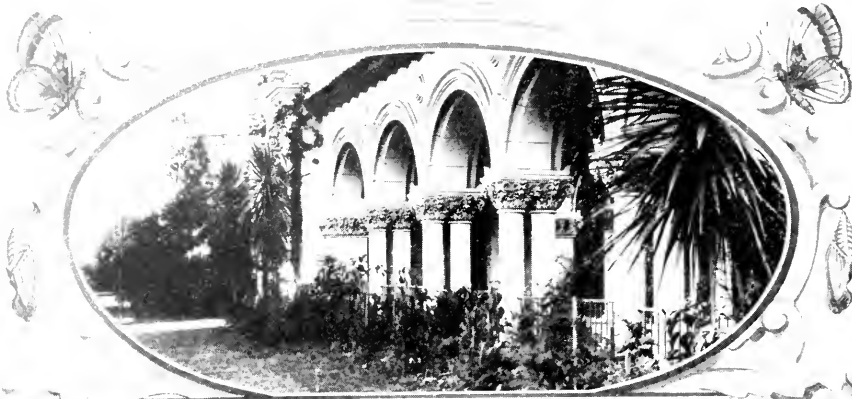
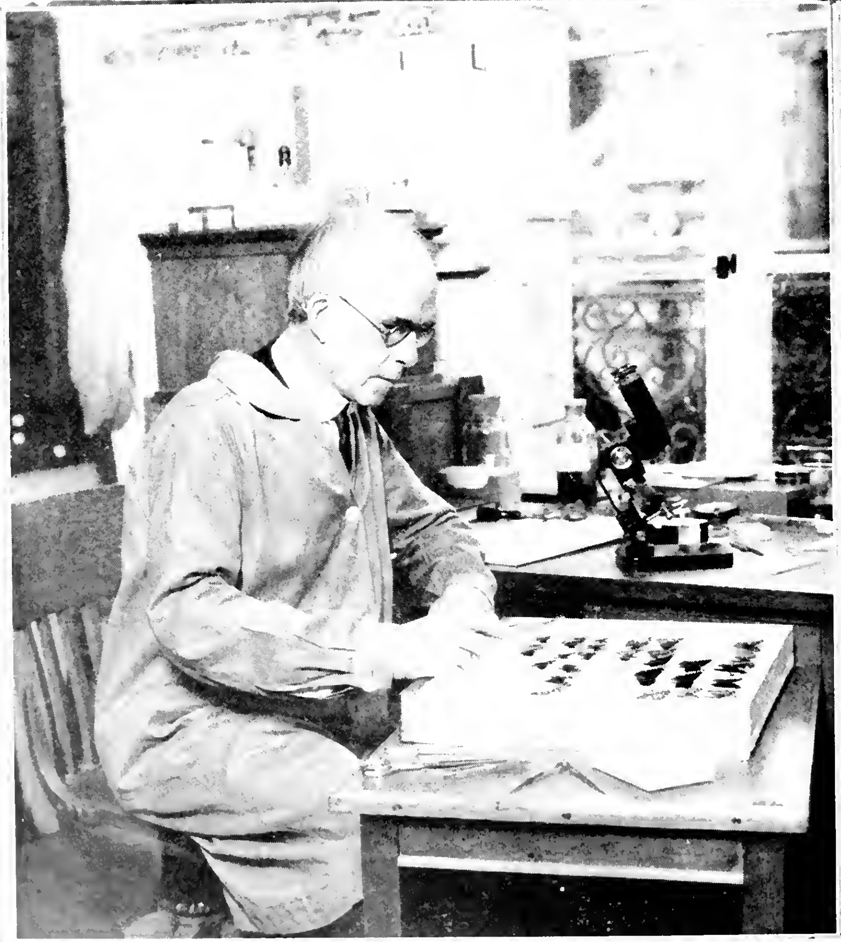
Stated Meetings of The American Entomological Society will be held at 7.30 o'clock P. M., on the fourth Thursday of each month, excepting June, July, August, November and December, and on the third Thursday of November and December.

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

The printer of the "News" will furnish reprints of articles over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 35 cents; three or four pages, twenty-five copies, 70 cents; five to eight pages, twenty-five copies, $1.40; nine to twelve pages, twenty-five copies, $2.00; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be the corresponding multiples of these rates.



Natural History Museum, San Diego, Calif.



W. S. WRIGHT

ENTOMOLOGICAL NEWS

Vol. XL. FEBRUARY, 1929 No. 2

North American Institutions Featuring Lepidoptera.

I. The Natural History Museum, San Diego, California.

By J. D. Gunder, Pasadena, California.

(Plate II.)

[This is the first article of an illustrated series describing several of America's important entomological centers. It is hoped that the information about these institutions will be of interest to the readers of the Entomological News. The illustrations will, we hope, allow everyone to become more personally acquainted with the men about whom they have read or with whom they have corresponded in the past.—Author.]

Anyone visiting the City of San Diego in Southern California is struck by the beauty and magnitude of its famous Balboa Park. Within this park were erected the buildings of the Panama-California Exposition in 1915-1916, and one of these ornate structures is now the permanent home of the Natural History Museum. This institution is a private enterprise and although receiving some city funds, was largely dependent upon public support until 1920, when the Scripps family of San Diego left it a substantial foundation. Since then, and mostly through the efforts of the present director, Mr. Clinton G. Abbott, an ornithologist, the Museum has been enlarged and its scope of public service broadened. Mr. Abbott's wisely pursued policy of "local natural history first" is giving the southwest a really thorough and useful knowledge of its immediate environs.

In 1874, when San Diego was a little town and people came down the coast by means of horse stages or weekly boat, several naturalists who had been meeting at each other's homes, met in the law offices of Daniel Cleveland, a botanist, and founded the original San Diego Natural History Society. Among this group was O. N. Sanford, a coleopterist, who is considered the first curator of entomology for the present institution. As years went by Mr. George Field became the second curator. Mr. Field is still active and though not now connected with the Museum, is known to hundreds of lepidopterists around the country because of his commercial insect dealings dating back to the time when L. E. Ricksecker, the coleopterist, and Frank Stephens, the naturalist, were in their prime.

Mr. W. S. Wright, the present curator of entomology whose picture accompanies this article, needs little introduction. When one thinks of *Geometridae* (moths), one thinks of "W. S." right away! He has been collecting Lepidoptera for about thirty-five years and there are many new names listed to his credit. Most of his papers will be found published in the Entomological News, Jl. N. Y. Ent. Soc., Proc. Calif. Acad. Sci. and lately in the Trans. of the local Museum. Mr. Wright was born in La Salle Co., Illinois, on April 23, 1866, and after attending Doane College, Nebraska, went to Columbia University in New York. He has three sons and two daughters.

The entomological activities of the San Diego Museum really began in 1923 when it acquired by donation the Wright collection of insects. Two rooms in the building are devoted to entomological research and there is a sizeable display of local and exotic lepidoptera on view to the public. Mr. Wright estimates that there are about fifty thousand specimens of butterflies and moths in the mounted collections which are contained in thirty wooden cases of thirteen drawers each. He has represented practically all of the lepidoptera from San Diego County and has specialized for years upon material in long series from this section. The type and paratype specimens are not kept separate at present, but it is proposed to give them that advantage within the year.

Mr. Wright asks me to say that all entomologists will be especially welcomed by him should they come to San Diego and if they are visiting in Southern California, not to pass by his city.

The Life History of the Goldenrod Beetle, Trirhabda canadensis Kirby (Coleop.: Chrysomelidae).*

By W. V. Balduf, University of Illinois.

Introductory.

Trirhabda canadensis, now generally referred to in the literature as the goldenrod beetle, was described by Kirby in 1837, under the generic name *Galeruca*. Leconte revised the Galerucides of North America in 1865, and erected the new genus *Trirhabda* to which *canadensis* was then transferred. The beetle is seven to eight millimeters long, with seven longitudinal stripes,—two dorsal and two marginal dull yellow, and two lateral and the median black. Only occasional reference has been made to this common species since it was first described, and a study of its development through the year has not been previously made. The present history was determined at Oak Harbor, Ohio, in 1928. Leng's Catalogue of the Coleoptera of North America gives its known distribution as Hudson Bay Territory, New Jersey, Colorado, California, and Indiana.

Morrill reports extensive defoliation of sage *Artemisia* sp. by this species on the Navajo Indian Reservation, but it was not of great importance. In all other reports it is cited as feeding upon goldenrod *Solidago* sp. on which the writer also observed it. According to Knight, the beetle is attacked by the Pentatomid predator *Perillus circumcintus*. The adult feigns death readily, dropping to the ground or lower parts of the plant when the latter is shaken or approached. Disturbances by wind tend to bring them lower on the plant than when the air is still. Parasites were not obtained during the present observations.

The Larval, Pupal, and Adult Stages.

The species seems to be best known in its larval stage. The larvae are black, with venters brown and when mature become about three-eighths inch long, and in regard to proportions and general appearance are similar to the larvae of the common

*Contribution No. 129 from the Entomological Laboratories of the University of Illinois.

asparagus beetle. They feed exposed on the leaves of *Solidago,* usually near the tops of the plants, on the more tender leaves, and sometimes consuming much of the foliage. They were seen in good numbers and well advanced in growth at Urbana on June 10, and mostly larger and also common on June 20 along the Toussaint River north of Oak Harbor. They are rather uniform in size, hence would seem to have begun development almost simultanously at the beginning of the season.

One hundred larvae placed in an insectary cage on June 21 has descended into the sandy soil by June 28, where they pupated in oval cases about one-half inch below the surface. Marcovitch, who saw the larvae abundant on the leaves in Minnesota in June, found them pupating in a breeding cage in early July, and just below the soil surface.

The pupa has the arrangement of appendages typical of coleopterous pupae. The color is yellowish, otherwise corresponding closely to the adult. The first adults made their appearance in the cage on July 12 and all had issued from their cells by July 18th. Marcovitch found that the pupal period was nine days, but the air was cool during the first part of July at Oak Harbor, and pupation required seventeen to twenty days. Emergence in nature probably continued to about August 1. Beetles in copulation and females in an extreme gravid state with abdomens swollen to two or three times their natural size were found from July, in the cages, to August 23 along the Toussaint River and at West Harbor at Catawba Island. Maximum numbers were present in about the third week of July, and mating, which is performed in the usual way of beetles, seemed to have reached its height about July 23. By August 23, the numbers had reduced to about one-fourth that of latter July, and on August 28 a few scattered individuals persisted. None was found in copulo on that date, although some females with enlarged abdomens were still present. Obviously then, a few adults survive the first of September; two were recovered in a cage on August 30. Blatchley reported it scarce in Lake and Marshall counties, Indiana, from July 4 to July 30.

Oviposition and the Egg.

Gravid females crawling about in a peculiar way over the *Solidago* in an observation cage were obviously seeking to oviposit. During locomotion the beetle constantly tapped the plant parts with the caudal end of her abdomen, or dragged the latter along and brushed it from side to side, thrusting it down into the fold of the leaves, into axils, and on plain leaf surfaces. A very definite form of situation is needed to satisfy the requirements of the beetle for oviposition. The selection is by a positive thigmotropism, the beetle backing its abdomen into various places until a suitably shaped spot is found. Locations chosen were depressions, folds, or concavities of nearly the conical shape and greatly distended size of the terminal third of the abdomen. The rounded surface of the leaf, or the rounded petiole, or branches, were never selected, even when the urge to oviposit was strong as evidenced by the persistent search of the female. The roughly conical places required were found under cage conditions both in and out of doors to be as follows; in the soil under the food plant, among small clods of earth; in folds of dried *Solidago* leaves on the ground, the folds formed by the spiral twisting of the leaves incident to drying; in only one instance were eggs found on a green leaf in a concavity caused by the feeding of a lace bug *Tingitidae;* into cavities, or between bark and pith, at the broken ends of old reed, or other stems, lying on the ground below the goldenrod. The stems of *Phragmites* are common under the *Solidago* along the river's edge, and in one instance eggs were found in the end of such a stem in a cage. The preferred places, judged by cage observations, were the soil and the dried leaves, the latter with petioles at times still clinging to the plant stems.

The eggs are deposited in irregular arrangement, consisting of masses of five to twenty-two eggs each. The eggs are cemented together, and the walls of the concavities are held to the eggs, by a small amount of a thin colorless liquid secreted by the female. Seven to ten minutes were spent in depositing some of the masses of eggs. During the most active oviposition there was a marked separation of the sexes on the plants,—the males being near or at the tops.

The egg: surface dull, color light brown to dim yellow; ovate in outline, one end obtusely, the other acutely rounded, shaped much like a turkey's egg; surface rough but not acutely or pitted, suggesting the exterior of a mulberry or morel mushroom; length 1-1.2 mm., maximum width 0.6-0.7 mm. slightly broader than thick, the shape being affected at times by the drying of the sticky secretion or of the leaves on which the eggs are deposited.

Both chorion and vitelline membrane, particularly the latter as this membrane goes, are thick and tough, and enclose a yellow yolk. These shells, together with the hidden positions of the eggs and their gluey covering, seem to protect the eggs well against dessication during the ten months of their existence. Feces were sometimes found covering in part the egg masses. The first eggs were laid, under observation, on July 23, and beetles caged outside on August 23 deposited several masses in the following week. The occurrence of gravid females in nature on August 28 indicates that oviposition may continue into September.

Generations and Hibernation.

On October 10, the eggs which were laid on the first date, and kept out of doors after deposition, were still firm and contained healthy yellow yolk with no traces of advanced embryonic development. Hence, the species without doubt spends the winter in the egg stage, and inasmuch as the larvae are well advanced in early June, hatching occurs about the middle of May. The eggs being in or near the ground, the larvae readily find the new food plants developing in the spring. There is thus only one generation a year, and the egg stage is longer than any other, approximately 10 months, from latter July to May.

In conclusion, two facts of general interest stand out in this history. The first is that there is only one generation annually whereas some other Chrysomelidae, *Diabrotica vittata* Fabr., for example, have two cycles during the same period of development. *T. canadensis* would seem to have sufficient time from latter July through August and September to produce a second generation. It is possible that the determining factor here may be the timing of the larval stage with the existence of the tender growing period of the food plant. *Solidago* is in bloom and the foliage rather hard in August and September when the second cycle larvae would be present. Hence, there is probably an adaptation of the beetle cycle to that of the food plant. Britton's statement that the "plants *S. sempervirens* were stripped of their topmost leaves and tender shoots", whereas "the lower leaves were less injured and were still green", gives confirmation to this explanation.

The second point of interest is the discovery that the eggs of *T. canadensis* are placed in the soil or in folds of dry leaves on the ground rather than on the surfaces of green leaves that prevail at the time of oviposition and on which both larvae and adults feed. But the occurrence of only one generation per year explains this divergence in habit. The larvae, at the time of hatching, are more certain to be near their food plants in the next spring as a result of oviposition in the soil or on dry foliage on the ground than if the eggs were placed on green leaves which, upon drying, might easily be carried by the wind to some distance from the location of the next year's food plants with probably a higher consequent rate of mortality among the newly hatched larvae. The likelihood of being so removed is increased by the probability that the eggs, were they laid on green leaves, would quite likely be placed on the top of the plant on the more succulent foliage which winds would be more apt to carry away than the lower leaves which are sheltered from wind by the surrounding dense growth of goldenrod. This instance of the adjustment of the insect's oviposition habits seems to follow therefore its adaptation, by the number of generations, yearly, to the cycle of the food plant.

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Descriptions of Six New Species of Microphylellus (Hemip.: Miridae).*

By Harry H. Knight, Ames, Iowa.

Microphylellus adustus n. sp.

Pale yellowish and darkened with brownish and fuscous; rather suggestive of *Plagiognathus delicatus* Uhler but lacking the fuscous spots on femora and tibiae.

♀. Length 3.4 mm., width 1.3 mm. Head: width .696 mm., vertex .38 mm.; fuscous brown above, tylus blackish. Rostrum, length 1.12 mm., extending to near hind margins of middle coxae, yellowish, apex blackish. Antennae: segment I, length .21 mm.; II, .74 mm.; III, .41 mm.; IV, .36 mm.; dusky brown, last two segments more fuscous. Pronotum: length .52 mm., width at base 1.11 mm.

Clothed with simple, fine yellowish pubescence. Pale yellowish to brownish, more or less behind each callus, scutellum except for lighter streak each side of median line, inner half of clavus and inner half of corium, triangular central area of propleura, and sides of venter, dark brown to fuscous. Cuneus uniformly pale yellowish brown. Membrane rather uniformly fusco-brownish, but darker within areoles. Legs yellowish, apical half of femora, and the tibiae, dark brownish.

Holotype: ♀, August 11, 1925, Ute Creek Ranch, Ft. Garland, Colorado (H. H. Knight); author's collection. *Paratypes*: 2 ♀, taken with the type. ♀ July 24, 1900, Salida, Colorado (E. D. Ball).

Microphylellus adustus **binotatus** n. var.

Differs from *adustus* in the paler color and distinct black spots, one behind each callus; pale, tylus, vertex, spot behind each callus, lateral margins of scutellum, inner margin of clavus, inner half of corium, and the membrane fuscous to black. Sternum, propleura except margins, epimera, ostiolar peritreme, and venter, blackish.

♂. Length 3.7 mm., width 1.24 mm. Head: width .71 mm., vertex .326 mm. Rostrum, length 1 mm., reaching upon middle of intermediate coxae. Antennae: segment I, length .24 mm.; II, 1.03 mm., equal in thickness to segment I; III, .53 mm.; IV, .37 mm. Pronotum: length .50 mm., width at base 1.03 mm.

*Contribution from the Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

Holotype: ♂ June 29, 1927, Montesano, WASHINGTON (Wm. W. Baker); author's collection. *Paratypes*: 2 ♂, taken with the type. ♀ July 23, 1924, Saanich District; ♀ Sept. 8, 1922, Victoria, BRITISH COLUMBIA (W. Downes), "on cottonwood".

Microphylellus brevicornis n. sp.

Allied to *adustus* but smaller and of paler color; distinguished by the short second antennal segment which is not equal to width of head.

♀. Length 3.1 mm., width 1.3 mm. Head: width .66 mm., vertex .38 mm. Rostrum, length .47 mm., reaching to middle of intermediate coxae. Antennae: segment I, length .16 mm.; II, .61 mm., gradually thickened apically but not attaining thickness of segment I; III, .25 mm.; IV, .28 mm.; combined length of last two segments not equal to segment II. Pronotum: length .49 mm., width at base 1.08 mm.

Color pale, tinged with yellowish and dusky; apical half of clavus, inner half of corium, spot behind coxal cleft, more or less on sternum and sides of venter near base, dusky to fuscous. Clothed with short, fine, pale to yellowish pubescence, tibial spines yellowish brown. Membrane pale, dusky brown within and between areoles, also a small cloud just behind apex of areoles.

Holotype: ♀ April 20, 1926, Santa Cruz River, Pima Co., ARIZONA (A. A. Nichol); author's collection. *Paratypes*: 3 ♀, taken with the type on "cotton weed" by Mr. Nichol.

Microphylellus mineus n. sp.

Distinguished by the small size and light red color.

♀. Length 2.8 mm., width 1.23 mm. Head: width .62 mm., vertex .31 mm. Rostrum, length 1.09 mm., reaching to near hind margins of posterior coxae. Antennae: segment I, length .21 mm.; II, .68 mm.; III, .32 mm.; IV, .30 mm.; yellowish, last two segments dusky.

Color light reddish, scutellum, embolium, base and outer margin of cuneus, more yellowish. Legs pale to yellowish, tibial spines blackish. Tylus, lora, and tip of rostrum blackish. Membrane pale, anal area, within and between areoles, and more or less bordering apical margin of areoles, dusky to fuscous. Clothed with moderately prominent, simple, yellowish pubescence.

Holotype: ♀, Gainesville, FLORIDA (J. R. Watson); author's collection.

Microphylellus nicholi n. sp.

Allied to *bicinctus* Van D., but differs somewhat in color characters: hind femora blackish on distal half only, the pale band across clavus curving forward and involving basal one-fourth of corium.

♂. Length 3.3 mm., width 1.12 mm. Head: width .68 mm., vertex .266 mm. Rostrum, length 1.11 mm., reaching to middle of hind coxae, pale, segments one and four blackish. Antennae: segment I, length .19 mm.; II, .92 mm.; III, .55 mm.; IV, .31 mm.; yellowish, last two segments fuscous, segment II becoming dusky, darker apically. Pronotum: length .50 mm., width at base .98 mm.; lateral margins of disk sinuate sulcate, pale on middle third.

Color dark fuscous to black, basal one-third of cuneus white, an arcuate pale area across clavus behind scutellum, curving forward and involving the basal one-third of corium. Legs pale, distal half of hind femora blackish, hind tibiae and the tarsi fuscous. Tibial spines pale to brownish. Membrane rather uniformly dusky, darker along veins. Clothed with fine, recumbent, pale yellowish pubescence, becoming fuscous on dark part of cuneus.

♀. Length 2.8 mm., width 1.15 mm. Head: width .65 mm., vertex .33 mm. Antennae: segment I, length .18 mm., II, .70 mm.; III, .43 mm.; IV, .27 mm. Pronotum: length .47 mm., width at base .99 mm. Pubescence similar to the male but coloration much lighter; head black, pronotum yellowish, calli fuscous, propleura reddish; median line of scutellum yellowish, hemelytra more broadly pale than in the male, cuneus with basal half white. Venter reddish to brown; legs nearly as in the male.

Holotype: ♂ April 25, 1926, alt. 3200 ft., Santa Catalina Mts., Arizona (A. A. Nichol); author's collection. *Allotype*: taken with the type. *Paratypes*: 7 ♂ 12 ♀, taken with the types on *Quercus hypoleuca* by Mr. Nichol.

Microphylellus minor n. sp.

Very similar to *bicinctus* Van D., but size smaller, distinguished by the more porrect head, the tylus projecting distinctly forward, this difference more prominent in the female, the vertex also somewhat wider.

♂. Length 2.6 mm., width .95 mm. Head: width .61 mm., vertex .27 mm. Rostrum, length .93 mm., reaching to near hind margins of posterior coxae. Antennae: segment I, length .13 mm.; II, .65 mm.; III, broken; yellowish to dusky. Pronotum: length .38 mm., width at base .78 mm.

Color dark chestnut brown to blackish, basal one-third of cuneus white, a transverse pale band across clavus and corium beginning just behind scutellum; antennae and legs pale yellowish, hind femora chestnut brown except for pale base and apex. Pubescence pale to yellowish, tibial spines pale.

♀. Length 2.4 mm., width .95 mm. Head: width .59 mm., vertex .296 mm. Antennae: segment I, length .13 mm.; II, .58 mm.; III, .31 mm.; IV, .21 mm. Pronotum: length .37 mm., width at base .80 mm. Very similar to the male in coloration and pubescence.

Holotype: ♂ June 20, 1926, Fresno, CALIFORNIA (C. J. Drake); author's collection. *Allotype*: same data as the type. *Paratypes*: 4 ♀, taken with the types. Dr. Drake found this species on one host and *bicinctus* Van D. on a different host in the same locality, altho the plants were not identified. The small size of this species and the different host plant observed, indicates a biological difference between this and *bicinctus*, which taken with the differences noted in head, antennae and pubescence, further substantiates the view that we are dealing with distinct species.

Microphylellus flavicollis n. sp.

Allied to *bicinctus* Van D., but distinguished by the pale band across pronotum, by the broader head and distinctly tumid frons.

♀. Length 3.4 mm., width 1.36 mm. Head: width .78 mm., vertex .37 mm; vertex and frons strongly tumid, tylus slightly angulate, the apical half sloping posteriorly. Rostrum, length 1.24 mm., reaching to middle of hind coxae. Antennae: segment I, length .21 mm.; II, .83 mm.; III, broken; yellow. Pronotum: length .56 mm., width at base 1.14 mm.

Black, basal one-third of cuneus white; a transverse pale band across middle of clavus, more narrowly across corium and extending to include basal third of embolium; scutellum pale to yellowish, apex fuscous; pronotal disk with broad pale to yellowish band, leaving only narrow basal margin and the calli black, also extending over on the propleura. Legs pale yellowish, distal half of hind femora blackish. Membrane pale fuscous. Clothed with very fine pale to yellowish pubescence; tibial spines yellowish.

Holotype: ♀ May 10, 1926, Tampico, WASHINGTON (E. W. Davis); author's collection. ♀ May 15, 1911, Humboldt Co., CALIFORNIA (F. W. Nunenmacher). ♀ May 21, 1893, Hood River, OREGON.

Undescribed Species of Crane-flies from the Eastern United States and Canada (Dipt.: Tipulidae). Part V.

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

The novelties discussed in this installment were collected chiefly in Florida by my colleague, Professor J. Speed Rogers, of the University of Florida. A few additional species taken by myself in New York and New England are included. The striking new *Ulomorpha* from Florida is of especial interest.

Limonia (Limonia) **novae-angliae** n. sp.

General coloration yellow, the praescutum with narrow black stripes on the interspaces; knobs of halteres brownish black; femora yellow, the tips black, preceded by a clearer yellow ring; wings with three large brown areas in cell *R*, the second at the origin of *Rs*, the third at the stigma; R_2 subequal to R_{1+2}.

♂. Length about 7.5-8 mm.; wing 8-9 mm.

Rostrum and palpi black. Antennae with the scape brownish yellow, the flagellum black, with long verticils. Head brown above, obscure yellow beneath.

Pronotum dark brown, yellowish laterally. Mesonotal praescutum obscure brownish yellow, with four narrow black lines that margin the yellow stripes, the intermediate pair paler to subobsolete on the posterior half; lateral dark stripes crossing the suture onto the scutal lobes; scutellum pale; postnotal mediotergite chiefly pale, dark laterally. Pleura chiefly pale, variegated with small dark spots. Halteres yellow, the knobs brownish black. Legs with the coxae and trochanters yellow; femora yellow, the tips blackened, preceded by a slightly wider clearer yellow ring, with vague indications of a second dusky ring immediately proximad of this; tibiae yellow, the bases very narrowly, the tips more extensively blackened; tarsi black. Wings yellow, the costal region clearer; three conspicuous brown areas in the radial field, the first post-arcular, the second, roughly circular to subquadrate, at origin of *Rs*, the third area at stigma, almost entire; conspicuous and extensive greyish clouds in all cells beyond the stigma, the radial clouds interrupted by yellowish marks in the ends of the cells; cells *M*, *Cu* and the Anal cells more extensively variegated; veins dark brown, the costal and subcostal veins more yellowish. Venation: R_2 subequal to R_{1+2}; *m-cu* before the fork of *M*.

Abdomen brownish yellow, the basal rings of the tergites somewhat clearer yellow; hypopygium obscure yellow. Male hypopygium with the dististyles separated only at tips. Gonapophyses slender, the apex with a microscopically spiculose cone, not with a tuft of setae as in *cinctipes* and allies.

Habitat. — MASSACHUSETTS. *Holotype*: ♂, Chesterfield Gorge, West Chesterfield, altitude 850 feet, August 2, 1928 (C. P. Alexander). *Paratopotype*, ♂. Type in the author's collection.

While this paper was going through the press, Mr. F. W. Edwards of the British Museum (Natural History) informs me that he collected a few additional specimens of the present species at Tuxedo Park, New York, August 27-28, 1928. Mr. Edwards notes that this was the commonest species of *Limonia* on the wing at that date.

Limonia novae-angliae is readily told from *L. cinctipes* (Say), to which it is apparently most closely allied, by its small size, darkened halteres and very distinct hypopygium. The wings of the types show abnormalities of venation, with adventitious crossveins and spurs, together with other malformations.

LIMONIA (Limonia) ROGERSIANA **longistylata** n. subsp.

♂. Length about 5.5 mm.; wing 6.2 mm.

Generally similar to typical *rogersiana* (Alexander) of the southeastern United States (Ent. News, 37: 45-46; 1926), differing especially in the larger size and details of structure of the male hypopygium.

Mesonotal praescutum with only the median praescutal stripe well-indicated. Wings with *Rs* longer and the basal section of R_{4+5} shorter, the former approximately three times the latter; *m* very long and arcuated, much exceeding the basal section of M_3. Male hypopygium with the basistyles very elongate, as in the group, the ventral-mesal lobe conspicuous, with elongate setae. Dististyle single, narrowed outwardly, at apex a slender chitinized spine. Apex of each gonapophysis microscopically serrulate, more distinctly so than in *rogersiana*.

Habitat.—FLORIDA. *Holotype*, ♂, "Camp Torreya", Liberty Co., April 26, 1924 (J. S. Rogers); No. 5. Type returned to Professor Rogers.

Although close to the typical form, *longistylata* certainly appears to be distinct, especially in the structure of the dististyles of the male hypopygium. In *rogersiana*, the apex of the style is abruptly narrowed into a long, finger-like lobe, with two or three long setae close to the tip. The coloration of the allotype female of *rogersiana* is darker, with the three praescutal stripes better indicated, and this latter may be found to be a still different race or species. The present species belongs to a group that is well-developed in Tropical America (*basistylata* Alexander, *hoffmani* Alexander, *apicata* Alexander, and others).

Dactylolabis supernumeraria n. sp.

♂. Length about 7-8 mm.; wing 8-9 mm. ♀. Length about 8 mm.; wing about 8.5-9 mm.

Generally similar to *D. montana* (Osten Sacken), differing especially in the thoracic coloration and the venation.

Antennae a little longer, the outer flagellar segments correspondingly lengthened; antennae black, the basal segment a little pruinose. Head clearer grey. Mesonotal praescutum dark brownish grey, the four stripes poorly delimited against this background; in *montana*, yellowish grey, the stripes very conspicuous and well-defined. Pleura dark, pruinose, the pteropleurite paler. Wings with cell M_1 much longer than its petiole; cell *1st* M_2 long, exceeding M_3 beyond it; a supernumerary crossvein in cell R_3, opposite or just proximad of R_2.

Habitat.—New York, New England. *Holotypes* ♂, Wilmington Notch, Adirondacks, NEW YORK, *June* 13, 1927 (C. P. Alexander). *Allotopotype*, ♀. *Paratopotype*, ♂. *Paratypes*, ♂ ♀, Smuggler's Notch, Green Mts., VERMONT, June 15-20, 1927 (C. P. Alexander). Type in the author's collection.

The specimens of *Dactylolabis montana* mentioned by Osten Sacken (Mon. Dipt. North America, 4: 228; 1869) as having adventitious crossveins in the submarginal cell presumably refer to the present species. The recently described *D. corsicana* Edwards (Corsica) similarly possesses a supernumerary crossvein in cell R_3 and Mr. Edwards tells me that the character was constant in the numerous specimens observed. Other species of the genus possess this character, but in some of the far northern species, as *D. rhicnoptiloides* Alexander, the crossvein tends to be evanescent. The present species was found commonly in the Green Mts., Vermont, and this feature of a supernumerary crossvein was quite constant.

Pilaria arguta n. sp.

Antennae (♂) short; mesonotal praescutum shiny brown, more yellowish laterally; wings relatively narrow, with a strong brownish suffusion; cell M_1 present.

♂. Length 7.2-7.5 mm.; wing 8-8.5 x 1.95-2 mm.

Rostrum obscure brownish yellow; palpi dark brown. Antennae (♂) short, if bent backward extending approximately to opposite wing-root; scapal segments obscure brownish yellow, the second darker at tip; flagellum brownish black, the verticils long and conspicuous. Head obscure reddish brown, the postgenae infuscated.

Mesonotal praescutum shiny yellow laterally, the disk behind more infuscated; posterior sclerites of mesonotum infumed. Pleura yellow. Halteres dirty white, the knobs darker. Legs with the coxae and trochanters yellow; remainder of legs yellowish brown, the terminal tarsal segments darker; basal setae of femora short and subspinous. Wings relatively narrow, with a strong brownish suffusion, the oval stigma a little darker than the ground-color; veins dark brown. Venation: Sc_1 ending about opposite three-fourths to four-fifths the length of the long Rs, Sc_2 at its tip; R_{2+3+4} subequal to or longer than R_3; R_2 just beyond the fork of R_{2+3+4}; cell M_1 subequal to its petiole; *m-cu* at or beyond midlength of cell *1st* M_2.

Abdomen obscure yellowish brown, fringed laterally with conspicuous setae.

Habitat.—FLORIDA. *Holotype*: ♂, Newman's Lake, Alachua Co., April 6, 1928 (J. S. Rogers); No. 230. *Paratype*, ♂, Marianna, Jackson Co., April 13, 1928 (J. S. Rogers); No. 3. Type returned to Professor Rogers.

Pilaria arguta is allied to *P. recondita* (Osten Sacken), differing especially in the smaller size and narrow wings.

Pilaria vermontana n. sp.

General coloration brown; antennae of moderate length in both sexes, in the male extending approximately to the base of the abdomen; wings with a pale brown tinge, the relatively small oval stigma only a little darker; cell M_1 present.

♂. Length about 7.5-8.5 mm.; wing 8-9 mm.

♀. Length about 8 mm.; wing 9.5 mm.

Rostrum and palpi dark brown. Antennae dark brown, of moderate length, in male if bent backward extending approximately to the base of the abdomen; flagellar segments cylindrical, with verticils that are shorter than the segments. Head dark greyish brown.

Mesonotum pale testaceous brown, the posterior sclerites darker brown. Pleura more yellowish than the notum. Halteres pale, the base of the stem restrictedly yellow. Legs with the coxae and trochanters yellow; femora brownish testaceous, the tips darkened; tibiae and tarsi passing into darker brown. Wings with a pale brown tinge, the relatively small oval stigma hairy, only a little darker than the ground-color; veins dark brown. Venation: Sc_1 a short distance before the fork of Rs, Sc_2 at its tip; Rs elongate, gently arcuated at origin; R_2 oblique, at fork of R_{3+4}; cell M_1 present, varying from subequal to much longer than its petiole; *m-cu* at or shortly beyond mid-length cell *1st* M_2. Wings broader than in *tenuipes*.

Abdominal tergites dark brown, the sternites somewhat paler; hypopygium obscure yellow.

Habitat.—VERMONT. *Holotype*: ♂, Woodcrest Farm, near Stowe, at foot of Mt. Mansfield, in a sphagnum bog, altitude 1000 feet, June 22, 1927 (C. P. Alexander). *Allotopotype*: ♀, June 22, 1927. *Paratopotype*: ♂, June 24, 1927. Type in the author's collection.

Pilaria vermontana is somewhat intermediate in its characters between *P. tenuipes* (Say) and *P. recondita* (Osten Sacken). The antennae are conspicuously shorter than in *tenuipes* but much longer than in *recondita* and allies. It is probable that the present species, like *P. stanwoodae* (Alexander), will be found to be confined to the vicinity of bogs.

Ulomorpha rogersella n. sp.

General coloration shiny coal-black, the ventral pleurites reddish yellow; fore femora extensively blackened, the remaining femora yellow; wings yellowish, the veins broadly seamed with darker; cell M_1 lacking.

♂. Length about 5.5 mm.; wing 6 mm.

♀. Length about 8 mm.; wing about 7.5 mm.

Rostrum and palpi black. Antennae black throughout, the verticils elongate. Head shiny black.

Mesonotum shiny coal-black. Pleura black, the ventral sternopleurite and meron pale reddish yellow, with a microscopic appressed silvery pubescence. Halteres pale brownish yellow, in the female the knobs more infuscated. Legs with the coxae and trochanters obscure yellow; fore femora with the distal two-thirds black, the base light yellow, the segment weakly clavate; remaining femora obscure yellow, the base a trifle clearer; tibiae and tarsi pale yellowish brown, the distal tarsal segments infuscated; legs conspicuously hairy. Wings with a yellowish ground-color, the veins broadly seamed with brownish to produce a more or less distinct streaked appearance; stigma oval, a trifle darker than the brown seams; veins brown. Macrotrichiae of the cells abundant, including all cells beyond cord, as well as the distal ends of cells *R*, *M*, *Cu* and *1st A*. Venation: Sc_2 at tip of Sc_1, ending about opposite two-thirds to three-fourths the length of *Rs*; *Rs* relatively long, strongly arcuated to angulated and short-spurred at origin; cell R_3 sessile; cell M_1 lacking; cell *1st* M_2 elongate-rectangular, *m-cu* at near two-fifths its length.

Abdomen shiny coal-black, the intermediate sternites a little brightened. Ovipositor with the tergal valves long and slender, pale horn-yellow, gently upcurved.

Habitat.—FLORIDA. *Holotype*: ♂, Marianna, Jackson Co., April 13, 1928 (J. S. Rogers); No. 847, study-specimen. *Allotopotype*: ♀. *Paratopotype*: ♂, No. 3. Type returned to Professor Rogers.

Ulomorpha rogersella is very distinct from the only other known Eastern species, *U. pilosella* Osten Sacken. It is named in honor of the collector, Professor J. Speed Rogers, who has done more than any other person to make known the Tipulid fauna of the southeastern United States.

Dasychernes inquilinus from the Nest of Meliponine Bees in Colombia (Arachnida: Chelonethida).

By JOSEPH CONRAD CHAMBERLIN, Stanford University, California.

Through the courtesy of Mr. George Salt of Bussey Institution of Harvard University, I have had the privilege of examining an interesting collection of false scorpions taken at two localities in Colombia from the nesting cavities of Meliponine bees. This magnificent form (it is one of the largest of the false scorpions) hitherto undescribed is here named *Dasychernes inquilinus*, genus et species nova. It is assigned to the family CHELIFERIDAE Hagen and to the subfamily CHELIFERINAE Simon.

DASYCHERNES nov. gen.

Orthotype: *Dasychernes inquilinus* n. sp. Colombia.

Diagnosis: Cheliferoid genus related to *Chernes* and *Chelanops*. Sclerotic parts obscurely granulate, almost smooth but scarcely polished. Setae simple and slender, non-denticulate. Venom apparatus reduced and present in movable finger only. Chela with accessory teeth serially developed exteriorly and interiorly on both fixed and movable fingers. Fingers of chela with sense spot areas tremendously developed, primarily basally on exterior and interior surfaces of both fixed and movable fingers. Fingers of chela in female slightly gaping when closed; widely gaping in male. Chaetotaxy of chela: movable finger—terminal seta about one-third finger length from tip of finger; sub-terminal seta one-eighth to one-ninth finger length from terminal seta; sub-basal seta about one-fifth finger length from base with the basal seta midway between it and base of finger; fixed finger—exterior terminal seta one-eighth finger length from tip; exterior sub-terminal seta between 3 and 4 eighths of a finger length posterior to the exterior terminal seta; interior terminal seta dorsal and one-third closer to exterior terminal seta than exterior sub-terminal seta; exterior basal seta almost truly basal; exterior sub-basal seta dorso-anterior thereto a distance equal to that between the basal and sub-basal setae; interior basal seta dorsal, slightly anterior to the exterior sub-basal seta; interior sub-basal seta dorsal, nearly midway between the interior sub-terminal and the interior basal setae, situated clearly on basal half of finger. Flagellum of three blades. Spinneret galeate, multi-ramose and not sexually differentiated.

Palm of chelicera with seven (two accessory) setae, of which the central group of three are terminally, minutely denticulate. Carapace garypoid in form, totally eyeless and with two strongly developed transverse carapacal furrows of which the anterior one is slightly posterior of median and procurved; the posterior one nearer posterior carapacal margin than anterior furrow and weakly recurved. Tracheal trunks with numerous, internal, finger-like papillae. Leg IV without differentiated tactile setae but with a tarsal sense dome one-third to one-fourth from base. Tarsal claws partially retractile against the excavated tip of tarsus; claws and subterminal setae simple; empodium normal in form and shorter than claws. Clothing setae normal on palps and nearly so on carapace and legs; tergites and sternites distinctly hairy especially laterally and posteriorly; setae not arranged in rows as usual but more or less evenly distributed over the entire tergal scutae and over the posterior half of the sternal scutae; in the orthotype a median tergite (compounded of 2 scutae) bears well over 200 setae while a similar sternite bears in the neighborhood of 100. All tergites and sternites but the first and eleventh divided by a median membranous area which is broadest medianally; intersegmental membrane broad and plicate; pleural membrane broad and prominently papillate.

Remarks. The hairy tergites will distinguish this genus from all related groups. Known only from the orothotype.

Dasychernes inquilinus n. sp.

Large species measuring between 5 and 6 millimeters long when expanded. Femur shorter than carapace; fingers of chela longer than femur; tibia shorter than femur; fingers much longer than hand which is clearly longer than broad. Trochanter 1.7 to 1.8 times as long as broad; femur 2.7 to 2.9 times as long as broad, slenderest in male; tibia 2.5 to 2.8 times as long as broad, slenderest in male; chela 3.3 to 3.7 times as long as broad, also slenderest in male; hand slightly broader than deep but almost cylindrical; fingers 1.3 to 1.6 times as long as hand, more elongate in male. Spinneret (galea) scarcely twice as long as basally broad, strongly conical in shape and with many short simple branches. Chela with a band of densely packed sense spots extending from base to beyond midpoint on exterior surface of both fixed and movable fingers; fixed finger with a large basal area and an attenuated zone of sense spots extending to middle of finger or beyond; interior surface of fixed finger with a large basal area of sense spots from which extends a scattered zone to beyond middle of finger; interior surface of movable finger with a close basal cluster and ill-defined projecting zone of scattered sense spots extending to beyond middle of finger. Nodus ramosus opposite 27th to 30th marginal tooth. Fixed finger with a series of 12-18 accessory teeth on either side of marginal row; movable finger similarly, with 10-16 teeth on either side of marginal series.

Holotype, ♂ (JC—439.01002); *Allotype,* ♀, (JC—439.01.-001). Paratypes, 10 ♂, and 8 ♀, (JC—439.01003 to 21). Also 9 immature specimens (JC—439.01022 to 29). All from Rio Frio, COLOMBIA. Collected by George Salt, October 11, 1927. Additional material (Paratypes) 6 ♀, 1 ♂ (JC—442.01001-8), from Sevilla, Colombia. Coll. George Salt, July 30, 1927. All material except 2 ♀, (JC—442.01002 and 3) from Sevilla, and 2 ♂, and 2 ♀, (JC—439.01004 to 7) from Rio Frio, in author's collection. The excepted specimens have been returned to Mr. Salt.

Transient Color Changes in the Tortoise Beetles[1] (Coleop.: Chrysomelidae).

By Clyde W. Mason, Laboratory of Chemical Microscopy, Department of Chemistry, Cornell University, Ithaca, New York.

As entomologists have known for years, specimens of the common "tortoise beetles," *Coptocycla bicolor* Fabr. and *C. signifera* Herbst, lose their brass-yellow metallic iridescence soon after death, becoming a pale brown. It is perhaps not so generally known that they may lose it temporarily when alive, or may vary its hue in a most striking manner. Such unusual behavior affords an excellent opportunity to apply the thin-film theory of structural colors in insect integuments, which has been discussed by the writer in a series of earlier papers.[2]

This theory is supported by a wide variety of evidence from numerous workers. It explains the production of brilliant colors which change their hue with changing angle of observation, and which show almost metallic luster without the presence of any but neutral-hued pigments, as being due to purely structural causes. The color production is ascribed to films of transparent chitinous material which are themselves colorless, and which produce color by virtue of their extreme thinness, just as does a soap bubble or an oil film on water. The colors are more brilliant and metallic than those of soap bubbles because several films function to produce them. These films are less than 0.5 micron thick, and are in contact except for cementing layers of slightly different chitinous material. The entire color-producing layer may be no more than a micron or two in thickness.

Color phenomena observed.

The appearance of the living, undisturbed beetle is almost like a ball of gold. Its elytra are highly metallic, and their bright brass-yellow color makes the insect conspicuous in sunshine. The reflections are specular and the high lights sharply

[1]This paper is a continuation of an investigation supported by a grant from the Heckscher Foundation for the Advancement of Research, established by August Heckscher at Cornell University.

The writer is indebted to Dr. W. T. M. Forbes, of the Department of Entomology, for advice and criticism in connection with this study.

[2]Mason: Structural Colors in Insects, J. Phys. Chem. *30,* 383-95 (1926); *31,* 321-54, 1856-72. Structural Colors in Feathers, J. Phys. Chem. *27,* 201-251, (1927), 401-447 (1923).

defined, as with metals. If the line of vision is inclined to the surface the color is not yellow but green, or even blue at grazing incidence. This color change with increasing angle of vision corresponds exactly to that of numerous other iridescent insects, and is typical of thin-film colors. It represents a shift in Newton's series of colors,[1] from upper second order to lower second order. A similar decrease in order is noted at the edges of the elytra or of pits in the integument, and corresponds to a *thinned* color-producing structure. The slight localized non-uniformities of hue visible microscopically are due to unevenness in the thickness of the films.

The color originates beneath the outer hard transparent layer of the elytron, as may be shown by scraping the latter; it is above the fluid interior however, and is backed by the orange color of the latter. Scrapings may be removed, or torn edges studied, and their properties are wholly consistent with those anticipated from the thin-film theory.

When the insect is disturbed, in the course of less than a minute its color changes progressively through the hues of lower order in Newton's series, becoming green, blue, violet, and finally a brownish orange which is lost against the color of the fluid interior of the elytron. The metallic lustre and brilliancy of the color seem to decrease, but this is probably because blue and violet are less bright to the human eye than is yellow.

This shift in hue from golden yellow to dark purple or orange may serve as a protective device, for certainly the beetles are less easily noticed when they have changed to their less gorgeous hues. If the insect is left undisturbed for a few minutes, the colors pass through the above sequence in reverse order until the original hue is regained.

One might perhaps postulate that these changes involve the rapid, reversible, syntheses of a series of different colored pigments, or at least the presence of a pigment which can show

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[1]Colored charts of the series of interference colors such as are produced by thin films may be found in the following books:

C. V. Boys, Soap Bubbles (1912)
Johannsen: Determination of Rock Forming Minerals (1908)
Iddings: Rock Minerals (1911)
Winchell: Elements of Optical Mineralogy (1909).

Or one can produce the colors for himself by allowing a drop of oil to spread on water over a dark background. At the edges, where the film is thin, the colors are of low order, and their order increases toward the thicker center of the film.

several colors, as an indicator does with acids and alkalies. But in addition such a pigment would have to exhibit a high degree of "selective reflection" and still be almost colorless by transmitted light. We know of no pigments or other colored substances which even approximate these properties.

On the other hand, all of the remarkable color phenomena which the tortoise beetles show can be easily explained by the thin-film theory. The brilliancy of metallic lustre of the coloring are perfectly analogous to those of thin films, and the hues are identical with those of Newton's series. The faint transmission colors, complementary to the reflection colors, are also consistent. The changes of color with changes in the angle of incidence are exactly what one would predict. In all the above respects the tortoise beetles do not differ from other insects having metallic iridescent integuments.

As regards their unique behavior in changing their hue when disturbed, one naturally assumes that in some way they are able to vary the thickness of the color producing films. As confirmation of this idea, we note that the change in hue corresponds precisely to that produced when a color producing film is made thinner. The colors pass from upper second order green, through the lower second order of Newton's series, to upper first order violet or orange. As the insect recovers its composure the reverse changes are again in perfect agreement with those which we would expect if a color-producing film were thickened.

We can test this explanation further by subjecting scrapings of the iridescent layer of the integument to pressure, so as to make the films thinner. The colors change just as described above. When pressure is removed, they are restored, similarly.

In attempting to test the insect's control over its color, an elytron was cut transversely by fine scissors, so that only the inner edge remained intact. It was found that the power of color variation did not extend beyond the cut. But more important, the vicinity of the cut showed a pronounced alteration in color, as compared with the remainder of the elytron.

The uninjured portion of the surface becomes violet of the lower second order, due to the disturbance of the insect by the operation. Toward the cut, the colors rise in order, up to yellow of the second order, or even as high as the red between the second and third orders. Still nearer the cut the colors decrease in order, down through the second order to the lowest violet or orange which is ever perceptible on the insect. The zone of higher order colors parallels the cut and follows any angles which it may make. The color producing layer may show a distinctly wrinkled surface in the region of highest order color.

Such behavior makes impossible demands upon any pigmentation theory, but can be explained rather simply as due to a localized "congestion" in the vicinity of the injury, which results in a swelling of the color films. This is confirmed by the wrinkled appearance developed. At the very edges of the cut, where the tissue is actually laid open, evaporation of moisture, and consequent shrinkage, cause a lowering of the color.

This swelling and shrinking of the color-producing film, with corresponding changes in its thickness, is also the explanation of the color changes shown by the living insect. By a slight regulation of the turgor of the tissue in which the color originates, probably by regulation of its moisture content, the insect can produce a wide variety of colors. Instead of growing pale with fright, by the contraction of the capillaries of the skin, the tortoise beetle becomes a lower order color, by the shrinkage of his color-producing membrane. The study of the deeper physiological and psychological aspects of this manifestation of insect emotion the writer is forced to leave to the entomologist.

One might carry the absurd comparison a step further by saying that superficial injuries, instead of causing swelling and redness from congestion of blood, bring about swelling and high order colors from the increased thickness of the color film.

To test this explanation, attempts were made to swell and to shrink the color-producing membrane. It was laid bare, either by scraping or by cutting through the elytron, and wetted with water. Instead of lowered colors at the very edge of the exposed part, the colors were even higher than in the adjacent zone. The color-producing tissue was strongly wrinkled, and obviously had undergone swelling where the water had soaked into it. On drying out the colors decreased in order to the original hues. This points to the color-producing films being made up of a tissue capable of variable degree of hydration and consequent swelling, such as is common in all forms of life.

As a further test, a specimen which had been swelled with water in the manner just described was wetted with a concentrated solution of sodium chloride. Just as in the familiar experiments with plant and animal cells, the salt solution, of high osmotic pressure (hypertonic), abstracted water from the tissue, resulting in a marked shrinkage which was evidenced by a smoothing out of the wrinkles, and by a lowering of the order of the colors. Replacing the salt solution by water restored the previous swollen condition.

In the light of the above observations it seems reasonably certain that the loss of color after death is due to similar causes. Drying out of the tissue causes a thinning of the color film, a lowering of the colors, and finally the loss of iridescence and lustre, just as when drying out occurs at the edge of a cut. However, if the insect is killed by drowning, or is kept moist after death, the colors may last for months, and would probably be permanent if the specimen were preserved in an appropriate isotonic "physiological saline solution." Specimens which have been dry and colorless for some months may have their color and lustre restored more or less perfectly by soaking in water. This is not always successful, probably because the tissue may have been so completely coagulated and hardened as to be practically unsusceptible to the swelling action of water. It might be of interest for an entomologist with plenty of material to apply the explanation given above to working out a method of retaining the fugitive coloring of the tortoise beetles (and possibly other insects) by the use of isotonic solutions which will keep the tissue in its original condition, with neither swelling, shrinkage, decay or loss of differentiated character.

Conclusions.

The conclusions of this paper are as follows:

1. The "tortoise beetle" changes its color when disturbed, by altering the thickness of the films which constitute its color-producing layer.

2. The loss of color in dead specimens is due to a dehydration and shrinkage of the tissues, which is not perfectly reversible.

ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., FEBRUARY, 1929.

Entomology at the "Convocation Week" Meetings, December 27, 1928, to January 2, 1929.

Again we summarize the papers treating of insects and a few other tracheate arthropods listed on the program of the (eighty-fifth) meeting of the American Association for the Advancement of Science and Associated Societies, held in New York City. As heretofore, we do not attempt to differentiate between papers actually delivered and those not given, due to the absence of their authors. The summary at least gives information as to the topics being studied at this time.

The numbers of papers listed by the various societies were as follows:

Entomological Society of America	34
American Association of Economic Entomologists	115
American Society of Zoologists alone	12
Same, Joint Genetics Section	12
Ecological Society of America	2
American Society of Parasitologists	4
Botanical Society of America	2
Total	181

These papers were distributed in subject as follows:

General Entomology	4
History of Entomology	4
Teaching Entomology	2
Collecting Methods	3
Cytology	2
Anatomy	5
Physiology	29
Ecology	16
Geographical Distribution	5
Ontogeny	5
Genetics	11
Parasites of Insects	5
Affecting Man and other Animals	4
Taxonomy	9
General Economic Entomology	13
Insecticides and Appliances	31
Apiculture	10
Affecting Cereal, Forage and Field Crops	15
Do. Truck Crops	12
Do. Greenhouse Plants	2
Do. Fruits and Fruit-trees	32
Do. Household and Stored Products	1
Do. Forest and Shade Trees	4
Carrying Plant Disease Germs	1

ii

Orthoptera	5
Isoptera	1
Plecoptera	1
Ephemerida	1
Homoptera	16
Thysanoptera	1
Coleoptera (excl. Japanese beetle)	19
Japanese beetle	8
Hymenoptera (excl. *Apis*)	7
Apis	4
Lepidoptera (excl. codling and oriental peach moths and corn borer)	6
Codling moth	12
Oriental peach moth	6
Corn borer	6
Trichoptera	1
Diptera (excl. *Drosophila*)	14
Drosophila	8
Araneina	1
Acarina	1

Many of these figures are duplicated, both between sections i and ii and also within each section.

The total of 181 papers exceeds any of those of the preceding five years, beginning with 1923-24, as follows: 180, 166, 158, 167, 178. The numbers given on the programs for the same five years were, for the Entomological Society of America: 70 (41 of which comprised the symposium), 38 (9 of them jointly with the Ecol. Soc. Amer.), 34 (7 of them with the Assn. Econ. Ent.), 38, 31; for the American Association of Economic Entomologists: 89, 93, 83 (see above), 102, 111; for the American Society of Zoologists, both alone and jointly: 18, 17, 21*, 19, 15. Papers on Physiology, Insecticides, Insects affecting Fruits and Fruit trees and on *Drosophila* exceed in number those of any of the preceding five meetings.

The Entomological Society of America, Prof. E. O. Essig, *president,* Prof. J. J. Davis, *secretary,* met Dec. 27 and 28, the annual public address on "The Potentialities of Entomology" by Dr. R. N. Chapman, of the University of Minnesota, being given on Dec. 28 at 8 P. M. The American Association of Economic Entomologists, Prof. W. B. Hermes, *president,* Mr. C. W. Collins, *secretary,* met Dec. 27-31, including its sections of Plant Quarantine and Inspection and of Apiculture. The annual address of the president, "The Experimental Method as Applied to Entomological Investigations" was delivered on the morning of the 28th. Both societies met in Teachers' College of Columbia University. The "Dinner of Pure and Applied Entomologists" was held in the Flying Bird Gallery of

*Including Section F, A. A. A. S. and its joint meetings—Ent. News, xxxvii: 54.

the American Museum of Natural History, Dec. 29, at 5.30 p. m., Prof. W. M. Wheeler presiding.

An "At Home" for entomologists was arranged for the afternoon of Dec. 30 at the Museum, followed by an informal reception at the home of Mr. and Mrs. John D. Sherman, Jr., at Mount Vernon, New York. To them, to Dr. F. E. Lutz and his associates on the local committees of arrangements, we, who attended all or some of these meetings and gatherings, are deeply grateful for a cordial welcome and pleasant and valuable interchange of ideas and of greetings.

Articles on Museums Containing Lepidoptera.

Thanks to the generosity of Mr. J. D. Gunder, of Pasadena, California, the News will be able to present to its readers, from time to time, some additional pages and some illustrations showing museums in North America containing important collections of Lepidoptera and portraits of entomologists active in those institutions.

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

GENERAL.—Christie, J. R.—Notes on larval nemas from insects. [Jour. Parasitology] 15: 127-130, ill. **Cockerel, T. D. A.**—What is a hybrid? [31] 122: 845. **Ehrenberg, K.** — Ueber Standortsformen. [Verh. Zool.-Bot.

Gesell. Wien] 78: 53-59. **Horn & Schenkling.**—Index literaturae entomologicae. Leconte-Schaum. 3: 705-1056. **Knight. P.**—The development and present status of entomological courses in American colleges and universities. [12] 21: 871-877, ill. **Lambrecht. K.**—Die verwendung der fluorographie in der paläontologischen forschung. [Verh. Zool.-Bot. Gesell. Wien] 78: 62-70, ill. **Merle, R.**—Les insectes prédateurs du Chili. [La Nat.] 1928: 502-506, ill. **Ogilvie, L.**—The insects of Bermuda. [Bermuda Dept. Agric.] 1928: 3-52, ill. **Roig, M. S.**—Catalogue of natural history specimens in the Museum of Natural History of Havana, Cuba. [Inst. Nac. Investigacions Cien. Mus. Hist. Nat. Cuba] 1928: 9-220, ill. **Stiles & Hassall.**—Key-catalogue of insects of importance in public health. [U. S. Hyg. Lab. Bull.] 150: 291-408. **Sweetman, H. L.**—Notes on insects inhabiting the roots of weeds. [7] 21: 594-600.

ANATOMY, PHYSIOLOGY, ETC.—Boulangé, H. —Sur le déterminisme du fouissement chez la larve de Naurotoma flaviventris. (Tenthredinidae) [25] 1928: 254-259. **Despax, R.**—A propos de l'action de la lumière sur la métamorphose des Trichoptères. [25] 1928: 244-247. **Fasten, N.**—Concerning cilia in the Arthropoda. [7] 21: 670. **Friedmann, H.**—Social parasitism in birds. [73] 3: 554-569. **Fulton, B. B.**—Some temperature relations of Melanotus (Elateridae). [12] 21: 889-897, ill. **Geist, R. M.**—The heat sensitive areas of certain grasshoppers. [7] 21: 614-618. **Hiestand, W. A.**—A correlation of strength and weight in insects. [7] 21: 601-606, ill. **McIndoo, N. E.**—Responses of insects to smell and taste and their value in control. [12] 21: 903-913. **Mordvilko, A.**—The evolution of cycles and the origin of heteroecy (migrations) in plant-lice. [75] 2: 570-582. **Morgan & Crumb.**—Notes on the chemotropic responses of certain insects. [12] 21: 913-920. **Robinson, W.**—Water conservation in insects. [12] 21: 897-902, ill. **Sayle, M. H.**—The metabolism of insects. [73] 3: 542-553, ill. **Snodgrass, R. E.**—Morphology and evolution of the insect head and its appendages. [Smiths. Misc. Coll.] 81: 1-158, ill. **Stahn, I.**—Ueber die atmungsregulation, besonders die kohlensäureregulation, bei Dixippus morosus und Aeschna grandis. [89] 46: 1-85, ill. **Timon-David, J.**—Sur les variations des graisses de réserve pendant l'evolution de la Pyrale du Maïs (Pyrausta nubilalis). [77] 99: 1799-1800. **van Bemmelen, J. F.**—Die farbenzeichnung von raupe, puppe und imago und ihre beziehungen zur erblichkeitslehre. [34] 3 Suppl. Band: 169-183, ill.

ARACHNIDA AND MYRIOPODA.—***Leitão, M.** —Opiliões de Matto-Grosso e Pernambuco. [32] 4: 9-13, ill. ***Worley, L. G.**—New Nebraska spiders. [7] 21: 619-622, ill.

THE SMALLER ORDERS OF INSECTS.—**Claassen, P. W.**—Additions and corrections to the monograph on the Plecoptera of North America. [7] 21: 667-668. **Spencer, G. J.**—External parasites on certain birds of British Columbia. [4] 60: 257-260.

ORTHOPTERA.—**Hubbell & Walker.**—A new shrub-inhabiting species of Schistocerca from Central Florida. [Occ. Pap. Mus. Zoll. Univ. Michigan] 1928: 1-10, ill. **Kuhl, W.**—Die variabilität der abdominalen korperanhänge von Forficula auricularia unter berucksichtigung ihrer normalen und abnorman entwicklung, nebst einem anhang über die geschlechtsbiologie. [46] 12: 299-532, ill.

HEMIPTERA.—**Esaki & China.**—A monograph of the Helotrephidae, subfamily Helotrephinae (Heteroptera). [EOS] 4: 129-172, ill. ***Granovsky, A. A.**—A review of Myzocallis species inhabiting Alnus, with description of a new species (Aphiidae). [7] 21: 546-565, ill. ***Harris, H. M.**—A monographic study of the hemipterous family Nabidae as it occurs in North America. [70] 9: 1-97, ill. ***Hoke, G.**—Some undescribed Diaspines from Mississippi, II. (Coccidae.) [7] 21: 671-676, ill. **Jaczewski, T.**—Bemerkungen über die geographische verbreitung der Corixiden. [An. Mus. Zool. Polonici] 7: 45-67. ***McAtee & Malloch.**—Thyreocorinae from the State of Paranà, Brazil. [An. Mus. Zool. Polonici] 7: 32-43.

LEPIDOPTERA.—***Hall, A.**—A revision of the genus Phyciodes (Nymphalidae). [Suppl. Bull. Hill Mus.] 2: 25-44, cont. ***McDunnough, J.**—Notes on Canadian diurnal Lepidoptera. [4] 60: 266-275. ***Meyrick, E.**—Exotic Microlepidoptera. 3: 417-448. **Ripper, W.**—Ueber die systematische bedeutung der stellung der primären borsten bei Lepidopterenlarven. [Verh. Zool.-Bot. Gesell. Wien] 78: 76-80. ***Talbot, G.**—List of Rhopalocera collected by Mr. C. L. Collenette in Matto Grosso, Brazil. [Bull. Hill Mus.] 2: 192-223, ill. ***Talbot, G.**—List of Arctiidae and Amatidae collected by C. L. Collenette in Matto Grosso, Brazil. With descriptions of some new forms. [Bull. Hill Mus.] 2: 241-246.

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KLIMA UND ENTWICKLUNG, by Dr. FRITZ ZWEIGELT. Entomologischer Anzeiger, Vienna, Volume VIII, (9) p. p. 93-94, (10) p. p. 99-100, (11) p. p. 107-114, 1928. The author lays stress on the fact that development of insect life depends mostly upon external forces, as climate, temperature, ecology, and others. He gives a few examples: "*Pieris rapae* and other butterflies require a certain average summer-temperature for their development. *Mimas tiliae* if fed on birch, almost invariably produces the *brunnea-form*. *Phylloxera vastatrix* and *P. vitifoliae* are becoming more restricted every year, even to the point where one certain grape variety is required for its development, namely the one which responds to its sting in gall producing. *Acherontia atropos* can only complete its normal development in the warmest climates, as specimens which mature in cooler climates in fall do not possess the regenerative faculty. The larvae of *Polyphylla* can not adapt themselves to every soil." A chart is given showing the flight years of the respective three and four year races of the May beetle, (*Melolontha* species) also a chart showing the boundaries where the races *Melolontha melolontha, M. hippocastani, M. h. nigripes* and *M. pectoralis* abound. Charts showing the vertical plague-boundary and isothermal map are also given. Based upon these studies it is proven that the climate is the positive and the soil the negative factor in the distribution of the May beetles (*Melolontha* species). The author deplores the wholesale naming of varieties, forms, races, aberrations, etc., as most of these are only based upon external factors, and hopes that entomologists will rather study the reason for variation than create an everlasting amount of synonomy, which has no value. The article is well worth serious thought.—FRANK HAIMBACH.

THE PRINCIPLES OF SYSTEMATIC ENTOMOLOGY. By G. F. FERRIS, Stanford University Publ. Biol., Vol. 5, No. 3, 1928, 169 pp., 11 figs., Stanford University Press, paper $2.00, cloth $2.75.—This book, the first of its kind, is a stimulating discussion of methods in systematic entomology, with suggestions for the betterment thereof, that should be carefully studied by younger systematists, and could be heeded, not unprofitably, by many of their elders. The author terms his work "a frankly critical survey of the existing conditions in systematic entomology," but as it is critical of practices more than of people, probably not as much opposition will be aroused as the author seems to expect.

There are not many chapters, and citation of their headings will serve briefly to indicate the scope of the book. These are: 1., The contribution of the systematist to biology; 2, The scope of systematic biology; 3, The principles of systematic entomology; 4, The segregation of species; 5, Categories less than the species; 6, The morphological basis of systematic entomology; 7, The preparation of material; 8, Entomological drafting; 9, The description of species; 10, Classification; 11, Nomenclature, and 12, The training of the systematist.

Although the reviewer has been asked by Ferris to comment on his book in a critical way, he finds himself in most cases impelled to reinforce rather than oppose the arguments presented. For instance, as to the place of the systematist in the scheme of things biological. There are those who regard the taxonomist as a servant in the house of biology, an attitude of ignorant bumptiousness, which the views of a biologist of the standing of Raymond Pearl (quoted by Ferris), should help to alleviate. The "disrepute" of taxonomy to which the author alludes is due to its being judged by standards different from those applied by critics in their own fields. Their numerous failures have been condoned, while taxonomy because not infallible, has been condemned. The taxonomist, however, need not worry over the attitude of critics; in the end they must come to him, must accept his findings, and defer to his judgment, be it with ever so little grace.

Ferris is much more sympathetic with the querulities of geneticists and other experimental biologists towards systematic work than the reviewer would be. Wonder and even pain have been expressed that systematists do not adopt the findings of the laboratory workers, but why anyone should ever have expected close team-work is a more legitimate reason for surprise. The laboratory group for the most part work under controlled conditions and with abnormalities, while the systematist seeks the normal product of natural conditions, in fact rejects all abnormalities. Even were some of the laboratory work applicable in classification, it would be impracticable to use it, because the element of time alone would render impossible similar analysis of all comparable organisms, which the systematist would have to consider. In other words classification must rest on characters known for all members of the group concerned, and we never shall have complete chromosome or other biological analysis of insects or even of any considerable group of them.

Hence we must proceed on the basis of structure, and Ferris does well to dwell on the responsibilities of the systematist as a morphologist. Again, however, there is little doubt that strict morphologists have gone to extremes where systematists have not felt justified in following. The theoretically inclined morphologist, in particular, is an unsafe guide, and it does not take long to reveal that his work is too much in a state of flux to furnish the solid basis needed for satisfactory classification.

The author in several places warns against the description of species being mistaken for systematic entomology. It may be part of it, but the lowest part; what is needed throughout is improvement, refinement, of classification, in other words of more and more thorough revisional work. Description of species is necessitated in revisions but it is not the main objective, and, paraphrasing an aphorism, we may say that if systematists will take care of revisions, species will take care of themselves. Ferris well says "The writer who contributes to the genuine knowledge of species is accomplishing far more than one who merely names them."

Within the limits of a review it is impossible to comment on the many interesting points raised in Professor Ferris' book.

The author is especially qualified to write upon morphology as applied to classification, and to give advice on entomological illustration. His insistence upon the importance of adequate illustration of papers on systematic entomology is not too strong, and by implication condemns the requirement of numerous entomological publications that authors pay engraving costs, a practice that certainly discourages illustration. The reprinting in the book of the International Code of Nomenclature (a singularly inaccessible document) and of the Committee decisions pertinent to entomology in itself should result in considerable demand for the work.

Propositions in the book, with which the reviewer finds himself more or less in disagreement include the following. Ferris thinks all data of every kind available should be used in connection with the segregation of species; the reviewer would urge that it is practicable to use only those which we have uniformly for all forms in the group being revised. His first 3 paragraphs in chapter VI practically admit this contention. Ferris says he disagrees with the reviewer as to the necessity of being satisfied with approximations to the truth in classificatory work, but we do not take this literally, for however much the approximations are refined, they remain approximations. This is the nature of science, and its distinction from dogma. The author says also he does not agree with the reviewer's ideas on naming lower than specific forms of insects, but the reasons for naming them are the same as in the case of other groups. Lacking a name knowledge does not accumulate. The varieties of today are the species of tomorrow (see Ferris on pyramiding, p. 124). As to criteria for recognition of genera and higher groups, the reviewer would not pay much attention to average number of units in a group, nor to "hollow curves," but would urge that the test of intergradation be applied throughout from the lowest to the highest groups in making decisions as to what should be united and what separated. In the lower categories usually it is the condition as to intergradation of single characters, that we must observe, and, in the higher, of combinations of characters.

Upon the topic of the training of systematists, it might be added that usually they must be self-trained, and good systematic work requires the highest talents. In this final chapter, particularly, but scattered throughout the book, Ferris has concisely stated truths and cogent criticisms which if read and incorporated into their consciousness by systematists cannot but have the effect of improving their output and elevating the standards of the science.—W. L. McAtee.

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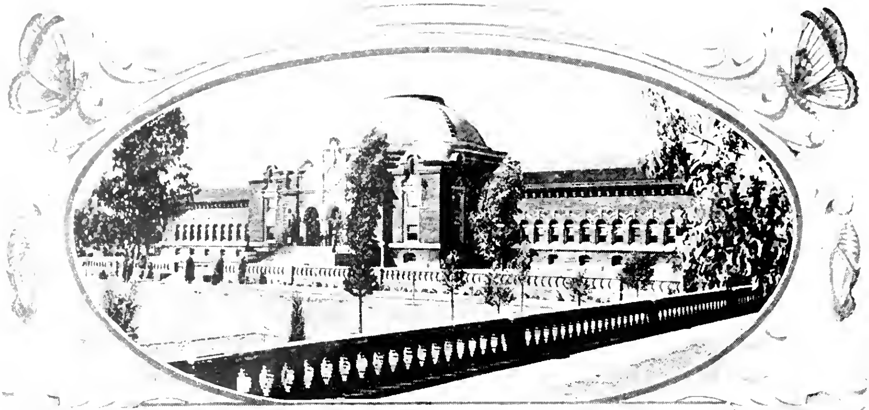

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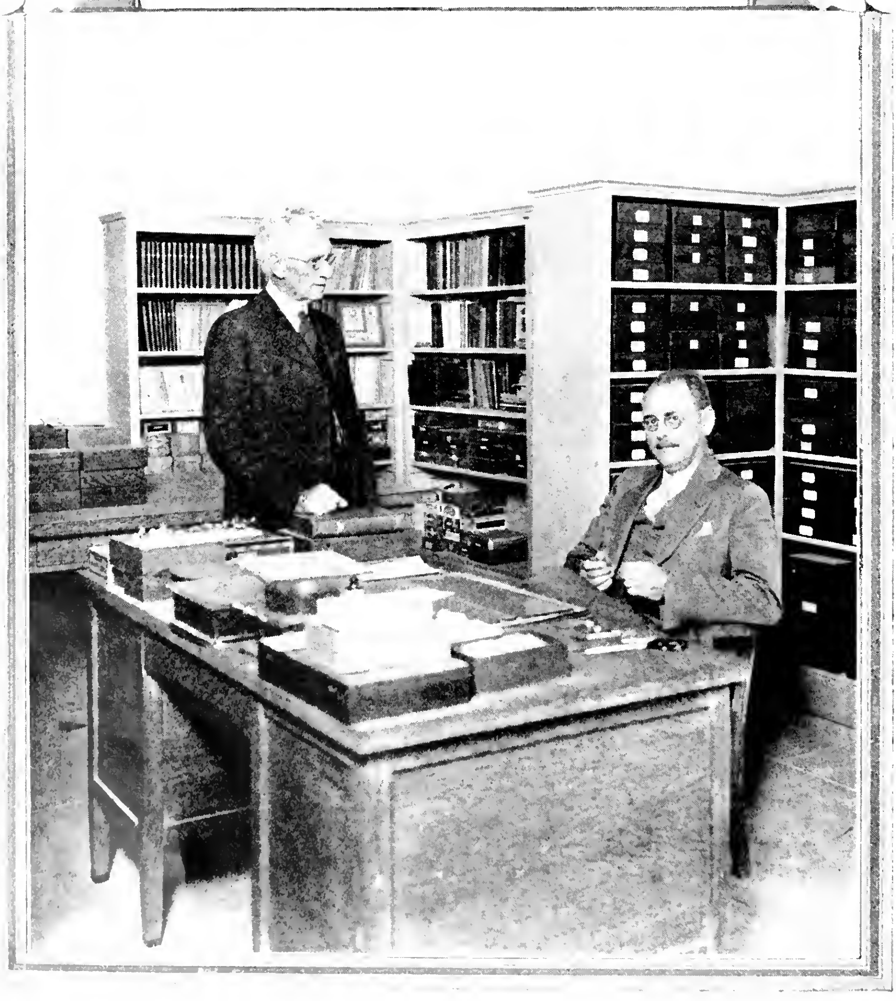

PROF. L. J. MUCHMORE DR. J. A. COMSTOCK

ENTOMOLOGICAL NEWS

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North American Institutions Featuring Lepidoptera.

II. The Los Angeles Museum, Los Angeles, California.

By J. D. Gunder, Pasadena, California.

(Plate III.)

One of the most imposing buildings in Exposition Park, Los Angeles, is the Museum of History, Science and Art. This Museum was formally opened on November 6, 1913, under county financial supervision. Within the last eight years the present structure (illustrated) has become inadequate, so about two years ago a major building program was begun, of which two units have been constructed and which, when finally completed, will make this Museum one of the largest in the United States. The new buildings will have approximately thirteen times the present ground area and will cost over ten million dollars. The construction is of the most approved type, reinforced concrete throughout, and with adequate facilities for modern display and research.

Although the Museum's activities cover the three fields of art, science and history, its most outstanding collection, from the viewpoint of international interest, is that of the pleistocene remains recovered from the La Brea asphalt beds which are within the city limits. It is estimated that this collection contains more bone material than is found in all the combined museums of the world.

Of interest to entomologists is the collection of insect remains found in the La Brea pits. Of course, the crude asphalt has not preserved any Lepidoptera, but occasionally beetles and other hard shelled insects are found in fair condition.

The Museum, as a whole (including also the Otis Art Institute and Hancock Park), is under the direction of Mr. William Bryan, well known as a museum executive and connoiseur of art. Before assuming the directorship of the Los Angeles Museum, Mr. Bryan had filled numerous posts in public service, including a curatorship with the Bishop Museum of Honolulu. He has been ably supported in the phenomenal expansion and development of the Los Angeles Museum by the County Board of Supervisors. The associate directorship of the Museum is held by Dr. John A. Comstock, formerly director of the Southwest Museum (Los Angeles), and all departments of Natural Science are under his personal guidance.

Prof. L. J Muchmore is in charge of the entomological department and except for the Lepidoptera which are under the supervision of Dr. Comstock, all other insects are in his care. Mr. Muchmore has been engaged for the last few years in bringing the Coleoptera material up to date. The collections of Lepidoptera include those of Daggett, Herr, Albright, Cooledge (Heterocera only), and the recently acquired Comstock collections.

Dr. Comstock is well known for his work on western diurnal Lepidoptera and for his recently published book, "The Butterflies of California", which has taken the place of the older publication, W. G. Wright's "Butterflies of the West Coast". Dr. "J. A." was born Jan. 30, 1883, in Evanston, Illinois, and attended public high school there. He received his M. A. at Occidental College, Los Angeles, and his medical degree through the College of Ost. Phys. & Surg, also in Los Angeles.

Since 1920, he has been editor of the "Bulletin of the So. Calif. Acad. of Sciences". He began collecting about 1895 and with his brother, Hurd Comstock, first attended an entomological meeting in Chicago.

The Entomological Department of the Los Angeles Museum is housed on the third floor of the second new unit and occupies three spacious rooms. Types are at present incorporated in the general collection, but will eventually be segregated in separate steel cabinets. A display collection of insects, chiefly Lepidoptera, is one of the museum features and is used extensively by visiting teachers and classes.

The Lorquin Entom. Society is affiliated with the Museum and holds monthly meetings in the main building. This organization was founded by Fordyce Grinnell and was for a time working in association with the Southwest Museum, but when that institution decided to limit its field to anthropology, the Society transferred its interests to the Los Angeles Museum. Once each year in February this Club sponsors a "Butterfly Show" which is held in the Museum and creates much public interest and press comment. This year the 8th Annual Exhibit will be held.

The Museum buildings are only a short distance from the giant Los Angeles Stadium in which will be centered most of the activities of the Olympic Games in 1932. At that time it is hoped that many entomologists will take the opportunity of visiting Los Angeles, and to these the Museum extends a most cordial invitation of welcome.

Descriptions of Five New Species of Plagiognathus from North America (Hemip.: Miridae).*

By HARRY H. KNIGHT, Ames, Iowa.

Plagiognathus salicicola n. sp.

Runs to *delicatus* Uhler in my key (Hem. Conn., 1923, p. 433), but easily distinguished by the larger size and black color markings; cuneus black with all margins pale.

♂. Length 4.1 mm., width 1.5 mm. Head: width .83 mm., vertex .33 mm.; pale, tylus and lora black, arcuate mark each side of frons and spot each side above, fuscous. Rostrum, length 1.4 mm., extending upon middle of hind coxae, fuscous at the joints. Antennae: segment I, length .27 mm., black, apex pale; II, 1.09 mm., pale, base and apex blackish; III, .77 mm., pale to dusky; IV, .45 mm., dusky. Pronotum: length .65 mm., width at base 1.26 mm.

Clothed with pale to yellowish simple pubescence, suberect and moderately prominent. Color blackish, anterior margin of pronotum, disk behind calli, lower half of propleura, scutellum except on base, along claval suture and radial vein, embolium, all margins of cuneus, xyphus, sides of sternum, epimera, and apical area of genital segment, pale to yellowish. Legs pale, basal half of coxae largely fuscous, double row of spots on femora, also apically on posterior aspect, knees, spots and spines on tibiae, black.

♀. Length 3.9 mm., width 1.7 mm; very similar to the male in pubescence and coloration but the dorsum somewhat more broadly pale.

*Contribution from the Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

Holotype: ♂ July 17, 1927, St. Mary's, OHIO (S. A. Watson); author's collection. *Allotype*: July 13, 1920, Berrien Co., MICHIGAN (R. F. Hussey), collected on Salix. *Paratypes*: ♂, 2 ♀, July 19, 1925, Ledges State Park, Boone, IOWA (H. H. Knight), taken on *Salix longifolia*.

PLAGIOGNATHUS SALICICOLA **depallens** n. var.

Similar in structure to *salicicola* but differs in the pale color; dorsum uniformly pale, without distinct fuscous markings altho the membrane is fuscous; antennae infuscated like the typical form but the legs with spotting somewhat reduced; hind femora with a spot on middle and a group of smaller spots on apical half.

Holotype: ♂ August 2, 1924, St. Anthony Park, St. Paul, MINNESOTA (H. H. Knight); author's collection. *Paratypes*: 5 ♀, taken with the type on *Salix* sp. 12 ♂ ♀, July 12, 1919, Hennepin Co., Minnesota (H. H. Knight), taken on *Salix longifolia*. ♀ July 8, 1921, St. Paul, Minn. (H. H. Knight), taken at light. 10 ♂ ♀ July 11, 1923, Red Rock, Ramsey Co., Minnesota (H. H. Knight), on *Salix longifolia*. IOWA—♂ 3 ♀ July 19, 1925, Ledges State Park, Boone (H. H. Knight), taken on *Salix longifolia* where the species was breeding. 2 ♂ July 26, 1928, Ames, Iowa (H. H. Knight), on *Salix longifolia*.

PLAGIOGNATHUS TINCTUS Knight.

This species was originally described as a variety of *P. albonotatus* Kngt. (Hem. Conn., 1923, p. 437), but with the accumulation of considerable material since 1923, it is evident that *tinctus* is a valid species. We have found it breeding on sand bar willow (*Salix longifolia*), the same host as the above described *salicicola* but it may be readily separated by the fuscous to blackish scutellum combined with a pale to reddish cuneus.

Debilis Blatchley is a color form of *tinctus* Kngt., it being the common phase of the species in the Mississippi valley region. I found it particularly abundant in Minnesota breeding on sand bar willow. Typical *tinctus* has reddish appearing in the pale cuneus and occurs as might be expected, in the cooler and higher elevations of its range, especially Pennsylvania, but I have also taken it in Minnesota.

Plagiognathus shepherdiae n. sp.

Pale and marked with black; color pattern suggestive of *Phyllopidea picta* (Uhl.) but distinguished by the longer rostrum and soft pale pubescence.

♂. Length 4.5 mm., width 1.6 mm. Head: width .87 mm., vertex .38 mm. Rostrum, length 1.38 mm., reaching upon middle of hind coxae. Antennae: segment I, length .30 mm., pale, base and two setigerous points on apical half black; II, 1.27 mm., pale to greenish yellow, base and more widely on apex blackish; III, .77 mm., fuscous; IV, .42 mm., fuscous. Pronotum: length .64 mm., width at base 1.29 mm.

Clothed with soft pale pubescence. Ground color pale to yellowish, four spots on front of vertex, transverse marks each side of frons, apex and bivittate mark on basal half of tylus, tip of rostrum, calli, more or less transversely on basal half of pronotal disk and sometimes extending forward to outer margin of callus, middle of mesoscutum and sometimes extending on base of scutellum, clavus except rather broadly along claval vein, claval suture, corium except rather broadly along radial vein and extending to apex, central area of cuneus, coxal cleft above, central area of propleura, sternum, and venter more or less, fuscous to black. Legs pale, anterior aspect of femora with double row of prominent spots, posterior aspect also with incomplete rows, and dorsal margin with line on apical half, black; knees, tibial spines and spots at base also black. Membrane fuscous, paler bordering the white veins.

♀. Length 4 mm., width 1.6 mm. Head: width .83 mm., vertex .41 mm. Antennae: segment I, length .29 mm.; II, .98 mm.; III, .61 mm.; IV, .37 mm. Pronotum: length .62 mm., width at base 1.24 mm. More robust than the male but very similar in coloration; membrane paler, the heavy infuscation reduced to an irregular transverse band, and between and within the central areas of larger areoles.

Holotype: ♂ August 12, 1925, Pagosa Springs, COLORADO (H. H. Knight); author's collection. *Allotypes* same data as type. *Paratypes*: 22 ♂ ♀, taken with the types on buffalo berry (*Shepherdia argentea* Nutt.) on which the species was breeding. 11 ♂ ♀ Aug. 13, 1925, Mancos, Colorado (H. H. Knight), taken on the same host.

PLAGIOGNATHUS SHEPHERDIAE **flavidus** n. var.

Very similar in structure to *shepherdiae* but differs greatly in color aspect; uniformly pale, antennae and legs marked with black as in *shepherdiae* but without black line forming above on femora; frons above with four dusky spots but other markings obsolete; cuneus sometimes dusky on middle, membrane uniformly pale fumate. Clothed with soft pale pubescence.

♂. Length 3.8 mm. Head: width .86 mm., vertex .385 mm. Antennae: segment I, length .29 mm.; II, 1.15 mm.; III, .74 mm.; IV, .45 mm. Pronotum: length .59 mm., width at base 1.21 mm. Female very similar to the male in size and coloration.

Holotype: ♂ July 24, 1927, Kennebec, SOUTH DAKOTA (H. H. Knight); author's collection. *Allotype*: same data as type. *Paratypes*: 16 ♂ 22 ♀, taken with the types on buffalo berry (*Shepherdia argentea* Nutt.), but the fruit of these plants was yellow and not dark red like the Colorado plants which have been determined as the same species.

It seems rather significant that not a single specimen of the good series obtained, varies toward the dark color pattern of the typical *shepherdiae* from Colorado. Perhaps the form here described represents a race or subspecies, but it will take time and more work before we can be sure of the status of such closely related forms.

Plagiognathus luteus n. sp.

Distinguished by the uniformly orange-yellow color; first antennal segment, base and apex of segment II, line on dorsal margin of apical half of hind femora, knees and spots on tibiae, black; membrane uniformly pale fumate, veins of the same deep orange-yellow as the corium and cuneus. Tibial spines fuscous to black; tarsi apically, last two antennal segments and tip of rostrum, fuscous.

♂. Length 3.8 mm., width 1.3 mm. Head: width .70 mm., vertex .31 mm. Rostrum, length 1.3 mm., reaching to middle of hind coxae. Antennae: segment I, length .26 mm.; II, 1.12 mm.; III, .59 mm.; IV, .33 mm. Pronotum: length .52 mm., width at base 1.06 mm.

♀. Length 3.2 mm., width 1.5 mm. Head: width .68 mm., vertex .34 mm. Antennae: segment I, length .25 mm.; II, .95 mm.; III, .52 mm.; IV, .31 mm. Pronotum: length .49 mm., width at base 1.1 mm. Very similar to the male in coloration and pubescence.

Holotype: ♂ June 12, 1925, Williams, ARIZONA (A. A. Nichol); author's collection. *Allotype*: same data as the type. *Paratypes*: 16 ♂ 1 ♀, taken with the types on *Berberis fremontii* which is the host plant. Mr. Nichol states: "Recalling the yellow species of which there was a good series taken on barberry at Williams, it may be of interest to know that the color of the flower and insect not only closely agreed, but the outer layer of the cambium is also that shade of yellow."

Plagiognathus tenellus n. sp.

Distinguished by the uniformly pale yellowish color, rather broad head and prominent eyes. Antennae yellowish brown, last two segments dark brown to fuscous. Hind femora with five or six setigerous fuscous dots subapically on anterior face; tibial spines prominent, black, with small fuscous spots at base. Membrane unformly pale fuscous. Clothed with prominent, simple, pale yellowish pubescence. Left genital clasper rather prominent for the genus, forming a small lobe distally, the dorsal margin forming an arcuate line.

♂. Length 3.8 mm., width 1.4 mm. Head: width .89 mm., vertex .31 mm. Rostrum, length 1.14, scarcely attaining hind margins of middle coxae. Antennae: segment I, length .25 mm.; II, 1.2 mm.; III, .86 mm.; IV, .35 mm. Pronotum: length .61 mm., width at base 1.27 mm.

♀. Length 3.6 mm., width 1.6 mm. Head: width .86 mm., vertex .40 mm. Antennae: segment I, length .24 mm.; II, 1.03 mm.; III, .80 mm.; IV, .41 mm. Pronotum: length .59 mm., width at base 1.3 mm. Very similar to the male in pubescence and coloration.

Holotype: ♂ August 2, 1917, top of Bright Angel trail, Grand Canyon, ARIZONA (H. H. Knight); author's collection. *Allotype*: taken with the type. *Paratypes*: 12 ♂ ♀, taken with the types. 36 ♂ ♀ June 20, 1928, alt. 6200 ft., Chiricahua Mts., ARIZONA (A. A. Nichol). Mr. Nichol reports the species as breeding on *Philadelphus rugosus*.

Plagiognathus phoradendronae n. sp.

Pale greenish yellow, more greenish on thorax, hemelytra yellowish translucent, tinged with dusky apically on corium. Membrane pale, anal area, apically within areoles, and transverse cloud just behind areoles, dusky to fuscous. Legs unspotted, tibial spines pale to yellowish. Head rather short and broad for the genus.

♂. Length 2.8 mm., width 1.2 mm. Head: width .74 mm., vertex .33 mm. Rostrum, length .83 mm., just attaining hind margins of intermediate coxae. Antennae: segment I, length .16 mm.; II, .90 mm., thickness about equal to segment I, clothed with rather prominent fuscous pubescence; III, .40 mm.; IV, .35 mm.; greenish yellow, last two segments becoming fuscous. Pronotum: length .47 mm., width at base 1.06 mm.

♀. Length 2.8 mm., width 1.2 mm. Head: width .71 mm., vertex .37 mm. Antennae: segment I, length .16 mm.; II, .75 mm.; III, .41 mm.; IV, .29 mm. Pronotum: length .445 mm., width at base 1.03 mm. Very similar to the male in coloration and pubescence.

Holotype: ♂ June 20, 1928, Chirichaua Mts., ARIZONA (A. A. Nichol); author's collection. *Allotype*: same data as the type. *Paratypes*: 18 ♂ ♀, taken with the types on mistletoe (*Phoradendron macrophyllum*) where the species was breeding.

Two New Heteroptera from Southern California (Cydnidae, Nabidae).

By W. S. BLATCHLEY, Indianapolis, Indiana.

Among the 100 and more species of Heteroptera taken by the writer in the vicinity of Los Angeles, California, between November 25, 1927, aand March 15, 1928, were four which are apparently new to science. Two of these, belonging to the family Lygaeidae, will soon be described by Prof. H. G. Barber. The other two are described in the present paper. The types of both are in the writer's collection.

Pangaeus californicus, n. sp.

Broadly oval, subdepressed. Dark chestnut-brown to piceous-black; membrane whitish-hyaline; tarsi and joints 4 and 5 of antennae pale reddish-brown. Head declivent, as broad across eyes as front margin of pronotum, without an anteapical spine-beset groove; cheeks each with four or five erect bristles and two broad sub-transverse ridges, the intervals between the ridges very finely indistinctly punctate; vertex almost smooth. Beak reaching middle coxae. Antennae reaching basal third of pronotum; joint 1 cylindrical; 2 more slender, subclavate, one-fourth longer than 3, the latter stouter, also subclavate; 4 and 5 still stouter, subfusiform, densely clothed with fine very short yellowish pubescence, 4 slightly the longer. Pronotum with the usual subapical transverse impression of the genus very feeble and without visible punctures at middle; submedian transverse impression also ill defined and with a single irregular row of fine punctures; disk of pronotum otherwise almost smooth, the front lobe the more convex; front angles broadly rounded, hind angles subrectangular, side margins each with 9 or 10 erect, evenly spaced bristles. Scutellum a nearly equilateral triangle, its sides strongly converging from base to the narrowly rounded apex; disk with basal third smooth, feebly elevated, apical two-thirds coarsely, sparsely irregularly punctate. Elytra with membrane slightly surpassing tip of abdomen; costal margins of basal half each with three bristle-bearing punctures; outer margin of clavus with a single regular row of coarse punctures, these obsolete toward apex; corium with a single row of finer punctures along inner margin and a few irregular ones on basal third, otherwise wholly smooth. Under surface dark chestnut-brown, smooth, strongly shining. Length, 9.3-10 mm.; width, 4.8-5 mm.

Type a female taken January 10, 1928, from beneath a stone in a small semi-desert area near Sunland, Los Angeles County, CALIFORNIA. Other unnamed specimens are in the Museum of the California Academy of Sciences labelled "San Diego, Cal., IV-8 and Coldwater Canyon, Los Angeles Co., Cal., X-4." This species is most closely allied to *P. discrepans* Uhl., from which it differs in its larger size, lack of punctures or distinct groove behind apex of pronotum, much fewer and more regularly placed bristles on cheeks and along side margins of pronotum and elytra, smoother disks of pronotum and corium, etc. The length of *discrepans* is 6.5-8 mm.; there are on head about 10 erect bristles on each cheek, 18 or 20 similar bristles along each side margin of pronotum and 7 to 9 on each costal margin of elytra; the corium there has two rows of punctures along inner margin and numerous much smaller punctures scattered irregularly over the entire surface.

P. discrepans, and especially *californicus*, differ from *P. bilineatus* (Say), our most widely distributed and best known species, in the vagueness or absence of the anteapical groove of pronotum, and the generic keys at present extant in North American literature in which the presence of this groove is the primary character used, will either have to be modified or a new genus erected for these two species.

Nabis edax n. sp.

Elongate, slender. Color a nearly uniform bright straw-yellow, moderately shining; a stripe on sides of head behind the eyes, collar and a very narrow median stripe on pronotum, median stripe slightly widened posteriorly on scutellum, extreme tip of commissure, and a stripe on the side of mesosternum, purplish-black; membrane slightly dusky, a very small fuscous spot on the margins each side of middle; outer face of hind femora with a row of minute fuscous dots; tarsal claws piceous. Antennae very slender, minutely bristly-pubescent, joint 1 as long as head, 2 twice as long as 1, one-fifth longer than 3, its tip fuscous; 4 two-fifths the length of 3. Pronotum subcampanulate, the postapical and submedian constrictions broad but prominent, surface smooth. Elytra with sides parallel to apical fourth, thence curved into the broadly rounded tips; commissure and apex of corium subequal in length, the latter straight, diagonal, longer than scutellum; disk of elytra minutely, indistinctly rather sparsely pubescent. Connexivum narrowly exposed, the incisures between the segments each with a very small fuscous spot. Membranes slightly surpassing tip of abdomen. Femora unarmed beneath; hind ones very slender, one-half longer than middle pair. Abdomen thickly, very finely pubescent. Genital segment of male scoop-shaped and with a broad median lengthwise groove. Length, 6.5 mm.; width, 2 mm.

Type a male, taken December 6, 1927, by sifting debris beneath a pile of matted grass in Hancock Park, Los Angeles, California. Differs from all our other described species in its nearly uniform pale color, relative length of the very slender antennal segments, etc.

North American Predacious Insects Attacking Japanese Beetle Grubs (Popillia japonica Newman).

(Coleop.: Scarabaeidae, Carabidae; Dipt.: Tabanidae, Therevidae, Asilidae.)*

By Harold C. Hallock, Associate Entomologist, U. S. Dept. of Agri., Bureau of Entomology.

There has been considerable doubt as to whether North American insects were helping to reduce the numbers of the Japanese bettle in this country. In order that this question might be answered, at least in part, extensive surveys were made during the seasons of 1923 to 1925, inclusive. The work

*Contribution No. 49, Japanese Beetle Research Laboratory, Moorestown, New Jersey.

reported in this paper was confined to a few species of Carabidae, Tabanidae, Asilidae, and Therevidae, in their relationship to Japanese beetle grubs.

During the three years mentioned, work was done at ten locations near the Japanese Beetle Laboratory in the center of the infested area. These stations were about one mile apart, and were all in meadow land. At each station several plots of one foot square were examined to a depth of eight inches about once a week, and the insect population noted. As examinations of plots farther from the Laboratory but within the infested area revealed insect populations similar to those of the ten stations, further work was carried on only at the latter. All predacious insects found which might be connected with the reduction of the numbers of Japanese beetles were reared in the Laboratory, and Japanese beetle grubs were used as food during the rearing of these insects.

Coleoptera.

Carabidae. The larvae of *Harpalus pennsylvanicus* DeG. were found throughout the central Japanese beetle area. Other species of Carabid larvae were observed occasionally, but were never abundant. There was an average of one Carabid larva to every twelve square feet of sod land examined. When placed in soil with a Japanese beetle grub, the *H. pennsylvanicus* larva immediately attacked the grub, pierced the skin with its mandibles, and made a small hole through which the body fluids were extracted. In captivity the average number of grubs killed and their body fluid consumed was one every two days.

Diptera.

Tabanidae. The larvae of *Tabanus costalis* Wied. were observed from June 15 to August 20 in fairly dry soil. During the spring and fall months they were found only along the edge of streams, but when they became larger in the summer they were observed to occur about one to every 14 square feet of soil examined, as far as 200 feet from the streams. Japanese beetle grubs were also numerous at these localities. *Tabanus costalis* larvae fed readily upon grubs, and reached the adult stage in captivity even when they were kept in soil that contained only an average proportion of moisture.

Therevidae. The larvae of *Psilocephala haemorrhoidalis* Macq. are very hardy and are easily reared in captivity. They were found throughout the central Japanese beetle area, and occurred at the rate of about one to every five square feet of soil examined. The Therevid larvae attack grubs very readily, and in several cases were observed to puncture the skin of a grub with their mandibles and to insert the head in the wound so that they could obtain the body fluids. In captivity they killed more grubs than the Carabids, but they often leave the dead grubs after sucking out only part of the body fluids.

Asilidae. The average number of Asilid larvae in the open field is generally about the same as that of the Therevid larvae, but they are more difficult to rear in captivity than the larvae of either *Tabanus costalis* or *Psilocephala haemorrhoidalis.* The Asilid larvae were very abundant in one field which had been in sod for many years. Thirty-four were found during part of one day while the field was being plowed. Japanese beetle and other Scarabaeid grubs were also plentiful in the same field. Although only a small percentage of the Asilid larvae which were collected reached maturity, several specimens of *Erax aestuans* Linn. and of *Ommatius marginellus* Fab. were reared with Japanese beetle grubs as food.

Summary.

All the insects mentioned are predators, and will undoubtedly feed upon weaker predators as readily as upon herbivorous insects. They do some good, but, so far, they have never been found numerous enough in the field to have any noticeable effect upon the numbers of the Japanese beetle.

Dr. H. B. Hungerford, state entomologist and head of the department of entomology at the University of Kansas, has returned from an eight-months' visit to Europe, as collaborator for the Smithsonian Institution, where he went for the purpose of comparing insects in the University of Kansas collection with the type collections in the older museums of Europe.—*Science*, Jan. 18, 1929.

Studies in North American Spiders: the Genus Cochlembolus (Ananeina).

By C. R. CROSBY, Cornell University, Ithaca, N. Y.

(Plate IV.)

COCHLEMBOLUS gen. nov.

Type: *Dismodicus alpinus* Banks.

Related to *Spirembolus* and *Tortembolus* by the spiral form of the tail-piece and middle part of the embolus: distinguished from *Spirembolus* by the cephalic pits in the male and from *Tortembolus* by the shorter apophysis on the tibia of male palpus. The type of this genus was placed by Banks in *Dismodicus* to which it is not closely related. The American representative of *Dismodicus* is, as pointed out by Simon in 1884 (Ar. Fr. 5:568), *Lophocarenum decemoculatum* Emerton, a species very closely related to *D. bifrons* Blackwall, its type.

The first three species here included in the genus have been carefully studied and there is no doubt that they form a closely related natural group. I have also included *Lophocarenum vernale* Emerton, the type of which I studied in the Museum of Comparative Zoology at Cambridge. The drawings of the palpus which I had made at that time clearly indicate its close relationship to the other three species.

COCHLEMBOLUS ALPINUS (Banks).

Dismodicus alpinus Banks. Can. Ent. 28:63. 1896.

Lophocarenum alpinum Emerton. Conn. Acad. Sci. Trans. 14:190. pl. 3. fig. 3. 1909.

Not *Lophocarenum alpinum* Emerton. Conn. Acad. Sci. Trans. 20:150. pl. 2. fig. 7. 1915.

Tortembolus alpinus Crosby, in Chamberlin Calif. Ac. Sci. Proc. 14:115. 1925.

♂. Length, 2 mm. Cephalothorax gray with the cephalic lobe pale, dusky behind. Cephalothorax viewed from above elongate, the sides evenly rounded, round-pointed in front, the clypeus protruding; viewed from the side, gradually ascending and very gently arched over the thorax to the base of the cephalic lobe which is very high, rounded above and leaning forward, clothed above and in front with hairs directed forward and downward. Ocular area and clypeus slanting forward, the latter protruding and strongly convex.

Posterior eyes in a straight line, the median borne under the base of the cephalic lobe, separated by more than the diameter and from the lateral by less than the diameter. Anterior eyes in a very gently procurved line, the median smaller than the lateral and almost touching, separated from the lateral by nearly twice the diameter. Median ocular area convex and thickly clothed with hairs directed forward and downward. Cephalic pits small and placed in deep furrows.

Chelicerae dusky orange yellow. Sternum and labrum nearly black. Endites dusky. Legs pale yellowish. Abdomen gray. Epigastric plates very finely striate.

Femur of palpus rather short and thick, straight. Patella long, nearly straight and almost as thick as the femur. Ratio of length of femur to that of patella as 25 to 16. Tibia rather stout basally, armed above with two strong spines, the dorsal margin armed with two teeth, the mesal one black and strongly incurved, the lateral one broad, thin and quadrate, the two separated by a deep rounded fissure. The cymbium strongly angulate dorsally at base. Paracymbium broad, thin, with a short hook at tip. Bezel very high, thin, semitransparent with a rounded margin. The embolic division of the strongly spiral type. The tail-piece at apex broad and flat, the middle turn apparently doubled, the embolus long and slender making one complete turn around the tip of the bulb.

♀. Length, 2.25 mm. Similar to male but with the head normal. Cephalothorax viewed from above rounded on the sides with a shallow but distinct constriction at the cervical groove, broadly rounded across the front; viewed from the side rather steeply ascending behind and rounded over the head, highest back of the eyes. Clypeus slightly protruding and gently convex. Posterior eyes in a slightly recurved line, equal, separated by a little less than the diameter and a little nearer to the lateral. Anterior eyes in a very gently recurved line, the median smaller than the lateral, almost touching and separated from the lateral by less than the diameter.

Epigynum presents a median hour-glass shaped pale area. On each side of this the integument is thickened and nearly black bearing the openings midway from front to back. On the front margin is a low but distinct black semicircular median tooth formed from the thickened upturned anterior margin of the epigynum.

Type locality. Mt. Washington, N. H.

New Hampshire: Summit of Mt. Washington, 6000 ft., Aug. 19, 1925, 4 ♂ 15 ♀. Wyoming: Summit of Mt. Washburn, Yellowstone Park, 10,300 ft., Aug. 30, 1927, 1 ♂.

Cochlembolus sanctus n. sp.

♂. Length, 1.8 mm. Cephalothorax dusky brown; the clypeus and the eye area paler, the cephalic lobe pale dusky behind, the median line and a diagonal line extending inward and backward from the anterior lateral angle darker. Cephalothorax viewed from above rounded on the sides posteriorly, the sides converging towards the front and slightly concave at the cervical groove, obtusely pointed in front; viewed from the side, rather low and gently ascending to the base of the cephalic lobe where there is a slight depression, cephalic lobe rather high and rounded over the top, highest in front of the middle, the whole face slanting forward, clypeus protruding and strongly convex towards the margin. Cephalic lobe divided by a shallow median groove, clothed in front with hairs directed downward and outward. Cephalic pit small, circular, in a shallow groove.

Posterior eyes in a slightly recurved line, equal, the median separated by less than the diameter and from the lateral by more than the diameter. Anterior eyes in a gently procurved line, the median a little smaller than the lateral, almost touching and separated from the lateral by a little more than the diameter. Chelicerae yellow orange. Sternum and labium dark gray. Endites honey yellow lightly suffused with gray especially across the middle. Legs and palpi light yellow, the coxae dusky below. Abdomen gray. Epigastric plates coarsely striate.

Femur of palpus nearly straight, rather thick. Patella long and broader than the femur, straight. Ratio of length of femur to that of patella as 24 to 17. Tibia rather long, armed near base with a stout dorsal spine, the mesal margin diagonally truncate, smooth with a short blunt tooth curved forward on the dorsal angle. In dorsal view the tibia is narrower at base and then gradually widened on the mesal side and abruptly widened laterally, the swelling so formed thickly clothed with stiff hairs directed forward, the dorsal margin obliquely truncate with the mesal angle armed with two short black incurved teeth. Paracymbium small and strongly curved. Tegulum deeply excavated on the mesal side for the reception of the tail-piece of the embolic division, the bezel very high and extended forward as a quadrate membraneous plate. The embolic division of the spiral type, the tail-piece thin and coiled with two turns, the embolus whip-lash in form and making a complete turn around the tip of the bulb.

Holotype male, in the Cornell University Collection.

UTAH: St. Johns, Oct. 8, 1927. 4 ♂ (R. V. Chamberlin).

Cochlembolus sacer n. sp.

♂. Length, 1.7 mm. Cephalothorax dusky yellow orange with darker radiating lines; viewed from above rounded on the sides posteriorly, the sides nearly straight and converging towards the front, clypeus protuding, rounded; viewed from the side, ascending evenly to the top of the cephalic lobe which is rounded on top and in front and separated from the ocular area by a transverse groove. Ocular area and clypeus slanting strongly forward in a straight line. Clypeus strongly convex. Cephalic lobe clothed in front with numerous stiff hairs directed forward and downward. Median ocular area clothed with shorter hairs. Cephalic pit small.

Posterior eyes in a slightly recurved line, equidistant, separated by the diameter. Anterior eyes in a slightly procurved line, the median smaller than the lateral, almost touching and separated from the lateral by more than the diameter. Chelicerae orange yellow. Sternum gray over orange yellow, darker along the edge. Endites the same color but without the gray. Legs and palpi orange yellow. Abdomen gray.

Femur of palpus nearly straight. Patella broader distally and gently curved downward. Ratio of length of femur to that of patella as 19 to 13. Tibia in dorsal view gradually widened distally with a sharp tooth on the mesal half which is separated by a deep rounded notch from the broader rounded lateral part. Tibia armed dorsally with a row of four stiff hairs. Tibia in mesal view shows the tooth at mesal angle short black and strongly incurved, and on the dorsal side near the margin in line with the row of hairs there is a high rounded hump. Bezel high and narrow. Embolic division very much as in *alpinus* but the embolus is much longer and very slender.

Holotype male, in the Cornell University Collection.

ALBERTA: Lake Louise, Aug. 4, 1927, 1 ♂.

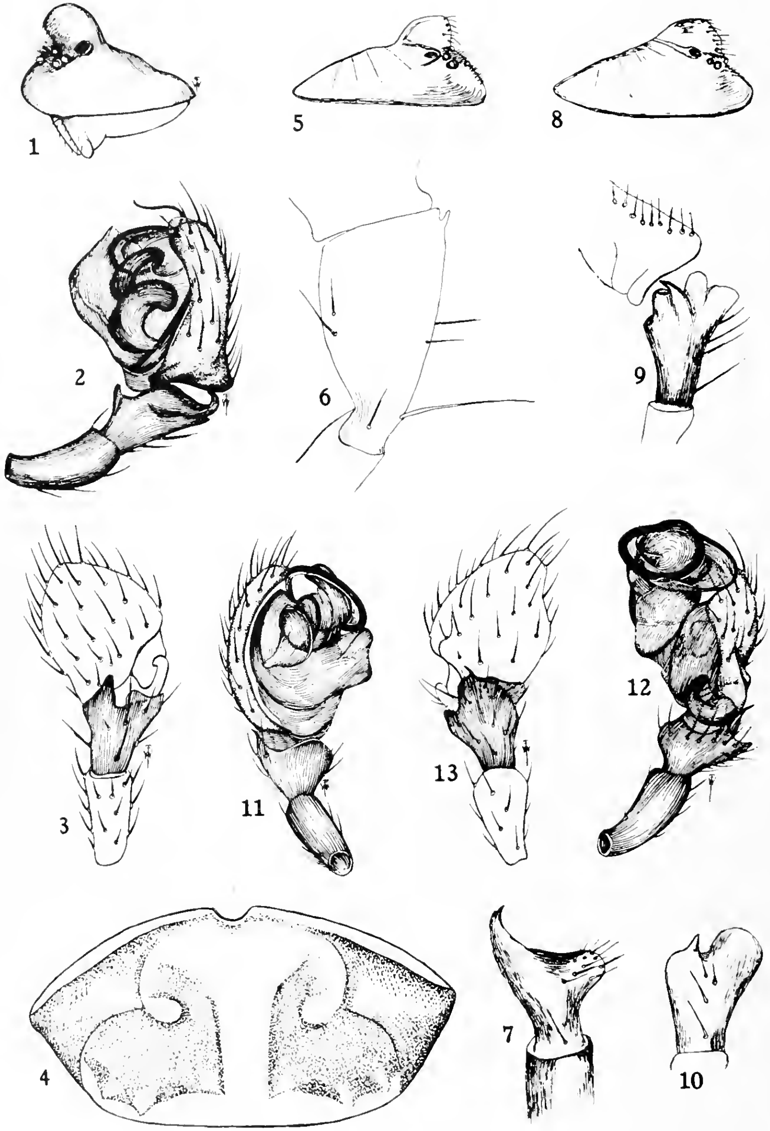
Emerton (Conn. Acad. Sci. Trans. 20:150, pl. 2, fig. 7. 1915) figured this species under the name of *alpinus* Bks. His specimen was from Sulphur Mt., Banff, Alberta, and was taken in moss below the Alpine Club House.

COCHLEMBOLUS VERNALIS Emerton.

Lophocarenum vernale Emerton. Conn. Acad. Sci. Trans. 6:51, pl. 14, fig. 8. 1882.

Diplocephalus vernalis Banks. U. S. Nat. Mus. Bul. 72:27. 1910.

The type specimens in the Museum of Comparative Zoology have apparently been dry and are very dirty. The colors are unreliable. The following notes were taken some years ago when the drawings of the palpus were made.



COCHLEMBOLUS ALPINUS, 1-4; C. SANCTUS, 5-7; C. SACER, 8-10; C. VERNALIS, 11-13.—CROSBY.

♂. Length, 1.5 mm. (according to Emerton). Cephalothorax viewed from the side ascending in a nearly straight line to the top of the cephalic lobe which is very low, rounded over the front of the lobe and then slopes downward at a steep angle through the median ocular area and clypeus.

Posterior eyes in a slightly recurved line. Anterior eyes in a slightly recurved line, the median almost touching but well separated from the lateral. Sternum broad, rounded on the sides with the hind coxae separated by less than the length.

Patella of palpus longer than tibia without the apophysis. Tibia armed dorsally with a broad rounded projection bearing a small tooth at apex. Near the base of this projection on the lateral side an erect process slanting forward. On the back of the tarsus opposite the paracymbium there are two parallel ridges. The paracymbium rather stout and bent in a semicircle. The body of the embolic division is very similar to *C. alpinus*. The tail-piece appears as a semilunate plate with a short projection on the lower inner corner. This plate is the first element of a spiral which at first appears double owing to the fact that the edges of the band are more strongly chitinized. On the third turn these edges come together to form the whip-lash-like embolus which is coiled twice around the end of the bulb with the tip lying near the bezel.

♀. Length, 1.8 mm. Posterior eyes in a slightly recurved row, the median separated by about the diameter and nearer to the lateral than to each other. Owing to the bad condition of the specimen the other characters could not be made out.

Type locality. Pine Rock, New Haven, CONNECTICUT (March).

EXPLANATION OF PLATE IV.

1. *C. alpinus,* cephalothorax, lateral view.
2. *C. alpinus,* right palpus, mesal view.
3. *C. alpinus,* right palpus, dorsal view.
4. *C. alpinus,* epigynum.
5. *C. sanctus,* cephalothorax, lateral view.
6. *C. sanctus,* right tibia of male palpus, mesal view.
7. *C. sanctus,* right tibia of male palpus, dorsal view.
8. *C. sacer,* cephalothorax, lateral view.
9. *C. sacer,* right tibia of male palpus, mesal view.
10. *C. sacer,* right tibia of male palpus, dorsal view.
11. *C. vernalis,* left palpus, meso-ventral view.
12. *C. vernalis,* left palpus, lateral view.
13. *C. vernalis,* left palpus, dorsal view.

The drawings were made by Nellie H. Crosby and Albert W. Force.

Notes on Pennsylvania Ortalidae (Dipt.).

By S. W. Frost, Pennsylvania State College.[1]

The continued use of baits as traps during the season of 1928 yielded several new records which should be added to the list of Ortalidae previously noted,[2] and give some variations in catches worth mentioning. The appended list of Ortalidae taken in Pennsylvania, shows by comparison, the value of bait traps in securing records of these species.

Approximately 1,000 bait traps were operated in a peach orchard near Arendtsville, Pa., during the past season. The baits consisted chiefly of molasses or refiner's syrups diluted by twenty parts of water and placed in 1 gallon tin cans, which were hung in the trees. In some cases sodium arsenite was added to the molasses, giving a bait of longer duration. The first examination of the baits was made on May 8 and collections were made each subsequent week until November 1.

The determinations of the species were made by Mr. E. T. Cresson of the Academy of Natural Sciences, Philadelphia, Pa. Only a few of the specimens of each series were sent for identification as some of the species were too numerous and too common to deem this advisable. The addition of new records during 1928 brings the total number of species taken from bait traps to 14, which represents about one-half the number of species of this locality and no doubt nearly all the species that could be expected from baits operated under these conditions. Undoubtedly if the traps were hung in more open places or along the edges of woods, the number of species could be increased.

It will be noted in the following summary that, with one exception, the species taken during 1927 were recovered again in 1928, and in approximately the same numbers. *C. annulipes* Macq., for some reason, was not taken as often during 1928 as in the preceding year. The new records added during the current season are probably due to the greater number of traps employed.

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[1] Published by permission of the director of the Agricultural Experiment Station, as technical paper No. 465.

[2] Frost, S. W., Ent News, 39:169-171, 1928.

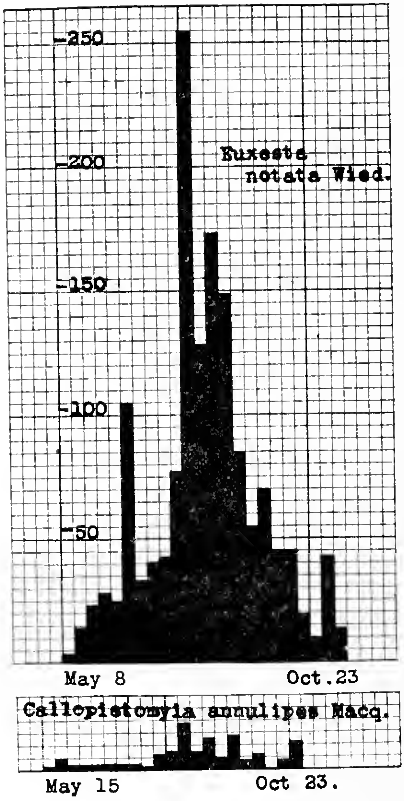
Summary of collections of Ortalidae from bait pails.

Species	1927 Number specimens taken	1927 Period specimens taken	1928 Number specimens taken	1928 Period specimens taken
Rivellia viridulans R-D	5	July 3–19	2	July 24, Sept. 4
Camptoneura picta Fab.	1	June 10	1	June 26
Idana marginata Say.	5	June 15, July 5	4	June 12 —26
Tephronota ruficeps V. d. W.	2	July 12, Aug. 2	7	July 3 —31
Callopistromyia annulipes Macq.	208	Apr. 12— Oct. 18	117	May 15 —Oct. 16
Pseudotephritis corticalis Loew.	12	June 2— July 23	0	
Pseudotephritis vau Say.	76	May 10— Oct. 11	28	May 21 —Oct. 16
Pseudotephritis approximata Bnks.	0		2	Aug. 7, Sept. 4
Euxesta notata (Wied)	417	May 10— Oct. 11	1342	May 8 —Oct. 16
Seioptera vibrans Linn.	4	June 15 —28	4	June 12 —July 17
Myrmecomyia myrmecoides Lw.	2	June 28	0	
Tritoxa incurva Lw.	0		1	Sept. 13
Chaetopsis fulvifrons Macq.	0		2	Aug. 2
Chaetopsis massyla Wlk.	0		1	May 28

Some pronounced differences in the number of specimens taken during the same periods in 1927 and 1928 are worth consideration. In the cases of *E. notata* Wied., and *C. annulipes* Macq., the weekly collections during May, June and July, 1927, greatly exceeded those during August, September and October. In 1928 the conditions were reversed and the captures during August, September and October exceeded those during the early part of the season. This was especially true in the case of *C. annulipes* Macq., and the plotted curves for 1928 should be compared with those for 1927.[1] These differences can be correlated with variations in precipitation and temperature. June and July, 1928, were abnormally wet and cool, 11.04 inches of rain falling in June, and 5.26 inches in July, 1928, as against 4.48 inches and 4.83 inches in June and July, 1927. It is

[1] Frost, S. W. Op. cit.

interesting to note further that the one large collection of *E. notata* Wied., which stands out conspicuously in June, 1928, occurred during the week of June 6 to 13, when only .5 inches of rain fell, and this occurred during a single period of twenty-



four hours. The combined influence of precipitation and low temperatures tends to reduce the catches of Ortalidae. It would thus appear that peaks in the curves for captures by baits do not necessarily indicate broods. The same condition might be attained in running trap lanterns or other mechanical methods for obtaining specimens.

In all the captures the males and females were taken in approximately equal numbers. The three species coming to the traps most freely, show this best. During 1928, 636 ♂ and 706 ♀ *E. notata* Wied; 12 ♂, 16 ♀ *P. vau* Say, and 68 ♂, 49 ♀ *C. annulipes* Macq., were taken.

The genus *Rivellia* was not freely attracted to baits. Of the seven species recorded from Pennsylvania, only one, *R. viridulans* Desv., was taken in baits and this only occasionally. It would look as though this genus had habits different from the majority of the other Ortalidae. The European genus *Platystoma*, belonging to the same subfamily, responded most readily to attractive baits, according to Cuscianna.[2]

Check List of the Pennsylvania Ortalidae.

Rivellia flavimana Loew. (H) (J) (C).
Rivellia pallida Loew. (H) (J).
Rivellia quadrifasciata Macq. (H) (J) (C).
Rivellia variabilis Loew. (H) (J) (C).
Rivellia viridulans Desv. (H) (J) (C) (F).
Rivellia boscii Desv. (J).
Rivellia cognata Cresson. (C).
Myrmecomyia myrmecoides Loew. (H) (F).
Tritoxa flexa Wied. (H) (J).
Tritoxa incurva Loew. (J) (F).
Camptoneura picta Fab. (H) (J) (F).
Idana marginata Say. (H) (J) (F).
Tephronota narytia Wlk. (H) (J).
Tephronota ruficeps V. d. W. (H) (C) (F).
Melieria philadelphica Desv. (J).
Tetanops luridipennis Loew. (H) (J) (C).
Callopistromyia annulipes Macq. (H) (J) (F).
Pseudotephritis corticalis Loew. (H) (J) (F).
Pseudotephritis approximata Banks. (F).
Pseudotephritis vau Say. (H) (J) (F).
Chrysomyza demandata Fab. (H) (J).
Euxesta notata Wied. (H) (J) (F).
Chaetopsis aenea Wied. (H) (J).
Chaetopsis massyla Wlk. (F).
Chaetopsis fulvifrons Macq. (H) (F).
Seioptera vibrans Linn. (H) (J) (C) (F).
  Seioptera colon Loew. (H).
Seioptera albipes Cresson. (C).
Stenomyia tenuis Loew. (H) (J).
Eumetopia rufipes Macq. (J).
Odontomera ferruginea Macq. (C).
Sepsisoma flavescens Johnson. (C).

H=State collection, Harrisburg.
J =Unpublished list of Penn. Diptera by Johnson.
F=New records by Frost.
C=Published records by Cresson.

[2] Cuscianna, N. 1922. Boll. Lab. Zool. gen. e. agrar. R. Scuola sup. d'Agric. Portici. Vol. 15:226-253.

A Calendar of Kansas Butterflies.

By Vance Randolph, Pittsburg, Kansas.

For some years I have been more or less interested in the life history and habits of *Dione vanillae,*[1] but it was not until I attempted a study of the seasonal migrations of this species that the difficulties of such investigations were brought home to me. *Dione vanillae* appears in southern Kansas about August 1 and flies until late November, but neither egg, larva, chrysalis or adult seems able to survive the Kansas winter.[2] In Mexico, however, *vanillae* is said to breed the year 'round, as it does in California.[3] It would certainly be interesting to know the precise dates upon which *vanillae* first appears at a series of points between southern Kansas and the northernmost region in which it flies continuously, but this information is not available at present. There are plenty of enthusiastic butterfly-hunters in the sparsely settled South and West, but most of them are more interested in collecting showy specimens than in recording definite information about dates of appearance and the like.

With this condition in mind, I have gone through my notes made at Pittsburg, in southeastern Kansas, for the last twelve years, and have set down such information as I have about the dates of the common butterflies in this locality. Since this work requires no technical knowledge beyond the mere ability to recognize common species, it seems to me that many other amateur lepidopterologists in the southern *hinterland* might be induced to record similar data, and that these records should be carefully preserved for the use of future investigators of seasonal and geographical distribution.

Ancyloxipha numitor is never common here. I have taken less than a dozen specimens, all flitting about marsh grasses and cat-tails, between August 1 and September 15.

[1] Randolph, Vance. Life History and Habits of Dione vanillae, Trans. Kansas Acad. Sci., XXX:351-362, 1919-1921.

[2] Randolph, Vance. On the seasonal migrations of Dione vanillae in Kansas, Ann. of the Ent. Soc. Amer., XX (2):242-245, 1927.

[3] Wright, William Greenwood. West coast butterflies, San Bernardino, 1905.

ANOSIA PLEXIPPUS appears early in April and flies until about June 15. Very few specimens are seen between July 1 and the middle of August, but great numbers suddenly appear about August 25, and the butterfly is common until late October. I have taken a few as late as November 20.

ARGYNNIS CYBELE is first seen in early May, and is fairly common until the end of June. Very rare from early July to the middle of September, when it becomes common again, and persists well into October.

ARGYNNIS IDALIA appears early in July and flies until late September. It is usually rather rare, but in 1919 I saw hundreds of specimens hovering about the red iron-weeds, in late July and the first half of August.

ATALOPEDES HURON is common from June 1 to the middle of November, being most abundant in September and October.

BASILARCHIA ASTYANAX is never very common here, but I have taken specimens from early May to late October. It is most abundant, I think, in late August and early September. I have taken several of the larvae on the wild cherry trees, in July.

BASILARCHIA DISIPPUS is comparatively rare in this locality. The earliest appearance recorded in my notes is June 11, and the latest entry September 27. Practically all of my specimens have been taken near willow trees on the margin of a small lake.

CATOPSILIA EUBULE appears late in July, and by the middle of September is probably the commonest of our large and showy butterflies. Not many specimens are seen after October 15, but I have taken two or three in late November, and one specimen on December 2.

CHLORIPPE CELTIS usually appears about the middle of July, and flocks about the hackberry trees all through August. Not often seen after September 20, but occasionally persists into October.

CHLORIPPE CLYTON is comparatively rare, but I have taken a few specimens in July and August, and one as late as the middle of September.

COLIAS EURYTHEME appears about the middle of April, and is very common from July 1 to the middle of November. I took several specimens on Dec. 3 in 1927.

COLIAS PHILODICE first appears early in March, and is common everywhere until the latter part of November.

DEBIS CREOLA is rare. I have seen only three specimens, and these were all taken in the first week of August, 1928.

DIONE VANILLAE appears about August 1, and is most abundant from August 15 to September 15. I have never seen one later than November 28.

EPARGYREUS TITYRUS is fairly common from the middle of April to the latter part of August, and occasional specimens are taken all through September.

EUPTOIETA CLAUDIA appears about August 1, and flies until almost the end of November, being most abundant in October.

FENISECA TARQUINIUS is rare. The few specimens I have seen were all taken in September.

GRAPTA COMMA is not common, but is seen occasionally from May 1 to early September.

GRAPTA INTERROGATIONIS flies from early May to late November, and is very common from July to October.

HESPERIA MONTIVAGO appears about July 15, is very common in September and October, and persists well into November.

JUNONIA COENIA is not seen until late August or early September, and is very common in late September and all through October. Not infrequently taken as late as November 15.

LIBYTHEA BACHMANNI appears in June, and becomes quite common in the latter part of July. I have never seen one later than the middle of October.

LYCAENA PSEUDARGIOLUS is sometimes seen as early as March 10, and is very common from about April 15 to the latter part of September.

MEGANOSTOMA CAESONIA is not one of our most common species, but a few specimens may be found almost any day between early June and late October. Most abundant between September 15 and October 20. A few entries in my notes record this butterfly in late March, and I took one specimen on January 15, 1928, at Pineville, Mo.—only about seventy miles south of Pittsburg.

MELITAE PHAETON is rare. The last one I have any record of was taken September 8, 1917.

NATHALIS IOLE is first seen in late August or early September, and is most in evidence about the middle of October. I have seen very few specimens later than November 15.

NEONYMPHA EURYTUS appears early in May, and is common throughout June and July, but is seen only in early morning and late afternoon, flitting about low weeds and grasses.

PAPILIO AJAX appears as early as May 1, and is most abundant about the middle of July. It is much less common in August, and is seldom seen after the middle of September.

PAPILIO ASTERIAS is rare. I once took a pair in coitus on July 17, and found a full-grown caterpillar July 29. I have never seen this butterfly later than August 25.

Papilio cresphontes is never common. It appears in the first half of August and is most abundant in the first half of October.

Papilio philenor occurs from early June to late October, and is most common in August.

Papilio troilus is first seen in the latter part of April, and becomes very common in July and early August. From then on it is rare, although I have taken a few specimens as late as October 10.

Papilio turnus is never very common, but a few specimens are seen every year in late April and early May, and persist well into September.

Phyciodes nycteis appears about the middle of June, becomes fairly common in August, and persists in small numbers to the latter part of November.

Phyciodes tharos is common from early April to late September; it is subject to considerable variation, and some of its phases are liable to confusion with *P. nycteis*.

Pieris protodice usually appears about the middle of May, and flies until the latter part of October.

Pieris rapae is sometimes seen as early as March 15, and is fairly common until about the middle of October.

Pyrameis atalanta appears in April, and flies until about the middle of September. Occasional specimens are taken as late as October 30.

Pyrameis cardui, according to my notes, does not appear until about the first week in July, and is not seen after the middle of November.

Pyrameis huntera flies from early April to late August.

Pyrrhanaea andria appears early in March, becomes very abundant in August, and persists until late November.

Satyrus alope is seldom seen before July 1, but becomes very common from the middle of July to the end of August, and often persists into the first part of a mild October.

Terias lisa appears about August 1, and from then on is one of our commonest roadside butterflies until late October. In the mild winter of 1927 I saw several specimens in the first week of December.

Terias mexicana is very rare, and I have not taken more than a dozen in all my years of collecting. I saw two specimens on November 29, 1927.

Terias nicippe appears about August 1, and becomes fairly common in late August and early September. I have taken a few specimens in October.

Thanoas martialis, according to my notes, occurs from late April to November.

THECLA MELINUS is not very common at any time, but I have taken it at various times between August 1 and October 28.

VANESSA ANTIOPA appears about the middle of March in ordinary seasons, and a few specimens are seen in early April. I have never taken *antiopa* during the summer months, but it appears again in late October and early November.

Entomology in the Literary Supplements.

Scientists, we hope, are gratified with the interest the general public is taking in their technical problems. One of the greatest indications of this interest is the change in reading taste on the part of the American people from fiction to non-fiction works. This was no doubt influenced by the publication of numerous interesting bits of popular science such as Slosson's 'Creative Chemistry' or DeKruif's recent 'Hunger Fighters.' Along with numerous newspaper articles and press notices these come as welcome preludes of an era when science will have a great influence in guiding social problems toward a solution. Today the public at least knows that the doctor is not the only scientist who can come to his aid.

The attention certain scientific books have recently been given in our leading literary sheets is probably less familiar to us than the many newspaper accounts or book store displays. The great mass of technical books never receive the stamp of literary critics, having no merits in this direction, but within the past ten years a galaxy of technical problems of science have been written into the language of the citizen who formerly read only current novels and newspapers. Some of these have been recognized by critics because of the style of writing and the unusual methods of presenting the subject matter.

The principal literary sheets have on their staffs one or more reviewers who have more than a bowing acquaintance with science. Many of us will be familiar with the names of Howard Madison Parshley, William Beebe, or Logan Clendening. These names, along with numerous others will be seen accompanying reviews in the 'New York Herald-Tribune Books,' the most widely circulated literary supplement in America.

Within the past year the writer has noticed careful reviews of a number of books on entomology in the above mentioned publication. It is interesting to note that, though the literary merit is perhaps the prime consideration, the subject matter is given careful analysis. Carpenter's 'The Biology of Insects,' though probably used largely as a text or reference, received more than a column of appreciative comment. Balfour-Browne's recent 'Insects,' a number in Holt's 'Home University Library,' received a short but friendly note. Wheeler's 'Foibles of Insects and Men,' a series of reprints of addresses and popular studies, received considerable praise for its humanitarian viewpoint and literary merit. His latest study, 'The Social Insects,' first published in France and recently made available in English, was carefully reviewed by William Beebe, who has first hand knowledge of the social insects. This review occupied more than a column and a half, calling attention to the behavior and evolution of the social insects as well as the keen human analogies and scholarly presentation. The most recent review is that of Phillips' 'Beekeeping.' Ben Ray Redman, who writes 'Old Wine in New Bottles,' a section of 'Books' devoted entirely to reprint editions, gives half a column to this work, ordinarily considered a textbook or manual of apiculture. "Although the book is addressed only to beekeepers, potential and active, few readers possessed of any curiosity will find it dull. For my part I found it fascinating . . . ." This from a reviewer who admits no knowledge of beekeeping before reading the book!

Within the past five years entomologists have seen a great improvement in the technical content of the books on insects, and now the literary merit is likewise improving. Dr. Howard tells us "The world is getting better, especially the entomologists." PAUL KNIGHT, University of Maryland.

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

GENERAL.—Dyar, H. G.—Obituary. [68] 69: 151-152. **Hollas, F.**—Photographische aufnahmen lebender insekten. [26] 8: 75-76, cont. **Ritchie, J. D.**—Capture of dragonflies by larvae of Cicindelidae. [19] 23: 271. **Schwarz, E. A.**—Obituary. [10] 30: 153, ill. **Swaine, J. M.**—Forest entomology and its development in Canada. [Canada Dept. Agric.] Pamph. 97: 3-20. **Taylor, R. L.**—The arthropod fauna of coniferous leaders weeviled by Pissodes strobi. [5] 35: 217-225. **Zweigelt, F.**—Klima und entwicklung. [26] 8: 93-94, ill., cont.

ANATOMY, PHYSIOLOGY, ETC.—**Abbott, C. E.**—The tarsal chemical sense of the screw worm fly, Cochliomyia macellaria. [5] 35: 201-204, ill. **Chorine & Korvine-Kroukovsky.**—Sur l'immunisation de fragments isolés du corps des chenilles de Galleria mellonella. [77] 100: 15-16. **Crampton, G. C.**—The evolution of the head region in lower arthropods and its bearing upon the origin and relationships of the arthropodan groups. [4] 60: 284-301, ill. **Ferris, G. F.**—The wax-secreting organs of the Coccidae. [55] 5: 67-70. **Murdock, G. E.**—The wax-secreting mechanism in the adult female of Icerya purchasi. [55] 5: 71-75, ill. **Portier & Rorthays.**—Sur l'evolution pondérale des chrysalides des Lépidoptères. [77] 99: 1954-1956.

ARACHNIDA AND MYRIOPODA.—***Chamberlin, R. V.**—Three new lithobiomorphous chilopods from Washington and Oregon. [55] 5: 85-86. A two-eyed spider from Utah. [5] 35: 235-236. ***Ewing, H. E.**—Three new american chiggers (Acarina: Trombidiidae). [10] 31. 9-11. ***Jacot, A. P.**—New oribatoid mites. [5] 35: 213-215. ***Kendall, J.**—A new gall mite on Prunus maritima. [5] 35: 210-212, ill. **Marcus, E.**—Spinnentiere oder Arachnoidea. IV: Bärtierchen (Tardigrada). [Tierwelt Deutschlands] 12: 1-232, ill. ***Petrunkevitch, A.**—The spiders of Porto Rico. Part 1. [Trans. Conn. Acad. Arts and Sci.] 30: 7-158, ill. **Williams & Hefner.**—The millipedes and centipedes of Ohio. [Ohio State Univ. Bull.] 33: 93-147, ill.

THE SMALLER ORDERS OF INSECTS.—**Fendt, F.** Die Libelle. [Kosmos] 26: 22-25, ill. ***Morgan, A. C.**—A new genus and five new species of Thysanoptera foreign to the United States. (S). [10] 31: 1-9. ***Moulton, D.**—A new ankothrips from Colorado. [55] 5: 91-92. **Richter, W.**—Die Thysanopteren des arktischen gebietes. [Fauna Arctica, Jena] 5: 837-850. **Schuster von Forstner, W.**—Was veranlasst die Libellenzüge. [26] 8: 29. **Snyder, T. E.**—Termites and architecture. [76] 1929: 143-151, ill. **Stitz & Ramme.**—(See under Orthoptera.)

ORTHOPTERA.—***Caudell, A. N.**—A new variety of Inscudderia walkeri from Virginia (Tettigoniidae). [10] 31: 11-13. **Engelhardt, G. P.**—An unusual flight record of the oriental mantid Paratenodera sinensis—from New York

City. [19] 23: 249. *Hebard, M.—Studies in the Gryllidae of Panama. [1] 54: 233-294, ill. **Stitz & Ramme.**—Nachtrag zu dem Neuropteren-und dem Orthopteren-abschnitt. [Fauna Arctica, Jena] 5: 855-856. **Uvarov, B. P.**—Synonymy of mantis (Thespis) armata, (Mantidae). (S). [75] 3: 74-75.

HEMIPTERA—*Barber, H. G.—Two new Lygaeidae from the western United States. (Lygaeidae). [19] 23: 264-268. ***China & Myers.**—A reconsideration of the classification of the cimicoid families, with the descriptions of two new spider-web bugs. (S). [75] 3: 97-125, ill. **Cockerell, T. D. A.** — Drosicha burmeisteri apparently rediscovered (Coccidae). [10] 31: 16. ***da Costa Lima, A.**—Contribeicão ao estudo dos aleytodideos da subfamilia Aleurodicinae. (S). [Suppl. Mem. Inst. Oswaldo Cruz] 1928: 128-140, ill. **Essig, E. O.**—Some insects of the Yosemite National Park. Coccidae. [55] 5: 76-78. **Knight, H. H.**—New species of Halticotoma and Sixeonotus (Miridae). [19] 23: 241-249. ***Knowlton, G. F.** — Notes on a few species of Macrosiphini (Aphididae) from Utah with descriptions of two new species. [55] 5: 79-84, ill. **Muir, F.**—New and little-known South American Delphacidae (Fulgoroidea) in the collection of the British Museum. [75] 3: 75-85, ill. **Sprehn, C.**—Die Pentastomiden des arktischen gebietes. [Fauna Arctica, Jena] 5: 853-854. ***Waterston, J.**—A new encyrtid (Chalcid.) bred from Clastoptera. (Cercop.). (S). [22] 19: 249-251, ill.

LEPIDOPTERA.—Bargmann, R.—Anaea rosae forma flora subsp. nova. (S). [80] 2: 196. Hyposcada evanides f. neustetteri m. n. (S). [80] 2: 212. Neue exotische falter. (S). [80] 2: 223-224. Cont. ***Box, H. E.**—La "Lagarta rosada" del algodonero (Pectinophora gossypiella). Una plaga que no queremos tener en Tuchumán. (S). [Rev. Ind. Agric. Tucumán] 19: 106-110, ill. ***Busck, A.**—A new injurious pine moth (Gelechiidae). [10] 31: 13-15, ill. **Clark, A. H.**—Notes on some butterflies from New England. [5] 35: 226-228. ***d'Almeida, R. F.**—Contribution a l'etude des Rhopalocères américains. (S). [24] 97: 369-388. ***Dyar, H. G.**—A new beneficial moth from Panama and a scavenger (Pyralidae, Phycitinae). [10] 31: 16-17. ***Gunder, J. D.**—New Euphydryas (Rhopalocera). [55] 5: 49-50, ill. **H. A. M.**—Apuntes lepidopterológicos. (S). [Bol. Soc. Columbiana Cien. Nat] 17: 180-183. ***Heinrich, C.**—Two new american Coleophoridae. [10] 31: 18-19. **Hepp, A.** — Zum überwinterungsstadium von Stilpnotia (Leucoma) salicis (Lymantriidae). [80] 2: 67-68. **Holland, W. J.**—The argynnids of the Nokomis-group. [3] 19: 15-

34, ill. *Kaye & Lamont — A catalogue of the Trinidad Lepidoptera Heterocera. [Mem. Dept. Agric. Trinidad and Tobago] 3: 1-159, ill. *Lathy, P. I.—The female of Catagramma casta. (S). [75] 3: 143. Lei, H. K.—Silkworm diseases in South China. [China Jour.] 10: 30-37. Lindsey, A. W.—Hesperioidea from the Kartabo district of British Guiana. [Jour. Sci. Lab. Denison Univ.] 23: 231-235, ill. Pollard, C. L.—Stilpnotia salicis, a European moth in the United States. [19] 23: 250. Portier & Rorthays.—Interprétation de la constance de poids que présentent certaines chrysalides pendant une longue période de leur existence. [77] 99: 1956-1958, ill. *Rummel, C.—Butterfly aberrations. [19] 23: 268. Voukassovitch, P. — Observations biologiques sur un Lépidoptère (Ephestia kuehniella). [77] 100: 62-64. Wolcott, G. N.—The mystery of Alabama argillacea. [90] 63: 82-87.

DIPTERA.—Curran, C. H.—Mosquitoes and other flies. [15] 29: 45-49, ill. *Johnson, C. W.—A new cecidomyiid of the genus Lestodiplosis. [5] 35: 216. Karl, O.—Zweiflügler oder Diptera. III: Muscidae. [Tierwelt Deutschlands] 13: 1-236, ill. Munro, H. K.—A note on the systematic status of Tridacus lounsburyi. (Trypetidae). [An. Med. Transvaal Mus.] 12: 336-337. *Parent, O.—Etude sur les Diptères Dolichopodides exotiques conservés au Zoologisches Staats institut und Zoologisches Museum de Hambourg. [Mitt. Zool. Staat. und Zool. Mus Hamburg] 43: 155-198, ill. Spencer, G. J.—(See under Coleoptera). *Van Duzee, M. C.—New north american species of Dolichopodidae. [55] 5: 87-89.

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Doings of Societies.

At the October and November, 1928, meetings of the Chicago Entomological Society the following items of interest were reported:

LEPIDOPTERA: Mr. W. F. Henderson reported the capture on Sept. 9th at Palos Park, just outside the limits of the city of Chicago, of *Danaus berenice* form *strigosa*. This is extremely unusual and much further north than it has hitherto been reported. The specimen was a female.

Mr. Emil Beer reported finding a number of caterpillars feeding on the flowers and seed pods of *Pentstemon glabra*. These developed late in September into *Oncocnemis saundersiana*, only one specimen of which has heretofore been reported taken here.

Mr. Arthur Herz reported rearing *Polia cctypa* on *Silene stellata*, commonly known as starry campion. He picked a number of the blossoms late in July or early in August when the seed capsules begin to form, kept them in water standing over a sheet of white paper and when he found frass on the paper he sought and found the larvae which he succeeded in bringing to maturity. After the last moult the larvae also feed on the leaves. They pupate in the ground in a case lightly bound together by a secretion of the larva. Only one moth emerged the same year, on September 5. The remainder hibernated, the first specimen emerging June 23 and the others developing from time to time until July 25. This species has always been considered very rare.

Messrs. Beer, Herz, Dluhy, Lustig and Wyatt attended the field meeting held on April 22 in the Dune region at Tremont, Indiana. The weather was cold and nothing was flying. Little of interest was found until afternoon when a moth was beaten out of a witch hazel whose leaves had adhered over winter. Diligent beating of witch hazel and oak resulted in the capture of twelve or thirteen specimens, all *Conistra ceromatica*, except one *Graptolitha bethunei*. Later, on Decoration Day, May 30, at the same place the same collectors found larvae on witch hazel in some numbers, but only Wyatt succeeded in rearing four to maturity. These proved to be *Conistra graefiana* and developed September 22 to 30. On October 21 Messrs. Beer and Wyatt made another trip to the same place and captured by beating and sugaring a number of specimens of *graefiana* and also a few *ceromatica*, besides one of *Graptolitha bethunei* and several *Iodia rufago*.

Other interesting captures during the year were *Graptolitha viridipallens* on sugar at Edgebrook, *Prodenia eridania* on sugar at Tremont, *Erebus odora* on sugar at Edgebrook and *Agriopodes lepidula* on sugar at Elmwood Park.

Mr. Herz bred quite a number of the latter species from eggs deposited by a captured specimen, feeding them on dandelion and dock. Six specimens developed during the fall and the remaining pupae hibernated.

Messrs. Wyatt and Beer bred to maturity six specimens of *Papaipema cerina* from larvae which they found in grass in the early stages. The small larvae were later transferred to stems of mandrake and finally into turk's cap lily in which they matured. They also bred *Papaipema harrisi, cataphracta, speciosissima, marginidens, impecuniosa* and *silphii*. Mr. Herz also bred several of these species and among others an unusual form resembling *marginidens,* but without the ordinary white spots. This was from a larva in burdock.

Mr. Charles Krueger exhibited at the meeting a large number of interesting moths and butterflies taken during a trip to Florida.

ALEX. K. WYATT, Secretary.

OBITUARY

Prof. EDWIN EDDY CALDER, A. M., Ph. C., Phar. D., Dean of the Rhode Island College of Pharmacy and Allied Sciences and an authority in chemical circles, died at the Deaconess Hospital, at Boston, at 2 o'clock, January 16, 1929, after an illness of several months. He suffered an infection of his foot last August from which blood poison developed and he was taken to the Deaconess Hospital early in September for treatment. It was found necessary to amputate a portion of the foot, but this failed to check the gangrenous development and subsequent amputations were necessary.

He was born in Providence, Rhode Island, March 17, 1853, the son of John Lewis and Julia F. (Eddy) Calder. He was educated in the public schools of this city and specialized in the sciences with particular reference to chemistry. He was assistant instructor in analytical chemistry at Brown University from 1874 until 1882 when he became professor of chemistry at the Boston University School of Medicine where he continued until 1906.

In 1890 he also took up duties at Brown University as instructor in chemistry, conducting classes at both institutions until 1900 when he resigned his chair at Brown. He was actively associated with the Rhode Island College of Pharmacy at the same time. He received the honorary degree of A. M. from Brown University and later the honorary degrees of Ph. C. and Phar. D. from the Rhode Island College of Pharmacy and Allied Sciences.

In addition to his educational duties he conducted a private analytical chemistry business as a member of the firm of Calder & Strickland in this city, his firm having been commissioned by the State authorities to conduct investigations in connection with a number of capital crimes and important surveys.

On Dec. 23, 1875, Professor Calder married Ella A. T. Elsbree, daughter of Mr. and Mrs. Hiram Elsbree, who died several years ago. He is survived by one daughter.

Professor Calder's hobby was the study and collecting of beetles and he was the possessor of one of the largest and most complete collections of coleoptera in this section of the country. —(*The Providence Journal* for Jan. 16, 1929.)

Three brief papers on Coleoptera by Prof. Calder are listed in Leng's Catalogue of the Coleoptera and the Supplement thereto. They are:

Cicindela rhodensis n. m. Jl. N. Y. Ent. Soc. XXIV, p. 94, 1916.

New Cicindelas of the fulgida group. Can. Ent. liv, p. 62, 1922. [Describes forms from British Columbia, Manitoba and Nebraska.]

Change of name in Cicindela. Can. Ent. liv, p. 191, 1922.

Dr. HARRISON GRAY DYAR, widely known for his work on Lepidoptera, especially their larvae, on Culicidae and related Diptera, died in Washington, D. C., on January 21, 1929. An obituary notice by Dr. L. O. Howard has been published in *Science* for February 8, 1929.

NOTICE.

Will subscribers who have received duplicate copies of Entomological News for March, 1929, February, 1927, and February, 1926, please return them to the News.

APRIL, 1929

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CONTENTS

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ACADEMY OF SCIENCES, SAN FRANCISCO, CALIF.

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DR. E. C. VAN DYKE		DR. E. H. BURKE

JAMES E. COTTLE

ENTOMOLOGICAL NEWS

Vol. XL. APRIL, 1929 No. 4

North American Institutions Featuring Lepidoptera.

III. The Academy of Sciences, San Francisco, California.

By J. D. Gunder, Pasadena, Calif.

(Plate V.)

Very little has been written and really nothing published concerning the early history of the California Academy of Sciences at San Francisco, yet it is the oldest scientific organization of its kind in western America. I am indebted to Mr. James E. Cottle and others for much time spent in ascertaining for me a few of the following historical facts.

It seems that some twenty-two San Francisco men of scientific bent of mind were assembled on April 4, 1853, in the offices of Col. Thomas J. Nevius, at what was then 174 Clay Street, to discuss the founding of an Academy for the development and study of natural phenomena. There is little evidence that any of these gentlemen were collectors or naturalists in the zoological sense of the word, but eight of them were prominent physicians in the city and several were ministers of the gospel. At a second, more formal meeting, which took place on the 16th of May following, a constitution was adopted and a corps of officers elected. Thus we find that Dr. Andrew Randell became the first president of what was then termed the Academy of Natural Sciences. Later, in 1868, the name was changed to simply the Academy of Sciences. From the first little gathering-place on Clay Street, the society moved into an old discarded Baptist church on the southwest corner of California and Dupont Streets. Here their meetings and lectures began to attract genuine public interest. Eventually, James Lick, of Lick Observatory fame, deeded to them a valuable piece of land at 819 Market Street, in the very heart of the down-town district. Again, several years later, they were fortunate in becoming one of the three residuary legatees to his vast estate from which was derived about $450,000. With most of this money, an Academy building was erected on the Market Street property and moved into during the summer of 1891. From then on the Academy was on a firm financial basis. Its exhibits, library and laboratories occupied a separate rear portion of the building, while the front part was leased to business offices from which a considerable income was generally derived. A noteworthy visitor to the Academy in the early 70's was Louis Agassiz.

On April 18, 1906, the great San Francisco earthquake and fire left the Academy in ruins.[1] It was a tremendous loss. Everything was destroyed and practically nothing saved. The fire did not reach that section of the city until the second day; so, Mr. Loomis, the director, with the aid of Miss Eastwood, the botanist, and Miss Hyde, the librarian, managed to remove by hand a few books, some old records (from which this article is written) and a complete set of publications, together with the botanical types and certain types of Coleoptera, Hymenoptera and Hemiptera. All the Lepidoptera collections were burned, including Dr. Behr's collections and his type specimens. What little material could be carried out was moved into a store on Turk Street and elsewhere. Although temporarily stunned by its losses, the Academy almost immediately resumed activity and in a few months had rented space in the Security Bldg., near Market Street. Fire insurance money began coming in; a donation of $20,000 was received from Chas. Crocker and with the Lick endowment again bearing interest, the Academy went ahead and laid its plans for a real new home to eventually rise in Golden Gate Park, which is over on the western edge of the city towards the ocean and far away from any future fire hazard. The new Academy building was completed and occupied by 1915. It is partly shown in the accompanying illustration (Plate V). Its construction is of solid concrete and stone, making it practically immune from cataclysm. One good feature is its roomy, well-arranged laboratories which are probably better equipped for the use of the student than any other in

[1] Mr. W. G. Wright in the June, 1906, issue of the News shows a picture of the buildings or what was left of them after the destruction.

the country. Dr. Barton W. Evermann is the present director and is interested mostly in ichthyology. An auditorium, an African Museum Hall and new library quarters are planned for the future.

The Academy's Department of Entomology was founded on January 6, 1862, by the appointment of a definite curator-in-charge and the following gentlemen have held that post to date: (Their chief interest is noted.)

Dr. H. Herman Behr, 1862-1867, Lepidoptera.

Mr. Richard H. Stretch, 1868-1880, Lepidoptera.

Dr. H. Herman Behr, 1881-1904, Lepidoptera.

Dr. Edwin C. Van Dyke, 1904-1916, Coleoptera.

Mr. Edward P. Van Duzee, 1916 to date, Hemiptera.

The entomological department is especially strong in the Coleoptera of western North America and in the Hemiptera of America, north of Mexico. It is estimated that the Lepidoptera collections number about eighty thousand mounted specimens. Almost one-third the moths listed in the 1917 Barnes Check List are catalogued, which makes this collection the largest of its kind in the west. Most of the specimens in all orders are kept in twenty-four drawer metal cabinets of the size and style of the several shown in the illustration. The butterfly collections consist of the well known W. G. Wright material and the collections of F. X. Williams, E. J. Newcomer and Albert Koebele. The Wright types and the particular specimens which went to make up his plates for the "Butterflies of the West Coast" are of special interest. There is also a sizable collection of western diurnals purchased from the late Chas. L. Fox.

Mr. E. P. Van Duzee, the present curator of Entomology, is well known for his work in the Order Hemiptera, but he has always taken a great deal of interest in Lepidoptera, especially Heterocera. "EP" was born in New York City, April 6, 1861, and his first entomological work was on moths under the personal guidance and encouragement of A. R. Grote, at Buffalo, from 1876 to 1882. He published a list of the Lepidoptera of Buffalo, New York, in 1894. From 1885 on, his scientific work with insects has been almost entirely in the Hemiptera on which more than one hundred papers have been published. For twenty-eight years he was connected with the Grosvenor Library at Buffalo. One year was spent at La Jolla, California, with the Scripps Institute for Biological Research. For two years the University of California, at Berkeley, claimed his services and from there he came to the Academy in 1916. All of his collections have been donated to the Academy. Mr. Van Duzee has made the following interesting field trips: Muskoka Lakes, Canada, in 1888; Michigan in 1891; Georgia in 1899; Colorado and Utah in 1900-3; New Jersey in 1902; Jamaica in 1906; Florida in 1908; New Hampshire and Maine in 1909; Ottawa in 1912; Lake Tahoe in 1915; San Jacinto Mountains, California, in 1917; Siskiyou County, California, in 1918; Huntington Lake, California, in 1919; Washington and Vancouver Island in 1920; Gulf of California in 1921; Utah in 1922; Arizona in 1924; Truckee, California, and Nevada in 1927. There are very few entomologists who can claim as active and unbroken a fifty-three year period of service for science as can E. P. Van Duzee.

The accompanying illustration shows Dr. Edwin C. Van Dyke, the well known Coleopterist, as well as Dr. H. E. Burke, a forest insect specialist who happened to be visiting the Academy when this picture was taken. Dr. Van Dyke may well be considered the best authority on beetles in the west.

I am particularly pleased to be able to include in this plate, a picture of Mr. James E. Cottle. He is undoubtedly the oldest living lepidopterist on the coast and personally knew all the bygone collectors like Behr, Letcher, Fuchs, Mueller, Rivers, Harford, Dunn and many others. Several years ago he retired from long, meritorious duty in the San Francisco Police Department and since then has been more than ever active in building up his collections of butterflies and moths. Jim Cottle was born in New York City on July 10, 1861 (same place and year as Van Duzee). When a small boy his folks moved westward to San Francisco and he has lived there ever since. In 1901 he married Magdelina Schulthress. Years ago, when an employe in the Hibernia Bank, he became ill and was sent to Anderson Springs to recuperate. While there an acquaintance was made with Beverly Letcher and from then on, according to Cottle, "I became a chaser with the net!" Anyone visiting San Francisco should look up Jim Cottle and see his collection. He can tell you all about the good old collecting grounds and besides it's a pleasure to meet and know Mrs. Cottle.

In 1901 Chas. Fuchs and others established the California Entomological Club, which, a year later, changed its name to the Pacific Coast Entomological Society. This organization meets quarterly and publishes an annual Proceedings. Since July, 1924, it has published the *Pan-Pacific Entomologist*, a good quarterly journal and one of which the Society may well be proud. Mr. Van Duzee is the editor.

The Nesting Habits of Anthidium mormonum fragariellum Ckll. (Hym.: Megachilidae).

By Charles H. Hicks, University of California at Los Angeles.

The facts in regard to the relationships of *Anthidium mormonum* Cresson and its allies have been reviewed and discussed by Professor T. D. A. Cockerell[1] and later by Herbert F. Schwarz[2]. The relationships in this group are very complicated and are ably treated in these two papers.

In the spring of 1928, while observing bees nesting in the ground or visiting flowers near Pasadena, California, *Anthidium mormonum fragariellum* Ckll.[3] was seen many times. She early attracted my attention but succeeded in eluding my searches until *Callanthidium illustre* (Cresson), nesting in stumps, was studied. The two species were found in numbers at the stumps and many facts were obtained concerning their nesting habits. A review of the more important ones in regard to *A. mormonum fragariellum* is given below.

The observed nesting period of this bee extended from March 14th to June 2nd and may be somewhat longer. During this period field observations were made; later nests were obtained from the stumps, after having been located by finding tunnels

[1] T. D. A. Cockerell. Anthidiine bees in the collection of the California Academy of Sciences. Proc. Calif. Acad. Sci. 14: 345-367. 1925.

[2] Herbert F. Schwarz. North American bees of the genus *Anthidium*. Amer. Mus. Novitates, No. 252: 1-22. 1927.

[3] Kindly determined by Professor P. H. Timberlake.

whose entrances were stopped with down, the cells removed and the insects reared in the laboratory.

The nests of down and pebbles are placed in the deserted burrows of coleopterous larvae in old, dead, live oak stumps and others. The bee, when a nest is started, begins by seeking a suitable cavity for her cells. Many different individuals have been observed inspecting the available tunnels, entering some, merely passing by others, or giving much attention to a suitable one. This attention is shown by the bee repeatedly entering and leaving the tunnel, flying about it, or returning to it after a brief flight elsewhere. Finding it of the right size and its walls of a sufficient degree of smoothness and hardness she begins nesting activities, sometimes by first removing some debris, or if the tunnel is clear, by obtaining down at once. Tunnels with rough projections on the walls, such as were found in some of the improvised ones formed with a brace and bit in an old yucca flower stalk, are quickly rejected, the bee emerging in a hurry.

Near the end of a nesting season the available tunnels are much in demand, as was evidenced at these stumps at Pasadena, and there is some competition for their use. In other localities where stumps or logs are more abundant and tunnels more plentiful, and where the wood is not too old and soft, this competition is not so keen. A dearth of ready tunnels in a given nesting territory causes the bee to waste much valuable time in a vain search as well as giving rise to an occasional, though not deadly, combat between the females. One such combat was witnessed and recorded on May 12th.

While observing an insect a few feet away, my attention was suddenly attracted by some insects flying heavily to the ground. Coming immediately upon the scene, I found two females fiercely fighting. Each had the other by a fore leg, held with the mandibles with which they were intermittently biting, intervaled every few seconds by an attempt to sting one another. Occasionally there was a loud buzzing of wings as they fought more actively. The contest lasted one minute and forty-seven seconds, at the end of which time one flew away while the other flew to her nest. It is probable that both had been trying to use the same tunnel for previously two bees had been watched at this tunnel, each attempting to appropriate it for her use.

The length of the tunnel used by *A. mormonum fragariellum* varies from 22 to 65 mm., with an average of 40 mm. from 6 nests measured. The outer diameter varies, depending on the tunnel appropriated, which in turn depends upon the species of beetle previously using it. The diameter of one tunnel measured 7 by 5 mm.; that of another, 7 by 6 mm. The entrance to the tunnels may be readily located by surveying the outer surface of stumps and logs and finding the exit holes of beetles, plugged flush with the surface with down. This down, early and before the weather has had time to dull it, is bright and easily seen; later it beomes darkened and some of it may be lost from one cause or another. This outer plug is usually short, being from 4 to 10 mm. in length (average of 6 mm. from 4 nests). Below this a space has always been found, filled with pebbles and debris often mixed with soil. The soil used is fine and sometimes especially abundant, an apparently unusual material for nesting among the Anthidiine bees. The length of the tunnel used for this material has been from 7 to 12 mm. long.

Usually below this outer region, filled with pebbles and soil, the down above and continuous with the cells of the bee is found. In a few instances, however, there has been a second and inner plug of down followed by a space filled with pebbles. A nest taken on May 30th illustrates this condition. It consisted of a plug of down to the outside, flush with the surface, measuring 4 mm. in length; next, 11 mm. of pebbles, soil, etc.; a partition of down of 5 mm.; a second series of pebbles, 4 mm. long; and finally, the down of the nest 14 mm. long and containing one cell with a larva. This larva was 8 mm. in length, full grown and ready to spin its cocoon.

The down immediately about the cells, varies in length depending upon the number of cells it contains. The number of cells to a nest has been found to vary from 1 to 4 with an average number of 1.44 from 25 nests. Females have been observed gathering down, pebbles, soil, small pieces of stems, and the like, and carrying them to the nest. They gather the down from the hairy leaves and stems of *Lepidospartum squamatum*.

When obtaining pebbles, one bee selected and carried 26 loads in 5 minutes from a rather definite place 13 feet and 5 inches from the nest. The nest entrance, in this instance, was nearly parallel with the ground and the bee often barely alighted at the edge, releasing the pebble within, while hesitating but a moment on the wing before quickly flying away. After 4 or 5 loads, however, she entered and arranged them with her mandibles. Having finished with the pebbles, she immediately began securing down, which after 6 trips filled the tunnel even with the surface. The nest complete this bee began entering vacant tunnels and searched as though looking for another nest site. This instance and others affords evidence that as soon as the female has finished one nest she may immediately begin another. Since there is often but one cell to a nest, *A. mormonum fragariellum* must, of necessity, and on the average, provision a number of them.

Loose soil from the surface has many times been observed carried by the bee in her mandibles to the tunnel. This fills in the spaces between the pebbles (the proportion of pebbles to soil varies considerably among different individuals) and would appear to aid somewhat in forming a more compact block against enemies as well as keep some rain from entering. Rain sometimes causes damage to the nest and its contents, when it comes heavily before the cells are completed and the protection placed on the outside.

During the season's study of this bee and later, from nests taken from stumps, parasites have been secured. The most common is a beautiful, little, metallic bee, *Chelynia leucotricha* Ckll.,[4] taken early at the stumps where *A. mormonum fragariellum* was nesting. The parasite remained about, entered and frequented the nesting tunnels of the bee. On a few occasions I have seen the parasite enter a tunnel being provisioned by the host, almost immediately come out, turn about outside and back within out of sight. Her actions suggested very strongly that she had gone within to lay an egg and agreed with similar observations, reported in a recent paper (Hicks),[5] on *Stelis permaculata* Ckll., a parasite of *Heriades carinatus* Cress.

[4] Determined by Professor P. H. Timberlake.

[5] Charles H. Hicks. Stelis permaculata Ckll., a parasite of Heriades carinatus Cress. Entom. News, 38, (10): 297-300. 1927.

The cocoons of the host agree very well with those formed by Anthidiine bees and especially with the ones made by the bees of the genus *Anthidium*. The mammillary projection is especially conspicuous, however, and shows some variation in size.

The males apparently do not seek the females very often, if at all, at the nesting sites for none were observed at the stumps. Neither have they been seen at the flowers mating with the females, although this would seem to be the place to expect them. Possibly the failure was due to not enough time having been spent at the flowers. My first acquaintance with the male occurred when one emerged from his cocoon on October 18th. The cocoon, from which he emerged, had been at slightly above room temperature, on the average, during the period from June 2 to October 18.

The females on several occasions have been found to rest or sleep in the tunnels during the night or when the weather was cool, cloudy or rainy. They crawl within and remain with their abdomens towards the outside, sometimes quite or nearly exposed. A female may sleep at night in the tunnel in which she is nesting until it is finished. Late one evening I found two females of *Callanthidium illustre* (Cresson) and a female, *A. mormonum fragariellum* close together in a single cavity in a yucca flower stalk.

The ease with which the cells of this bee may be secured throughout the year, the large number of nests often found in a single stump, the insects and parasites secured in obtaining these, and the ease with which they may be reared in the laboratory, together with the resulting facts obtained (i. e. sex ratios, ratio of parasites to host, ratio of one parasite to another, effects of temperature on rate of development, etc.) commend this species for further study.

One nest of this bee, which consisted of three cells in a row in usual order, contained a Tenebrionid beetle pupa in each of the outer cells. The middle cell contained a typical cocoon of the bee. Each pupa was completely surrounded by the down of the cell and there was no evidence that this down had been broken by an insect entering it. The pupa soon reached maturity in the laboratory. One was killed and pinned, the other remained alive within its vial for five and one-half months. It died at the end of this period and was later determined as *Aphanotus brevicornis* Lec. by Dr. L. J. Muchmore of the Los Angeles Museum. Whether the beetle larva ate the food provided for the bee larva or destroyed the latter could not be definitely determined from the nest content.

One beetle, the tunnel of which *A. mormonum fragariellum* sometimes appropriates is *Polycaon stoutii* Lec.[6] This beetle likewise was able to live without food, after having reached maturity, for over five months. The writer hopes to present in the future additional facts concerning the relationship of this bee to other insects, especially her parasites.

Entomological Collecting Equipment for the Western United States, with Special Reference to Orthoptera.

By Morgan Hebard, Philadelphia, Penna.

During some twenty years of entomological field work, with Mr. James A. G. Rehn, of the Academy of Natural Sciences, we have gradually discarded unnecessary equipment, condensing the outfit to a point where little that will not be used is now included. Some of the data obtained may be of use to the entomological collector, contemplating field work for the first time, particularly if Orthoptera is one of the orders to be sought.

In the first place the usual clothing is worn at the start of the journey, light if warm regions are to be visited and heavier if colder climates are to be encountered. Additional sets of underwear and socks, several shirts, neckties, handkerchiefs and toilet articles complete this part of the equipment, a cap sometimes being useful en route. An overcoat is unnecessary, though a light rain-coat, or better a poncho, is advisable if a region of frequent rain is to be visited at any time during the trip.

The camp equipment depends more on the type of transportation to be used. In a light motor truck I would carry a "Gold

[6] Kindly determined by Mr. A. C. Davis.

Medal" or similar knock-down army cot, several blankets and a pillow. Only the blankets are indispensable, but with days of hard work the energy of the individual shows real deterioration unless restful sleep can be obtained. A light knock-down table is also most serviceable, but rather a luxury in camp. On the other hand a "Coleman" or similar gasoline pressure lamp is absolutely essential, primarily for packing material and writing notes after dark, but also to secure night-flying species. A liberal supply of extra lamp mantles should also be brought, for sometimes a set will stand hard usage for days and the next shatter at the first severe jolt. A tent can be carried and is needed if heavy rains are to be expected, but enough waterproof canvas to keep the bedding dry is alone essential in most of the western United States. Putting up and taking down a tent causes serious loss of time unless stops of several days in one spot are contemplated, when a tent is pleasant, not only as a refuge in bad weather, but also as a safe place of storage and a shelter from wind, which later may prove extremely trying when packing material, either on the plains, the desert or the mountains. If a tent is carried, poles and sufficient stakes must also be secured, as in many places where it is likely to be used such can not be found.

The cooking equipment for camping may be reduced to frying pan, one or two small pots, coffee pot, large knife, can opener and cup, fork and spoon per man; but knives, a bucket and a dutch oven are often very welcome.

The food equipment depends greatly on the region to be covered, but the following has proved amply sufficient for three men for a week in the arid or semi-arid west. Twelve dozen eggs, crated; 1 side of bacon; 3 lbs, coffee; 7 loaves of bread (preferably a few purchased every two or three days); 1 box flap-jack flour; 2 large jars of jam; 7 cans of tomatoes; 4 cans of baked beans; 3 cans of chile con carne; 7 cans fruit (cherries, peaches and pears are usually the most satisfactory); 14 small tins condensed milk; 3 lbs. sugar; several pounds of butter (packed deep in load, which preserves from melting astonishingly), salt and pepper. One of the pleasantest additions to the above is a steak or other cut of fresh meat, added on passing through a ranch or village. Fresh vegetables and potatoes are also very satisfactory, but as a rule take just sufficiently more time to prepare than we have rarely found time available. In regions where game can be secured, the pleasantest of all additions to the normal diet is available if a shot-gun and box of shells is added to the equipment. Like fishing, however, considerable time is often needed in a strange country to secure in that way sufficient food for three men for even a single meal.

Of all these items canned tomatoes are the most important in the desert. They alone will quench the thirst and should the water supply fail they might prove vital.

In cooking, the dutch oven, a kind of deep frying pan with tightly fitting iron lid, gives splendid results over the camp fire. Both parts are heated and the food, cooked from both above and below, is more appetizing and more healthful than when fried.

Water is all important, as we have found that unless equipped to make several dry camps in succession it is often impossible to give a region thorough examination in the areas where best results can be obtained. Ten gallons of water should be carried and a load of twenty is far more satisfactory; contained in a barrel with a long rubber tube to syphon it out whenever needed without disturbing the rest of the load. In addition a quart canteen per man is almost indispensable.

Morover extra gasoline should be included, ten gallons in two sealed five gallon tins removing any worry on this score.

A medicine chest must be carried and should contain mercurichrome, sodium bicarbonate, aromatic spirits of ammonia, aspirin, a laxative, a purgative, bismuth subgallate (5 gr.), quinine (5 gr.), strychnia (1/8 gr.), potassium permanganate or (better) antivenin (for snake bite), a little gauze, newskin and adhesive tape.

The camp clothing needed consists of a fairly broad-brimmed felt hat, a sweater, light shirts or very light and medium olive-drab woolen shirts, khaki or woolen riding trousers, two light undershirts and underdrawers, several pair of heavy socks, leather puttees and at least two pair of moderately heavy shoes, large enough to fit comfortably over two pair of heavier socks. Very light shirts are needed particularly if work is to be done during the hot months in Death Valley, Imperial Valley, or other places of extreme heat. Undershirts but not under-drawers can be dispensed with in hot weather. Whatever the region and even with a sweater in reserve, heavy as well as light shirts are essential, as the contrast in temperature between noon and after dark is often very great. One pair of field shoes should, if possible, be broken in, as one is very apt to become lame wearing new field shoes unless they are alternated with old ones. Spare shoe laces are also often useful, and only the very strong survive. In one pocket should always be carried a compass and matches.

The collecting equipment requires two hand electric flashlamps and extra batteries, a supply of about one cyanide bottle per man per week, several small cyanide bottles for the more delicate specimens, two pair of tweezers, a note book, a fountain pen, pencils, one pair of good scissors, a small pair of straight manicure scissors (for evisceration), a small bottle of formaldehyde solution, about one-half pound of napthaline per week, a napthaline shaker (made out of a small tin with large holes punched in the lid), numerous blotters, needles and thread, a small screw-driver (mainly for putting together the collecting nets), a net frame per man per week and two net bags for the same period.

We have found the standard "Harrimac" fish landing-net frame the best, using only the first section of the wooden handle. This is a net about 14½ inches in diameter and slightly longer than wide, with a 24 inch handle. The net bags have to be made and the heaviest unbleached muslin is the best material. For our work the bag is 20 inches in depth, allowing a maximum depth that can be reached easily with the hand, the bottom very broadly rounded so that there are no pocketed corners and the material turned over twice along the rim. In this way two thicknesses must be worn through to reach the steel net rim where, along its extremity, the wear and tear is greatest. These nets are made symmetrical so that after some use they can be reversed on the frame, the protected basal portion of the rim then receiving the rough treatment and in this way nearly double work can be done with a net. It must be remembered that a large portion of the most interesting Orthoptera is not taken by pursuit in the open but by strenuous beating of shrubs, trees and brush, often covered with thorns.

I know of no better equipment for collecting Lepidoptera, particularly in the tropics where many forms show greater activity, than this same net frame using two of the wooden handle sections and a slightly deeper bag of green mosquito-netting. In spite of contrary arguments I have heard, I am convinced that many butterflies will take fright much more quickly at a white than at a green net, though as much immobility of the net before striking as may be possible is very important.

The final packing of material is a difficult problem. Triangular papers such as are generally used for Lepidoptera serve well with small series of Orthoptera, particularly if the paper is not stiff. When taken in quantity, however, that method becomes very unsatisfactory. We have used for a long time with great success cigar boxes, each containing about fifteen carefully cut and tightly fitting layers of sheet cotton. This is known as "cotton batting" and its surface holds the specimens but not entangling them, as plain cotton batting or jewelers cotton was found to do. One box a day is usually sufficient, but in rich regions we have filled many more in that length of time, so that an extra supply of this cotton should be carried, cigar boxes being easily obtained unless very isolated regions are to be investigated.

Most Orthoptera should be packed as closely as can be without specimens actually touching each other. A sprinkling of napthaline, a slip with a note book number and number of specimens on the layer in a circle beneath and the next layer of cotton is placed. The napthaline is indispensable as it prevents mould and also damage from insects or small animals. Great care must be taken to keep the box full of extra cotton layers until filled with specimens and several days later, when the contents has settled, additional layers should be added. The method of packing involves risk not only of damage to specimens but also mixing of layers unless the box is kept *tightly* packed at all times.

Though all Orthoptera will keep if given a reasonable chance to dry and not too closely packed, all large bodied specimens should, if possible, be eviscerated. This is done by slitting the under side of the specimen longitudinally from metasternum to the middle of the abdomen. The crop is then grasped with the tweezers as far toward the head as possible and pulled out. The specimen is then reversed, the forceps re-inserted and the intestine is similarly grasped near the other end of the body. A careful pull then removes the entire alimentary tract, the greatest care being used to keep the apex of the abdomen from telescoping, and a firm hold of that portion being necessary to prevent this. It then remains to extract the eggs or the sperm sacks. Only specimens with soft body walls need to have a little cotton inserted. All green individuals should be slitted or eviscerated and dropped into the bottle of about 2% formaldehyde. They can then be taken out almost immediately and dried on blotters. Much more time is required to entirely dry out the eviscerated examples with pieces of blotting paper and this must be done, as we have found that unless thoroughly dry such specimens will deteriorate and at the same time seriously injure other specimens packed near them. Use of a 5% solution or over at first led us to believe that this method of fixing green colors had little merit, as even that weak strength did damage. Later material packed when only dry externally did much damage. The method suggested above has, however, met with great success. We originally put at least some cotton in each specimen eviscerated, but have found this to be quite unnecessary except for soft-bodied species. The time saved by less "stuffing" has, however, been more than lost whenever green material is properly treated.

About camp an axe is always useful, and where roads have been bad a pick and shovel have helped more than once.

Though it may appear that considerable equipment has been suggested, we have found that for the best work little can be omitted. We have usually packed all but the camp outfit and some of the extra packing boxes and cyanide bottles in three waterproof telescopes, the best size being about 22 by 14 by 10 inches. The balance we have shipped in a trunk to the point where camping would begin. The telescope is vastly superior to the suit case in that it need never be set on its side and may be tightly packed though its content may vary from half to fully its capacity.

We prefer puttees and moderately heavy shoes to boots largely because they ventilate better and the latter are so much more difficult to pack in small spaces. Hob-nails should never be used in the desert regions as the heating of the nails on the bare ground makes them almost unendurable.

When we first began our work it was possible to make many stops in the west without camping equipment. A great many places on the railroads were very small, there was often a reasonably good hotel and collecting could be commenced at very short distances. The growth of towns and land under cultivation has made a motor, then rarely to be found, essential for effective work without serious loss of time. Though in this way probably more favorable locations are reached, the cost has been greatly increased. A motor for working over a territory of a thousand or more miles in several weeks, with a complete camping outfit, is in consequence now the most effective method. Though the city rate for motor and driver is often five dollars an hour, we have been able to secure a truck and a good man to drive and cook for as low as seven dollars per day, not including gasoline, oil and food. A covered truck is the ideal equipment, our preference being for a car as large or larger than a Dodge. A man who will drive and cook and who knows something of the region to be visited will enable the collectors to accomplish far more than would otherwise be possible. Even with these advantages a satisfactory survey of a reasonably large area in a few weeks means sufficient hardship and hard work to discourage all but the eager and physically fit. Packing and often collecting specimens far into the night, minor mishaps, unavoidable delays and often the need to investigate the life zones in mountains to their summits, on horseback if horses can be found, otherwise on foot, brings a strain that is endurable only because one is constantly in the open air and continuously exercising throughout the day.

Clothes Moth Prevention as Adapted to the Needs of the Housekeeper.

By HELENE WHITE,* B. B. FULTON, and KATHERINE T. CRANOR, Home Economics Division, Iowa State College, Ames, Iowa.

Clothes moth prevention is a subject of growing interest not only to scientists, but to homemakers as well. The damage done by the clothes moth is at least one-half as great as that done by fire. A leaflet distributed by the Better Fabric League of America estimates the annual loss from those insect pests as one hundred million dollars.

There are few homes in the land whose woolens, furs, rugs or upholstered furniture have not at some time been infested by the clothes moth. Many homemakers still believe that such worthless remedies as printers' ink of newspapers, red pepper, borax, tobacco leaves, red cedar leaves, or eucalyptus leaves, have value. Where worthwhile remedies, such as naphthalene crystals, and paradichlorobenzene, are used, they are not applied in the most efficient manner. These facts are indications that much education is needed concerning the satisfactory control of these insects.

It is hoped that this research may give some practical information to the average consumer, as well as to the teacher of Textiles and Clothing who has an opportunity to emphasize the importance of making systematic efforts to guard properly against the depredation of the moth.

This study was started in January when clothes moth larvae seemed to be scarce in Ames. Various efforts to find infestations met with small success. By April larvae enough for the proposed experiment had not been found. Therefore, an advertisement for clothes moth larvae was inserted in the Iowa Student and the Ames Tribune. As a result of advertising and spring cleaning many infestations were reported during that month.

One housewife was found to have mohair upholstered furni-

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*This paper is the experimental part of a thesis offered by the senior author in partial fulfillment of the requirement for the Degree of M. S., in Textiles and Clothing, June, 1927.

ture badly infested with the webbing clothes moth. In another home were discovered webbing and casemaking larvae, "Buffalo moth" larvae, and black carpet beetle larvae. These were found in stored woolens and furs, and among seldom used toys. Doll's hair seemed to be the favorite food from the toys. Other Ames-donated infested material included a fur cap, a jersey coat, and an army uniform.

From the many scources reported it is evident that the webbing clothes moth, *Tineola bisellicella*, is much more common in Ames than the case-making, *Tinea pellionella*. Since the webbing clothes moth larvae were easier to obtain, they were used in all experiments.

Infested fabrics were placed in two insect cages, 1 x 1 x 2 feet, in the bottom of which was kept moist sand to insure a desired humidity. These were put into a small room, the windows of which had been covered with beaver board to provide darkness. This room was kept at an approximate heat of 25°C.

Material next to the wet sand became moldy. More larvae were found to feed on this than on the other parts of the fabric, probably because there was more moisture. During April an adult clothes moth would now and then appear in a cage. In May there were always two or three adults present. During June and the first part of July they were very numerous. By the last of June the fabrics were infested with a crop of tiny larvae, the new generation.

For the experiments in this research scoured wool, yarns, and fabrics of various weaves were used. These were all wool, and white with the exception of the moth-proofed blankets, which were of various colors. All samples were cut one by one-half inches with the exception of those used in one experiment.

Round tin boxes, twelve inches in circumference were used for experiments with the exception of two for which paste board boxes, six by ten inches, were thought more desirable because of their size. In the tin boxes were placed pieces of blotting paper which were kept moist. The cardboard boxes were placed in an insect cage containing moist sand.

When larvae were needed for experiments they were removed from the infested material with as little handling as possible. At the time each set of experiments with moth- proofing solutions was started, a number of larvae were placed on a sample of batiste, untreated, as a check.

Experiment 1. To find the comparative attractiveness of scoured wool fleece and white wool fabric.

Four larvae were placed in each of five tin boxes with samples of fiber from a scoured wool fleece and a white wool blanket.

In two weeks' time, 80% of the larvae were found entangled in the wool fibers of the fleece. This indicates that clothes moth larvae prefer wool fiber untouched by manufacturing processes. This may also be due to the fact that the fibers of the fleece give them a greater opportunity to bury themselves in the manner they prefer.

Experiment 2. To find the comparative attractiveness of a dyed and an undyed wool yarn.

Two larvae were placed in each of five tin boxes with a sample of each of red and white yarn.

The red yarn although attacked, was injured only about one-half as much as the white yarn. It is probable that the dye was responsible for this.

Experiment 3. To find the comparative attractiveness of various weaves of white all-wool fabrics.

Folded samples, one and one-half inches by three inches, of each of the following materials were placed in a card-board box.

a—Blanket; twill weave; loosely woven, and heavily napped.
b—Light weight sweater; knitted weave.
c—Baby flannel; plain weave, woolen yarn.
d—Gaberdine; twill weave, worsted yarn.
e—Felt; pressed fiber.

Two larvae were put within the fold of each sample. Ten such boxes were prepared. At the end of one month it was found that many larvae had spun cocoons. Because of this and to insure pronounced results, two more clothes moth larvae were added to each box.

About one-half of the larvae in each box collected on the blanket sample. When examined the nap had been eaten from this fabric. Knitted material was considerably damaged, flannel of plain weave slightly damaged, felt and gaberdine of twill weave were almost untouched. These results would indicate that clothes moth larvae prefer the hairy, napped and loosely woven fabrics to the tightly woven hard finished ones. The only time the latter fabrics are attacked to any great extent is when the larvae have nothing else to feed upon.

Experiment 4. Testing of a commercially moth-proofed blanket.

> A sample of this wool blanket was placed in each of five pasteboard boxes with four larvae. A sample of moth-proofed blanket and a sample of untreated blanket were placed in each of five pasteboard boxes with eight larvae.

It was found that the commercially moth-proofed blanket was equally attractive to the larvae with untreated blanket samples of the same make.

Experiment 5. To test the effectiveness of Larvex, a moth-proofing solution.

> *a.* Five samples of white flannel, one by one and one-half inches, were saturated in Larvex solution by dipping, and slowly dried. Each sample with two larvae was placed in a tin box.
> *b.* Five samples of white flannel were treated as in a, and placed, each, in a tin box together with an untreated sample and four larvae.
> *c.* Five samples of batiste were saturated by spraying with Larvex, and allowed to dry slowly.
> Each was placed in a tin box with one larva on a sample. when the larvae died it was replaced.
> *d.* A sample of mohair upholstery material was treated and placed in a tin box with three larvae.
> *e.* A sample of blanket was treated and placed in a tin box with three larvae.

In the boxes which contained only flannel, after 14 days, 62% of the larvae were dead, 22% still alive and moving around, and 16% had spun cocoons. At the end of 24 days all the larvae had died except those in cocoons. No damage had been done to the fabrics.

Where both treated and untreated fabrics were used, 23% of the larvae were dead, 73% alive and 4% had spun cocoons after 14 days. The percentage of living insects was much greater in this group because part of them fed upon the untreated fabric. After 24 days a few more cocoons had been spun and the rest of the larvae were still feeding. The treated material was not damaged.

Batiste samples were sprayed with Larvex until saturated, or dipped in a sufficient amount of the liquid. All the larvae on the batiste samples so treated were dead by the end of 18 days. The fabric was uninjured.

At the end of 14 days the mohair sample treated with Larvex was not harmed, although the larvae had spun tunnels of silk through the pile, and one had died. In the case of the blanket treated with Larvex, after 14 days the larvae had spun short tunnels through the nap, one had bitten off a few fibers and incorporated them into its cocoon, and one had died. These results indicate the Larvex soultion will make materials, on thorough saturation, repellant to the moth larvae to such an extent that they will refuse it as food.

Experiment 6. To test the value of Eulan F Extra, a mothproofing compound.

> *a.* A solution of Eulan F. Extra was prepared according to directions furnished by the manufacturer. Three-fourths of an ounce of the Eulan was dissolved in two quarts of water by boiling for five minutes, yielding a saturated solution.
> Five samples of batiste were saturated with this by dipping, and slowly dried. Each was then placed in a tin box with one larvae. When this larvae died another was added.
> *b.* A sample of batiste was treated with the solution as in "a" and placed in a tin box together with an untreated sample and four larvae.
> *c.* A sample of blanket was treated as in "a" and placed in a tin box with three larvae.

Where five batiste samples were treated with Eulan F. Extra, the larvae ate small holes in two samples by the end of 30 days. The average life of a larvae on this material was 16 days, except in a few cases where cocoons were spun. In the case where a Eulan treated and an untreated sample were exposed to larvae, the treated sample was uninjured and the untreated slightly damaged. The larvae on the blanket sample had spun tunnels and died. These results indicate the Eulan F. Extra tends to prevent damage by moths.

(To be continued)

A Journey Round the World.

By T. D. A. Cockerell, Boulder, Colorado.

We sailed from New York on the "Leviathan" June 11, 1927, and landed at Southampton. After a few days in England we took the S. S. "Soviet" from London to Leningrad, spending three days at Bremen on the way. At Bremen I was much pleased to meet my old correspondent Dr. Alfken, one of the leading authorities on wild bees, and to attend a meeting of the Bremen Entomological Society. We also saw the procession of the Men's Singing Clubs, which was meeting that year in Bremen. It included groups from all over western Germany. We were very cordially received in Germany, and when we got our visa in London, no charge was made. On arriving in Leningrad, we put up at the Hotel Europa, and visited the great museum of the Academy of Sciences, the Geological Committee, and the Botanic Garden, all of them establishments of the highest scientific standing, doing an immense amount of work. In a few days we were on the train for Siberia, going first to Moscow, where we were aided and shown the city by Professor David Ilovaisky, of the Academy of Mines. In the long journey to Irkutsk, in Central Siberia, we were very fortunate in having as a travelling companion a young Russian woman, Miss Ksenia Lukhmanoff, who spoke excellent English, and acting as interpreter, enabled us to converse with the various people on the train. At Irkutsk we found Mr. Trotsky (the real Mr. Trotsky, not Bernstein) who served as our guide and interpreter. We were allowed to live in the guest room of the Geological Committee, and were greatly assisted by the members of the Committee, and the biological staff of the University. We visited the Jurassic fossil beds at Ust Balei on the Angara River, and the Biological Station of the University of Irkutsk on Lake Baikal. Later we went to Archan, where we were most hospitably entertained by the director of the Sanitarium. We found the country about Lake Baikal very interesting, full of flowers and insects, and captured many new species of bees. Leaving Irkutsk, this time with Miss Alexandra Troubnikoff as our interpreter, we went to Tashkent, in Russian Turkestan, now called Usbekistan. We had to spend a night on the way at Novo-Sibirsk, the new capital of Siberia, and to change trains in Russia at Kinel, near Samara. At Tashkent we found a large University, and were allowed to bring away collections of bees and snails to be studied. The snails have been published, and the bees are now being studied. We returned to Moscow, and thence on to Leningrad, and took the S. S. "Yamel" for London. The weather was very bad in the North Sea, and the small boat tossed about a great deal. We were the only passengers.

After a month in London, which gave me an opportunity to work up some of my materials at the British Museum, we sailed for the Orient in the "City of Karachi." We saw the rock of Gibraltar, and had a day at Naples, which enabled us to visit Pompeii and the Marine Biological Station. Leaving Naples, we had a good view of Mt. Etna on the way to Egypt, and on arriving at Port Said took the train to Cairo, later joining the ship at Suez. At Cairo we saw the Museum, and visited the Pyramids and Sphinx. The next place to go on shore was Colombo, Ceylon, and this gave us an opportunity to see Kandy, and the famous Peradeniya Botanical Gardens. Leaving Ceylon, we sailed for Calcutta, where we left the ship. We had about ten days in India, visiting Darjeeling and Agra, at the latter place seeing the Taj Mahal, at the former the great snowy peaks of the Himalayas. From Darjeeling we went to Rangoon, Burma (Dec. 14), and thence to Penang, where we met Miss Alice Mackie, who accompanied us to Siam, and was with us on the voyage to Australia and across the Pacific. We went by train from Penang to Bangkok, and then again by train northward to northern Siam. Leaving the train, we travelled four days through the jungle with carriers, and arrived at Nan, at the home of our friends Doctors Douglas and Mary Collier, on December 26. Christmas dinner was held over a day to await our arrival. We had a most interesting time in Siam, exploring the country, and making many zoological discoveries. After leaving Siam, we visited Kuala Lumpur, in the Federated Malay states, where there is an excellent museum. We then went on to Singapore, and took ship for

Australia, stopping at Batavia (March 5) and Surabaya (March 7) in Java. From Batavia we went to see the botanical garden at Buitenzorg, and were shown over by Dr. Karny, the distinguished Entomologist.

We first stood on Australian soil at Port Darwin (March 12), on the north coast, where we saw the black fellows and collected many insects. We had a day at Thursday Island, and proceeded down the beautiful coast of Queensland, between the barrier reef and the shore. At Brisbane (March 20) we visited the Queensland Museum and the University. I found things so interesting that I stayed three days, while Mrs. Cockerell and Miss Mackie went on to Sydney by sea. I went south by train and joined them there. We visited the Australian Museum, the Botanical Garden and other places in Sydney, and later on I undertook to write a book on Australian Bees for the Royal Zoological Society of Sydney. The greater part of our time in Australia was spent at Sandringham, near Melbourne, where we were the guests of Mr. and Mrs. Tarlton Rayment. Mr. Rayment has done more than any other man to study the habits of Australian bees, and has prepared an illustrated account of the species found at Sandringham.

We had intended to go to New Zealand, but the southern winter was now approaching, and we decided to go to New Caledonia instead. We took the S. S. "Suva" for New Caledonia, stopping at the Fiji Islands on the way, and seeing something of the excellent work in Economic Entomology carried on there. We had four weeks (May 14-June 12) in New Caledonia, and although we found few bees, we obtained many interesting snails. We had to go back to Sydney on the "Suva," and had a hard time, getting into one of the worst storms of recent years in that region. Leaving Sydney we crossed the Pacific, once more calling at the Fiji Islands, and then on to Pago Pago, in American Samoa. At this point Mrs. Cockerell and Miss Mackie left the ship and took the little "Lady Roberts" for British Samoa, while I went on to Honolulu, where they joined me two weeks later. We finally reached California just in time to hear Herbert Hoover's speech of acceptance at Stanford University.

So far (January 24th) 142 kinds of bees have been identified, 61 of these being new. When the work is completed, the total number of bees may approach 200. Of other insects, 212 species have been determined, most of them by the Imperial Bureau of Entomology, which has returned to me a large number of duplicates, beautifully mounted and labelled. Numerous new species and a few new genera have been detected. Mr. Curran has already published two Diptera from New Caledonia (the locality cited as Balky I. is really Bailly Island) and I have published three Mutillidae from Siam. The greater part of the material has been distributed to museums, especially the United States National Museum, British Museum, American Museum of Natural History, the Russian Academy of Sciences, the Australian Museum (New Caledonia spiders) and the Melbourne Museum (New Caledonia ants). My friends Dr. and Mrs. McKean of Chiengmai. Dr. and Mrs. Dr. Collier at Nan, and Dr. Kerr of Bangkok, have collected very many Siamese insects since I left, so that the Siamese collections are greatly increased. The Queensland Museum, the Australian Museum, Professor Nicholson of the University of Sydney, and the American Museum of Natural History, have submitted important collections of Australian bees, in which many new species have been found.

Notes upon Calephelis borealis and other Rhopalocera in Missouri (Lepid.).

Calephelis borealis is such an uncommon insect through most of its range that but little has been recorded regarding its habits, the early stages being entirely unknown. The writer had never taken anything except stray, worn males of the species until the season of 1926 when a number of perfect specimens, including perfect females, were taken. The curious habit of settling on the under side of leaves with outstretched wings like Pyralid and other moths makes the species an unusually interesting member of our butterfly fauna.

The locality, Willard, Missouri, is on the border of the Ozark Mountain Region. All the strays had been taken in the wooded hollows leading to a stream, and early in August 1926 fresh specimens were found in a limited area on the banks of this spring-fed stream. The locality was visited a number of times and specimens captured by sweeping the bunch grass and other plants growing there and capturing the weak flying insects as they arose. Owing to the scant amount of soil over the solid rock the timber is sparse and stunted, giving the herbaceous vegetation a chance to flourish. The vegetation is more nearly characteristic of the prairies of the Middle West than of the Eastern States. The trees are all oaks. Freshly emerged females indicated the proximity of the foodplant, but no females were found ovipositing and the foodplant remains unknown.

Two rare records for Missouri were made in 1927 on the White River, in Taney County, Missouri, which borders upon Arkansas. On October 11th a beautiful example of *Catopsila philea* was seen to settle upon a bed of Zinnias, but the wary insect eluded the sweep of the net. Following two or three days of strong southwest winds, a badly battered female of *Eresia texana* was captured on October 23. *Terias mexicana* was fairly common along the river banks.

AUBURN E. BROWER.

An Amateur Entomologist of 1762.

An advertisement in *The Boston Evening Post,* July 19, 26, Aug. 2, Sept. 13, 1762, may find a place among the historical documents of the entomologist. It contains a brief, but interesting record of the practice of collecting, and of exchanging duplicates, shortly after the middle of the eighteenth century. The notice follows:

"A Gentleman in LONDON, whose Amusement for some Years past has consisted in collecting English insects, particularly of the Moth and Butterfly Tribes, and having obtain'd the various Species generally found in that Kingdom, is desirous of procuring some that are Natives of these Parts, either by Purchase or exchanging a Collection of English Duplicates.—The Author of this Advertisement would think himself very happy in the Correspondence of any Gentleman or Lady in America, of a similar Taste, or who would assist him in obtaining a Collection by either of the forementioned Methods (the latter of which would be the most eligible to him) in Consequence of which all due Regard will be paid to any Letter directed to Mr. DRURY, to be left at Mr. LEVER'S, the New-England Coffee House in Thread-Needle-Street, London."

Two years later, Mr. Drury republished his appeal (*The Boston Evening Post,* April 16, 30, May 7, 14, 21, June 4, 11, 1764) as an "Advertisement to the Naturalists," but with an added paragraph:

"N. B. Any Person delighting in this Branch of natural History, and willing to procure a Collection of the above Things, may by directing a Line as aforesaid, receive ample Instructions for that Purpose (if they don't perfectly understand the Methods of obtaining them) and also depend on receiving the full Worth of any Thing so procured."

An interesting account of Drury's life and works, by H. B. Weiss, appeared in the NEWS for July, 1927 (pp. 208-214), in which this practice of Drury's is mentioned. A catalogue of his specimens was published in London, 1805. The records are silent, however, concerning the moths and butterflies which he succeeded in obtaining from his American correspondents.

ROBERT FRANCIS SEYBOLT, University of Illinois.

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

GENERAL.—Dampf, A.—El IV Congreso Internacional de Entomologia celebrado en Ithaca, N. Y., Los dias del 12 al 18 de agosto de 1928. [Bol. Oficina Defensa Agric. Mexico] 2: 692-729, ill. **Felt, E. P.**—A popular guide to the study of insects. [N. Y. State Mus.] 1929: 5-147, ill. **Foerster, E.**—Insektenschutz. [17] 45: 1-2. **Geiser, S. W.**—Naturalists of the frontier. I. Jacob Boll. [Southwest Review] 1929: 184-198. **Marelli, C. A.**—Un voráz enemigo del bicho de cesto. [Revista Soc. Ent. Argentina] 1: 37-38. **Myers, J. G.**—Additional notes on all-female families in certain insects. [Proc. Ent. Soc. Lond.] 3: 41-43. **Robson, G. C.**—The species problem. An introduction to the study of evolutionary divergence in natural populations. [Biol. Monographs and Manuals] 1928: 3-283. **von Dalla Torre, C. W.**—Obituary. [18] 22: 338-340, ill. **Weiss & Ziegler**—Notes on some wood engravers of North American insects. [6] 36: 421-431, ill.

ANATOMY, PHYSIOLOGY, ETC.—Eggers, F.—Die stiftführenden sinnesorgane. Morphologie und physiologie der chordotonalen und der tympanalen sinnesapparate der insekten. [Zool. Bausteine, Berlin] 2: 1-353, ill. **George, C. J.**—The morphology and development of the genital ducts of Homoptera and Zygoptera as shown in the life histories of Philaenus and Agrion. [53] 72: 447-485, ill. **Goldschmidt & Katsuki.**—Cytologie des erblichen gynandromorphismus von Bombyx mori. [97] 48: 685-699 ill. **Hasebroek, K.**—Atmosphäre und luftströmungen in ihren beziehungen zum industrie-und grosstadtmelanismus. [18] 22: 313-318, 321-335, ill. **Lischetti, A. B.**—Experiencias sobre la acción de substancias tóxicas sobre mosquitos adultos. (S). [Revista Soc. Ent. Argentina] 1: 29-32. **Morison, G. D.**—The muscles of the adult honey-bee (Apis mellifera). [53] 72: 511-526, ill. **Porchet, B.**—Contribution a l'etude des réactions immunitaires chez les invertébrés. [Bull. Soc. Sc. Nat.] 56: 553-560. **Roubaud, E.**—L'art paralyseur chez l'Abeille domestique. [25] 1928: 318-319. **Thomas, M.**—La fuite devant le danger et la simulation de la mort. [33] 68: 53-72. **Traub, V.**—Zur frage der entstehung des melanismus der industrie-und fäulnisabdünstungen in der natur. [18] 22: 188-189, ill. **Verlaine, L.**—Les réactions des antennes des Papillons aux températures élevées et aux chocs. [33] 67: 273-283.

ARACHNIDA AND MYRIOPODA.—Banks, N.—Spiders from Panama. [Bull. Mus. Comp. Zool.] 69: 53-96, ill. **Giltay, L.**—Quelques types de métamérisation tergale abdominale chez les araignées. [33] 67: 285-296, ill. ***Giltay, L.**—Arachnides nouveaux du Brésil. [33] 68: 79-87, ill. **Jacot, A. P.**—American oribatid mites of the subfamily Galumninae. [Bull. Mus. Comp. Zool.] 69: 3-37, ill. ***Pearse, A. S.**—Two new mites from the gills of land crabs. (S). [Pap. Tortugas Lab. Carnegie Inst. Wash.] 26: 225-230, ill. ***Roewer, C. F.**—Opilions nouveaux du Brésil. [33] 68: 123-127, ill. **Walker, M. E.**—A revision of the order Phalangida of Ohio. [Ohio Biol. Sur.] 4: 153-175, ill.

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HEMIPTERA.—Ballou, C. H.—Los Coccidos de Cuba y sus plantas Hospederas. [Cuba Est. Exper. Agron.] 1926: 9-47. ***Davis, W. T.**—Cicadas belonging to the genus Diceroprocta with descriptions of new species. [6] 36: 439-458, ill. **de Azevedo Marques, L. A.**—Cigarrinha nociva a varias especies vegetaes. Biologia do membracideo Aethalion reticulatum. (S). [Inst. Biol. Defesa Agric. Rio de Janeiro] 1928: 3-27, ill. ***Drake, C. J.**—New and little known neotropical Tingitidae. [Iowa Sta. Coll. Jour. Sci.] 3: 41-56. ***Knowlton, G. F.**—Notes on a few species of Myzini (Aphididae) from Utah with descriptions of two new species. [4] 61: 9-15, ill. ***Knowlton, G. F.**—A new juniper aphid from Utah with notes on a few other species. [39] 12: 59-62, ill., cont. **Marelli, C. A.**—Anotaciones sobre Dacnirotatus bruchi. [Rev. Soc. Ent. Argentina] 1: 43-44. **Steer, W.**—The eggs of some Hemiptera-Heteroptera. [8] 65: 34-38, ill. **Van Duzee, E. P.**—A rare pentatomid. [55] 5: 52.

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SPECIAL NOTICES. — Genera Insectorum. — Diptera. Fam. Empididae by A. L. Melander. 1-434, ill. [Indispensable to students of this family.]

Praktische Einführing in die Morphologie der Insekten. Ein Hilfsbuch für Lehrer, Studierende und Entomophile. By Eduard Handschin, (Univ. of Basle). Sammlung naturwissenschaftlicher Praktika, Bd. 16, Gebrüder Borntraeger, Berlin, 1928. Pp. vii, 112; pls. XXIII. 11 Marks.

This commendable little volume is a kind of text book on external insect anatomy, in which descriptions of structures are reduced, as far as possible, almost to the form of definitions. It is intended that the student build his own morphological concepts directly from a study of the various modifications under which structures may occur. The book is a thorough laboratory manual, since all structures are illustrated by numerous preparations to be made by the student. These preparations, mostly in the form of permanent mounts for microscopic study, number about 135 and are derived from ninety of the commoner genera of insects. The text is not illustrated but the volume is accompanied by a separately bound atlas, which contains 194 figures and fits into a substantial pocket within the back cover.

In the usual type of laboratory course in insect anatomy, a relatively few individual species, taken from different groups, are studied in detail. This plan has its advantages, among which is its more economical use of the insect material studied. The other method of approach to the study of insect anatomy, used in the present manual, is radically different. After the introductory chapter, which contains directions for fixing and preserving material and for preparing mounted material for microscopic examination, there follow chapters on the chitinous skeleton, the head, the appendages of the head, the thorax, the abdomen, the endoskeleton, the sound-producing organs and the spiracles. In each chapter or in its sub-divisions, as the case may be, a uniform plan is followed: First there is a carefully selected bibliography, then a list of the insect material to be used and finally a general characterization of each structure and the modifications it exhibits in the various preparations suggested. These descriptive characterizations, which are entirely adequate although surprisingly concise, are accompanied by references to the physiological significance and to the phylogenetic origin of the structures involved. The approach, then, is from the comparative morphological point of view, which has the advantage of yielding a better understanding of structure. Here structure is subordinated to life processes. Each structure, in turn, is observed as it occurs in its different adaptational relationships in the various groups so that the structure is understood in view of the function it fulfills. We find, even in very different groups, that wherever a similar mode of life exists, similar modifications of structure occur, and that within the same group differences in the mode of living will determine differences in structure. The plan for laboratory study first referred to differs essentially from this one in that, in the former, each insect is considered as a completed mechanism, to which the life functions are then subordinated.

This "practical introduction" is a thoroughly organized treatment throughout, it is full of practical information for teachers and students, and like others of the series of "Praktika" of which it is volume 16, is a beautiful piece of scientific book-making, well printed on glazed paper.—R. G. SCHMIEDER.

THE FULGORIDAE OR PLANT-HOPPERS OF MISSISSIPPI, INCLUDING THOSE OF POSSIBLE OCCURRENCE. A Taxonomic, Biological, Ecological, and Economic Study. By HERBERT L. DOZIER, Technical Bulletin No. 14, Miss. Agr. Exp. Station, 152 pp., 35 figs. Dec., 1926 [My copy received July, 1928].

This publication summarizes work that has been carried on for several years and which has suffered not only delay, but the loss of new species described in the interval by other workers, and more unfortunately still of some excellent colored plates that were prepared by the author to embellish it. Nevertheless, it is still adequately illustrated by 35 text figures, chiefly by Dr. Dozier. Keys to the subfamilies, genera, and in most cases to species are given, with descriptions of sufficient detail to serve as a check on results obtained by the use of the keys. Mississippi records are cited, but the general range also is given.

and species of likely occurrence are included, so that the work is more than a mere state list. It will function very well no doubt as a manual of Fulgoridae (exclusive of Delphacinae) of the Southeastern States. The following new species are described in the publication: *Bruchomorpha bimaculata, Aphelonema viridis, Cenchrea mcateei,* and *Amalopota mcateei.*

All in all, Dr. Dozier's contribution is a worthy and welcome one toward the elucidation of a group of insects that have been rather neglected. This is still true of one subfamily, the Delphacinae, a baffling complex, which also we trust Dr. Dozier will be able to study and to illustrate in his very capable manner.—W. L. McAtee.

OBITUARY.

William Rhodes Reinicke, widely known librarian and head of the Apprentices' Library, Broad and Brandywine Streets, Philadelphia, Pennsylvania, died on March 5, 1929 the Oncologic Hospital, where he had been a patient for se. weeks.

Mr. Reinicke, son of the late Henry P. and Julia J. Reinicke, was 50 years of age and had been associated with library work since boyhood. For many years he was connected with the Bureau of Documents in the State Library at Harrisburg. He recently concluded the installation of the library in the Penn Athletic Club. He began his library work in the Wagner Institute, Seventeenth Street and Montgomery Avenue, and from there went to Harrisburg and then returned to this city and took charge of the Apprentices' Library. He is survived by his widow, two children and a sister.

In connection with his work in libraries he formed a collection of books injured by insects and of insects which injure books which was acquired by the late Mr. Joseph G. Rosengarten, a Trustee of the University of Pennsylvania, and presented by him to that institution. Mr. Reinicke was at one time an associate (1894), and later a member (1900), of the old entomological section of the Academy of Natural Sciences of Philadelphia and a member of the Feldman Collecting Social of the same city. He published an article "Insects Destructive to Books" in the *American Journal of Pharmacy* for December, 1910, pp. 551-562.

NOTICE.

Will subscribers who have received duplicate copies of Entomological News for March, 1929, February, 1927, and February, 1926 please return them to the News.

MAY, 1929

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TO CONTRIBUTORS. All contributions will be considered and passed upon at our earliest convenience and, as far as may be, will be published according to date of reception. The receipt of all papers will be acknowledged. Owing to the limited size of each number of the News, articles longer than six printed pages will be published in two or more installments, unless the author be willing to pay for the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

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Owing to increased cost of labor and materials, no illustrations will be published in the News for the present, except where authors furnish the necessary blocks, or pay in advance the cost of making blocks and pay for the cost of printing plates. Information as to the cost will be furnished in each case on application to the Editor. Blocks furnished or paid for by authors will, of course, be returned to authors, after publication, if desired.

Stated Meetings of The American Entomological Society will be held at 7.30 o'clock P. M., on the fourth Thursday of each month, excepting June, July, August, November and December, and on the third Thursday of November and December.

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

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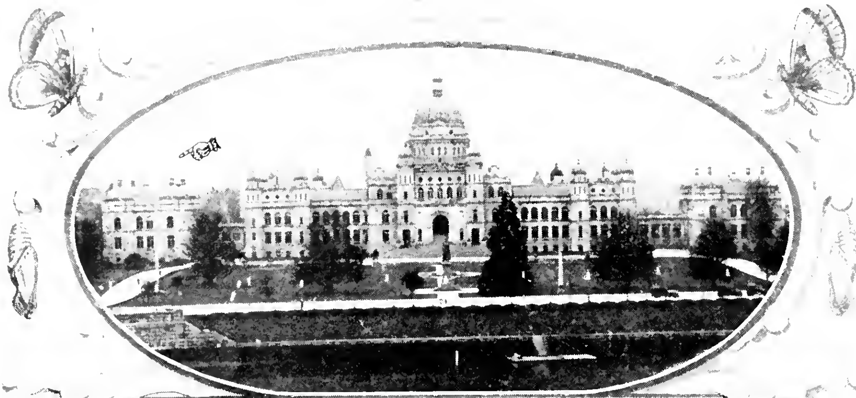

PROVINCIAL MUSEUM, VICTORIA, B.C., CAN.

E. H. BLACKMORE

ENTOMOLOGICAL NEWS

VOL. XL. MAY, 1929 No. 5

North American Institutions Featuring Lepidoptera.

IV. The Provincial Museum, Victoria, B. C., Canada.

By J. D. GUNDER, Pasadena, California.

(Plate VI.)

The Provincial Museum of Natural History at Victoria, British Columbia, Canada, was founded by the Provincial Government on October 25, 1886. Its first public displays occupied simple quarters in the old Supreme Court Building, but as the Institution developed under the leadership of John Fannin, ornithologist, it was thought necessary in 1897 to move it to its present home (shown to left in illustration as marked) in the two-story, east wing of the Parliament Block. These buildings, which are of solid stone construction, always look impressive to visitors and have that substantial, well built appearance so characteristic of Canadian Government structures. The present director, Mr. Francis Kermode, has been in charge of the museum since 1904, his special interests being, mammalogy and ornithology. A white bear *Ursus kermodei* Horn. is named in his honor. The local government should appropriate additional funds for expansion and reorganization, so that this deserving institution can be kept more up to date and abreast with the times.

There are two large, plate glass exhibition cases of nicely arranged and mounted lepidoptera representing local material on view to the public; one of butterflies and the other of moths. The study collection of insects amounts to about twenty glass-top drawers. The museum has no types of lepidoptera. Mr. W. H. Danby and Mr. C. DeB. Green, both collectors of lepidoptera, founded the collections in 1892.

A second complete "Check List of Macrolepidoptera of British Columbia" was recently (1927) issued by the Museum. This very helpful publication, which is being kept up to date in the Annual Reports, was edited by Mr. E. H. Blackmore, who acts as honorary curator for the entomological division. He is shown in the illustration standing by one of the museum's cases of insects. Mr. Blackmore has been interested in lepidoptera for about thirty-five years and has recently been devoting his entire spare time to the study of local micro-lepidoptera. For several terms (1916-17; 1919-20), he was president of the British Columbia Entomological Society. He was born on January 20, 1878, in Ludlow, Shropshire, England, and has two sons. Mr. Blackmore is credited to date with about fifteen entomological papers, the first appearing in the *Proceedings* of the local Society in March, 1916. Several have been published in the *Canadian Entomologist*. His personal collections and types are kept at home. He has been an official in the Government Postal Service for many years and is well thought of in Victoria.*

British Columbia has always listed a good quota of active entomologists. In 1901 Messrs. R. V. Harvey, G. W. Taylor and Tom Wilson founded the B. C. Entomological Society and this organization has published annually their "Proceedings" since 1911. Prior to that, from March, 1906, to June, 1908, there was issued a quarterly Bulletin. The Society meets alternately in Victoria and Vancouver.

A List of Macrolepidoptera of Pennsylvania.

I am compiling a list of macrolepidoptera of Pennsylvania and would like to obtain as many records as possible, giving dates, localities and any other notes of interest. Even notes on one or two species will help to make the article more complete. If you have many species to record, I can send a tentative list to which can be added the data you can furnish. All contributors will receive full credit for their contributions. Address DR. HARRISON M. TIETZ, Dept. Zoology, Penn State College, State College, Penna.

*I have just had word from Mrs. F. Blackmore with the sad news that her husband, Mr. E. H. Blackmore, passed away suddenly on March 2, 1929.

Clothes Moth Prevention as Adapted to the Needs of the Housekeeper.

By HELENE WHITE,* B. B. FULTON, and KATHERINE T. CRANOR, Home Economics Division, Iowa State College, Ames, Iowa.

(Continued from page 121)

Experiment 7. To test the value of Eulan A, a moth-proofing solution.

a. Eulan A was prepared for use according to directions furnished by the manufacturer. Twenty cc. of the solution was mixed with 240 cc. of water and 240 cc. of methylated spirits (wood alcohol). Five samples of batiste were saturated with this solution and allowed to dry. Each was then placed in a tin box with one larva. In case the larva died, it was replaced.

b. A sample of batiste was treated with the solution as in "a" and placed in a tin box together with an untreated sample and four larvae.

c. A sample of blanket was treated as in "a" and placed in a tin box with two larvae.

Samples treated with Eulan A were not harmed by the larvae at the end of 11 days. By this time all larvae placed on the materials at the beginning of the experiment were dead. In the case where treated and untreated samples were used, the larvae were still feeding on the untreated samples. This an indication that Eulan A is a satisfactory moth-proofing substance.

Experiment 8. To test the value of sodium silico fluoride (Na_2SiF_6), for moth-proofing use.

a. A saturated solution of sodium silico fluoride was made by boiling a liter of water containing an excess of crystals, 25 grams, for five minutes. (Na_2SiF_6) is said to be 2.46% soluble in boiling water, but is less than 1% soluble at ordinary temperatures.

After the solution had cooled and settled five samples of batiste were saturated and dried. Each was placed in a tin box with one larva. In case the larva died another was substituted.

b. A sample of batiste was treated as in "a" and placed in a tin box with four larvae.

c. A sample of treated batiste was placed in a tin box together with an untreated sample and four larvae.

d. A sample of blanket was treated and placed in a box with two larvae.

At the end of 11 days samples treated with sodium silico-fluoride were uninjured. The larvae on the blanket sample were still alive, but not feeding. Those in the boxes containing treated and untreated samples were still alive, either feeding on the untreated material or in cocoons. This indicates that sodium silico fluoride has a decided moth-proofing effect on woolens.

Experiment 9. To test the value of sodium floride (NaF) for moth-proofing use.

> *a.* A saturated solution of sodium floride was made by boiling a liter of water containing an excess of crystals, 45 grams, for five minutes. (NaF is slightly over 4% soluble in boiling water.) After the solution had cooled and settled five samples of batiste were treated by saturating and drying. Each was then placed in a tin box with four larvae.
>
> *b.* A sample of batiste was treated as in "a" and placed in a tin box together with an untreated sample and four larvae.

Samples treated with sodium fluoride solution were uninjured at the end of 15 days. Where both treated and untreated fabrics were used, the untreated was slightly damaged, but the treatment was unharmed. Apparently sodium fluoride is of value in moth-proofing.

Experiment 10. To find the value as a moth-proofing solution of Enoz Moth Spray.

> *a.* A sample of flannel was saturated with Enoz and allowed to dry. Three larvae were placed on the sample in a tin box.

The larvae died within a week. The material had such an oily feel and the odor was so disagreeable even after two months of airing that the solution was considered impractical for use for moth-proofing and no further experiments were made.

Experiment 11. To find the physical effect of the moth-proofing solutions on various material.

> Samples of purple felt, black and white checked wool suiting, red wool broadcloth, blue wool crepe, mohair upholstery material, and white fur were saturated in each of the following solutions: Larvex, Eulan F. Extra, Eulan A., sodium silico fluoride, and sodium fluoride.

Untreated material on which larvae were placed. as checks, at the same time that each group of experiments on moth-proofing was started, was bady damaged.

The results of the various moth-proofing experiments indicate that moth-proofing is of value in protecting textiles from infestation.

The visible physical characteristics of the wool fabrics of various colors and weaves were not changed by any of the five moth-proofing solutions used. The mohair upholstery material should be brushed while still slightly damp to insure the retention of its luster.

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An Orthopterist's Point of View as to the value of Specific and Racial (Subspecific) Names and the Uselessness of those for "Varieties" and "Forms."

By MORGAN HEBARD, Philadelphia, Penna.

In recent somewhat comprehensive studies of certain species of Orthoptera, certain factors, which have received but little consideration or have been wholly overlooked in the past, have become constantly more apparent and their relative values better understood. One of the most vital points is the comprehension of the occasional necessary subdivision of specific units into geographic races. This factor until recent years had been almost wholly overlooked by entomologists and, in the literature, material representing such subspăcific differentiation was almost invariably treated as inseparable from typical material of the species, or described as representing a distinct species. The reason for this is easily found; in the past work of almost all authorities on the subject, large series of specimens of one species from many portions of its range have not been obtainable, and from inadequate material the presence of geographic races could not be discerned.

GRADUAL GEOGRAPHIC SPECIFIC VARIATION.

In numerous species a gradual increase in size, or in brilliancy of coloration, or both, is found in their distribution toward the equator. In such species the size increase is general and proportional, while the difference in coloration does not affect the color pattern. These variations are, we believe, the specific adaptation to the gradual changes of climatic conditions over the range of the species; the naming of the very different appearing extremes of such variation from, say, New Jersey and Florida, must be strongly condemned. With the assumption that names are for the purpose of distinguishing units of varied importance, it is quickly apparent that when in such cases large series of material from the entire range of the species show a gradual and constant gradation from one extreme of development to the other, no definite points for division exist and were the extremes named, intermediate conditions could receive with equal propriety names having not the slightest value.

Geographic Races.

In some species virtually constant differences are found to separate series from one area from those from another area, such areas being almost always very extensive. These differences are found in disproportionate increase in size, length or width of certain portions of the insect, differences in the structure of various parts or in the color pattern; all of these being virtually constant over considerable areas, but in the intervening (usually much more restricted) areas showing every intermediate gradation. Such distinct units in a species are termed geographic races and are properly designated by a trinomial.

In insular and otherwise isolated aggregations of a species, such geographic races also occur, but these are sometimes naturally restricted to very limited areas and intermediate material is usually not to be found.

Undoubtedly some geographic races will eventually become specific units, while others will disappear, and the isolated forms mentioned above indicate the evolution of the species which has occurred since the separation took place.

Local Geographic Variation.

In addition to the above geographic variations, differences are often found in material from distinctive conditions in local environment. These are interesting in the study of a species, but can not properly bear name designation if they are found to vary without any line of demarkation from the extreme of difference to the typical condition.

Individual Differences.

Differences in species of Orthoptera such as macropterism and brachypterism, various types of coloration (such as melanism, albinism, etc.), intensive and recessive conditions of color pattern, extremes of ovipositor length and other similar variations can rarely be given names. If this were done, their complexity, intermingling and variability would lead to a senseless array of meaningless names, of interest perhaps to the hoarding collector but of no true scientific value. The confusion possible were "varieties" all considered, may be readily illustrated by the forms of *Dichromorpha viridis;* in this insect macropterism and brachypterism are found and in color we have a wholly green and a wholly brown form, one with green sides and brown dorsum and one with the reverse, and both immaculate and speckled conditions. Naming only the more evident of such variations would not only oblige the use of quadrinomials, but eight names for only the major types of coloration, and in other species showing as many forms and developing a geographic race as well quinquenomials would be requisite. For conditions of really minor importance, such an array of names would be ridiculous.

Mendelian Factors.

Mendelian factors, which rarely occur in their pure form in nature, can not logically be used as a basis for specific or subspecific names; exemplifying, as they do, but a single tendency of the variational complex of the organism.

Our attitude is that the usefulness of taxonomic names in zoology is to designate what appear to be definite steps in the evolutionary development of the organisms under consideration. By definite steps we mean those stages which show a degree of completion and stability sufficient to distinguish them one from the other, excluding features of difference within themselves which are individual, sporadic or occasional or which represent merely some single manifestation of the complexity of the organism.

Additions to the Lists of Buprestidae and Cerambycidae of Pennsylvania (Coleop.).

By J. N. KNULL, Pennsylvania Bureau of Plant Industry.

Since the lists of Buprestidae and Cerambycidae of Pennsylvania have been published*, collecting records have made it necessary to add the following species which were not included therein:

POECILONOTA MONTANUS Chamb.—an adult female which agrees quite well with a specimen of this species determined by Mr. W. J. Chamberlin and now in the author's collection, was found ovipositing in a wound on a large toothed aspen (*Populus grandidentata*) in Clark's Valley, just north of Harrisburg, on July 31. The poplar had been partly girdled by a beaver.

ANOPLIUM PUMILUM Newn.—A specimen collected at Chambersburg, June 7, by the author.

PSEUDIBIDION PERTENUE Csy.—Specimens were collected at Philadelphia Neck, June 30 and July 18, by Mr. Charles Liebeck.

TYPOCERUS ACUTICAUDA Csy.—Presque Isle, June 9, E. M. Craighead; Mt. Holly, June 25, Hummelstown, July 11, Perdix, June 11, Inglenook, July 5, author.

Typocerus deceptus n. sp.

Form and color of *T. velutinus* Oliv., however the reddish brown area of elytra is quite dark in spots between the yellow maculations.

Antennae black, without impressed poriferous areas in the female, but these areas are marked in the male from the 6th to 11th joints inclusive.

Thorax convex, constricted anteriorly, sides sinuate, surface coarsely punctured, each puncture bearing a stiff recumbent golden hair.

Elytra cuneiform, sides sinuate back of middle, apices obliquely emarginate, surface finely densely punctured, each puncture bearing a recumbent hair, color of pubescence varying from golden to nearly black with the ground color of the elytra.

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Female with last dorsal segment nearly twice as long as wide, distinctly emarginate, surface coarsely and sparsely punctured, last ventral broadly rounded, slightly concave near tip.

Male with last dorsal emarginate, surface coarsely densely punctured near tip, last ventral broadly rounded, with concave area near tip. Length 14 mm., width 4.5 mm.

Described from a small series of both sexes all but one of which were collected by the author in Clark's Valley, north of Harrisburg during July and August, on the flowers of the smooth sumac (*Rhus glabra*). One other specimen labeled Mt. Holly, June 25, also collected by the author. The species was extremely rare as compared with the very common *T. velutinus* which could be found on practically every cluster of flowers in the same locality. *Type* female and *paratypes* in author's collection.

The new species superficially resembles a dark colored specimen of *T. velutinus* and undoubtedly stands under this label in some collections. It can, however, be separated on the markings, when one gets a series of both species together. Aside from this it differs from *T. velutinus* by being more robust, the elytra more acuminate and more sinuate back of middle. The thorax is larger in proportion to the width which makes it less robust than in *T. velutinus,* antennae of female without evident impressed poriferous areas, pygidium in the female being more elongate and more coarsely and sparsely punctured. In the systematic arrangement it should come next to *T. velutinus.*

Anoplodera minnesotana Csy. — Hummelstown, May 15, July 4, Inglenook, June 21, Perry Co., July 11, Clark's Valley, July 20, author.

Apparatus for Making Insect Locality Labels.*

By B. B. Fulton, North Carolina State College.

By means of the apparatus described below an entomologist can prepare a hundred or more clearly legible photographic insect labels for any locality and date with about ten minutes of actual labor and can have them ready to use in a little over an

* Published with the approval of the Director of Research, N. C. State College, as paper No. 29 of the Journal series.

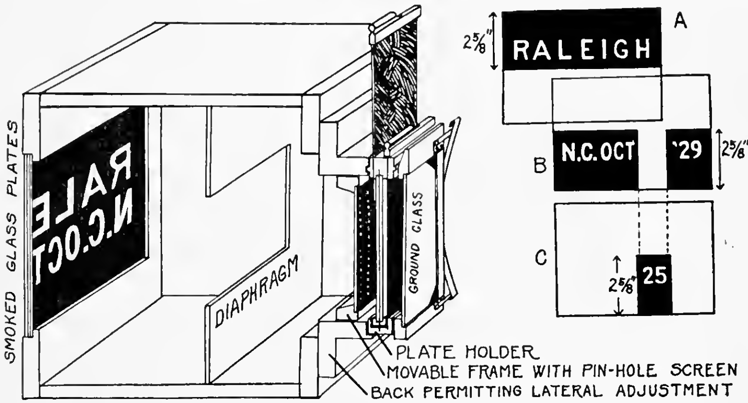
hour. One photographic operation, that of developing the finished print is all that is necessary. The preparation of locality labels is so simplified that material from various localities can be labeled and distributed as it comes in instead of saving it till the end of the summer and running the risk of mistakes.

The apparatus is simple and can be made from old boxes by anyone having the rudiments of mechanical training. The essential parts are, (1) a light-tight box with a diaphragm near the middle, (2) a frame for holding three 5 x 7 glass plates (other sizes may be used if desired), (3) an opaque screen containing regularly spaced holes of small diameter, (4) a back for holding an ordinary plate holder. Each pin-hole in the screen acts as a miniature camera and makes a duplicate in black letters of the label which is scratched on a smoked glass. The printing is done directly on photographic paper held in the plate holder in a film-sheath.

Altho a view camera could be adapted to the purpose here described, a rigid box has the advantage of being always ready for use once it has been adjusted for making labels of the desired size. In my own apparatus I used parts of an old view camera for the front and back and made a four-sided box to hold them together. Near the middle of the box which measures approximately 8"x8"x8", I inserted a cardboard diaphragm to cut off reflections from the sides. The whole interior was painted dead black.

The accompanying figure shows the apparatus as if cut longitudinally through the middle. The front consists of a removable frame for holding 5 x 7 plates. It is deep enough to hold three plates and has spring clips to hold them in place. The back is a special view camera back designed for making lantern slides. It holds a lantern slide size (3¼ x 4) plate holder in front of a ground glass focusing screen. The frame that holds the plate holder is deep enough from front to back to permit the pin-hole screen being inserted so as to stand about 13 mm. in front of the plane occupied by the photographic plate. This frame is clamped to another having a larger opening which in turn is fastened to the box. When the clamps are loosened the back frame can be moved up and down or laterally, a feature valuable for lantern slide making but of no use in the present circumstances after the back has been once squared and centered.

Making the pin-hole screen is the most difficult and exacting part of the whole operation. At first I tried a blackened celluloid film and made the holes with a fine insect pin. This did fairly good work but the thickness of the film tended to cut down light



that had to pass through at an angle. I tried tin foil with about equally good results. This was thinner but the holes could not be made without leaving a small burr around the edges. I finally made a successful screen by making holes in the gelatin film of a lantern slide plate that had been exposed to light, developed deep black, and fixed. The holes must be of uniform size and for best results should be about .3 mm. in diameter. These are made in the following manner: Pull the head off a very fine steel insect pin, No. 0, or smaller. Force the pin through a small piece of wood about ⅛ inch thick and pull through until only the head end is imbedded in the wood. Bend the free end into the form of a crank handle and place the block down on a blackened plate and turn the handle. A few turns will cut a neat hole in the gelatine film which can be examined and measured under a microscope. It may be necessary to try several pins before one is found that will cut a neat hole of the right size. The pin must fit tight in the wood so that it does not wobble when rotated. It should be inserted near one edge of the piece of wood and a line should be drawn from the pin to the edge as a guide in placing the holes. A piece of cardboard is then fastened down to the plate that is to be used for the pinhole screen and the edge of the card marked with 4 mm. spaces or whatever space is desired for the vertical width of the locality labels. The block of wood holding the pin is moved along the card and the pin rotated at each mark. When the row is completed the card is moved over to a new position, a distance corresponding to the desired horizontal width of the labels which in my own pin-hole screen is 9 mm. The rows should be kept parallel and square with the plate. I made 6 rows 9 mm. apart, each containing 18 holes 4 mm. apart. If letters three-quarters inch high are used in the label plate, a vertical spacing of 3.5 mm. would be sufficient. After the holes are completed the plate can be examined under a binocular microscope and small flaws corrected with the point of a pin.

The plate is then cut to the right size and fitted into a small wooden frame so that it can be moved forward and backward in front of the plate holder. The gelatin side should be toward the plate holder and the wide space between holes should correspond to the longer dimension of the label. I found that I could extend the line of the holes farther in a direction at right angles to the words in the label without interfering with the printing. Thus, rows of 20 or more labels can be made at right angles to the longer dimension of the label. In the other direction the length of the label itself tends to increase the angle at which the light from the first and last letters passes through the holes, and limits the number of holes in horizontal rows to about 6 or 7.

The size of the labels will depend on the placement of the pin-hole screen. In my own apparatus the distance from the pin-hole screen to the front is eighteen times the distance from the screen to the paper, causing an eighteen diameter reduction in size. The printed images of the label should nearly meet on all sides so that only one cut with the scissors is necessary in cutting them apart.

Before the apparatus is ready to use a lot of old 5 x 7 plates must be cleaned off with hot water. They are then smoked over a flame such as physiologists use for smoking their kymograph sheets. Gas passed through benzene and burned in a fish-tail burner makes a very good flame for this purpose. By using tin masks the plates are blacked in three ways as shown in the figure. There should be 31 prepared with the small black area and about 8 with the two black areas. The number to prepare of those which are half blackened will depend on how many places the collector expects to collect in during the coming season. The blackened areas should overlap slightly when the three kinds of plates are superimposed.

After smoking the plates, flow alcohol saturated with shellac over the smoked area by means of a pipette. After drying they can then stand ordinary handling but letters can still be easily scratched in the smoked surface with a chisel-shaped piece of wood 3 to 4 mm. wide. Prepare a lettering guide by cutting rectangular spaces in a 5 x 7 card. A letter height of three-fourths of an inch is about right. Letter the small black spaces from 1 to 31 for the days of the month. The plates with two black areas should have the state and month abbreviations scratched in the left hand space and the year in the right hand space. Most collectors do their collecting for any one year within the the same state and during a relatively few months so that ordinarily six or eight of these labels are sufficient and good for the whole year. Each year the year abbreviation can be smoked out and new numbers scratched in.

The plates which are half smoked are reserved for the name of the locality which can be scratched in when needed. By using a letter guide and making plain block capitals I found no difficulty in scratching in any name in two or three minutes. By simply adding the plates for the proper month and day of month a complete label is made up and placed in the front of the box so that it reads correctly from the front. The box is then propped up on a window sill so as to point toward an area of clear sky not too close to the sun, and exposed for about thirty minutes. Be sure that the line from the highest pin hole to the bottom of the label points above the horizon. Use a contrast paper placed in a film sheath and loaded like an ordinary plate. If several labels are needed at one time, several plate holders may be loaded and all exposures made before developing. The black slide in the plate holder is all that is needed for a shutter.

I gave my date and month plates a coat of varnish by flowing over them a little diluted balsam in xylol. This also clears the unsmoked areas that have been clouded with shellac. Most of the locality labels were simply cleaned up with a little alcohol on cotton and not varnished. All plates are kept between index cards in a card file. All locality plates are kept in the same way so that they may be used again if collections are again made in that locality. Since most collectors do much of their collecting around home or in a few interesting localities, a few plates will make labels for most of the insects collected and only a few new ones will need to be made each year.

By using a slightly wider space in the pin-hole screen this system could be used for making labels with three or even four lines so that the collector's name, or type of habitat could be included in the label.

Some Further Errors of Body Wall Nomenclature in Entomology.

By R. E. Snodgrass.

Probably the worst phase of any science is its terminology. The cultured mind cannot endure a bare fact. In order to have admission to intellectual circles, therefore, a fact must be properly clothed in a word or a phrase; in other words, it must have a name. But, once a fact is suitably costumed, we easily come to accept the dress for the thing itself. Hence, it readily follows that many imposters, which are mere ideas, though possibly at first honest ideas, acquire a good standing under cover of an agreeable adjective or noun.

The names of mere facts or of objects do not ordinarily create disorder; it is usually those terms that conceal an idea, or that connect a fact with an idea, that sooner or later lead to trouble, for there is sure to be a scandal eventually when it is discovered that some particular idea has lost its credentials and can not longer be permitted to associate with respectable facts.

Words, with most of us, are expressions of thoughts; and yet we change or multiply our thoughts much more rapidly than we change our vocabulary. It seems that linguistically we have practised almost too much economy in making over these relics of our first wardrobe of respectable garments to fit our growing and diversifying family of ideas. As a consequence, we find that many words in our languages today express something quite different from that for which they originally stood. It has also occurred, in changing a verbal garment from time to time, that we have happened to get the thing on backward and have buttoned it up behind, or in front, as the case may be, and have then unconsciously reversed the idea in accord with the dress.

Many years ago, one hundred and six at the present writing, a Frenchman, named Odier, made a study of the chemical nature of the cuticular covering of insects, and he found that after the cuticula had been macerated in potassium hydroxide for some time a definite insoluble substance was always left. This substance he designated *la chitine,* explaining "c'est ainse que je nomme cet substance chiton, KITON, envelope". It would seem, therefore, that the chitin, as we translate the French into English, should be the softer, flexible substance of the cuticula, for the hard parts evidently are removed by the treatment with caustic. But now, if we turn to the definition of chitin as given in Webster's dictionary we read as follows: "A white amorphous horny substance forming the harder part of the outer integument of insects, crustaceans, and other invertebrates". Evidently our word chitin has somehow turned itself completely about during the course of a century, and has reversed our ideas associated with it, for Webster only reflects the common custom among entomologists of speaking of the hardened areas of the insect body wall as "chitinized", and the softer parts as "weakly chitinized", or "unchitinized".

There are some of us perhaps who have realized the error, but have continued in it because the terms "chitinized" and "unchitinized" have been found very convenient in their current reversed application. Our tranquility has recently been disturbed. Messrs. Ferris and Chamberlin (1928) have called upon us to give an account of our laxness and our inconsistency, and, with Odier in the background, we can no longer evade a reform. Unlike most reformers, however, the writers just mentioned offer entirely acceptable substitutes for the misused terms they would displace, in that they propose the use of the words *sclerotic* and *sclerotized* instead of "chitinized". A sclerite thus becomes a sclerotized area of the cuticula, and not a "chitinized" or "strongly chitinized" area. The terms have been adopted by the writer, and are recommended for general use.

In a recent study of the chemistry of the body wall cuticula of insects, Dr. F. L. Campbell (1929), of the U. S. Bureau of Entomology, has shown that the entire cuticula contains chitin as its best known constituent, but that the hardened areas called sclerites can not be attributed to a condensation of the chitin, or to any change in its composition or texture. Other substances than chitin give rise to the sclerotization and pigmentation.

When the insect cuticula is heated in saturated solutions of sodium or potassium hydroxide, the hardening materials are dissolved, and the chitin is converted into *chitosan* and acetic acid, without change in appearance. Dr. Campbell, therefore, points out that the prevalent idea that chitin produces the hardness and inflexibility of insect exocuticula is no longer tenable. He shows that the so-called "heavily-chitinized", hard, pigmented exocuticula of the American cockroach contains about 22% of chitin, while the "non-chitinized", flexible, colorless endocuticula contains about 60%. In conclusion, he says: "The hardness of the exocuticula is caused by a chemical or physical change in certain substances intimately associated with chitin, which are present with it in the cuticula when the hardening process begins."

Having gone thus far in the matter of reform in the integumental terminology of entomology, we should rectify another erreor of equal importance. The insect cuticula commonly shows in sections that it is composed of an outer layer and an inner layer, the outer one being usually the principal seat of those non-chitinous deposits that give color and hardness to the integument. The cuticular strata have been termed the "epidermis" and the "dermis", respectively. Consistent with this terminology the cell layer of the body wall beneath the so-called dermis is designated the "hypodermis". Since, however, the names "dermis" and "epidermis" are taken evidently from vertebrate anatomy, where all parts of the skin are of a cellular nature, they are clearly not applicable to the insect cuticula, which is a non-cellular product of the underlying layer of cells, and neither of its strata is a dermis in any sense. It then becomes quite illogical to call the formative cell layer a "hypodermis".

The cell layer of the insect or arthropod body wall is the external part of the ectoderm of the embryo. It strictly corresponds, therefore, with the epidermis of vertebrates, and its homologue is so named in all other groups of invertebrates. Many of the earlier entomologists did not use "hypodermis", and some recent writers have discarded it. In Schröder's Handbuch (1912) the ectodermal layer of the insect body wall is described as the epidermis, and Kühnelt (1928), in discussing the structure of the insect integument, rejects "hypodermis" without ceremony. The term should no longer have a place in an entomological glossary, except as a disqualified synonym of *epidermis*.

The two layers of the insect cuticula are appropriately designated *exocuticula* and *entocuticula* by MacGillivray (1923), but *endocuticula* may be substituted for the second on the ground of euphony. Outside the exocuticula there is an extremely thin, non-chitinous surface layer, which is said to be of a lipoid nature (Kühnelt, 1928*a*). The German histologist usually refer to this film as the "Grenzlamelle", a term appropriate when applied to sectional studies, but one that does not carry the idea of a continuous surface layer. The writer would, therefore, propose the term *epicuticula* for this outermost stratum of the arthropod integument.

One further point in nomenclature relative to the body wall must be considered. This has to do with the term "suture" as it is commonly used in entomology. The word suture comes from the Latin *sucre*, to sew. In anatomy it properly applies, therefore, to the lines along which adjoining parts have united, as those between the centers of ossification in a vertebrate cranium. The so-called "sutures" of the insect skeleton are usually not of this nature. In most cases they are the external grooves of linear inflections of the cuticula that have formed internal ridges or plates to strengthen the skeleton, or to furnish increased surfaces for muscle attachments. In other cases they are lines where the hardening deposits of the cuticula have become secondarily discontinuous in order to give flexibility; or they are lines where the deposits have never been formed. In a few cases true sutures of fusion between originally distinct sclerites are present. Hence, under the term "suture" we commonly include at least four anatomically distinct structures. Since, however, an attempt to limit the use of the term would probably not be accepted at present, and, if it were, would leave us without substitutes for the three spurious cases, and besides would create confusion through differences of opinion, it will be well to leave rectification in this matter to some future reformer.

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Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

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SPECIAL NOTICES.—Studies on the stoneflies of Japan by Masuzo Uéno. [Mem. Coll. Sci. Kyoto Imp. Univ.] 4, (B): 97-155, ill. [A monographic work.]

A POPULAR GUIDE TO THE STUDY OF INSECTS. By E. PORTER FELT, D. Sc. New York State Museum Handbook 6. Albany, 1929. 7½ x 5 inches (19 x 13 cm.), 147 pp., 62 figs. (For sale at the Museum, 50 cents.)—This is an excellent pamphlet to put into the hands of any one becoming interested in insects and who desires to know what to do first and how to do it. After a general sketch of the "Interesting and practical phases of insect life" (pp. 11-61) follow directions for making a collection of insects (61-78) and for preserving them (78-105). The principal orders of insects are briefly described (105-127) and the final section is entitled General Literature (127-140). This last tells of juvenile and popular books, textbooks, serials and the chief bibliographical aids to systematic, morphological, economic and nomenclatural entomology. (Dr. Walther Horn's new *Index Litteraturae Entomologicae* might have been included.) But this is far from being the only guide to entomological literature. Many of the subsections into which the above mentioned topics are divided terminate with a list of books and papers relating to that special subject. The inquirer who wishes to know the qualifications of an entomologist, how to sugar, how to mail or ship insects, how to make microscopic mounts or to inflate insect larvae will find here answers to these and many other questions. Nor must we forget to mention the charming verses on insects and entomologists, from many authors, which are scattered throughout the volume. Finally, there is an index of 7 pages.—P. P. CALVERT.

THE PRINCIPLES OF FOREST ENTOMOLOGY, by SAMUEL ALEXANDER GRAHAM, pages I-XIV, 1-339, 149 text illustrations, McGraw-Hill Book Company, Inc., New York, 1929.

The title illustrates the scope of this work, since it is primarily concerned with the principles involved and is ecological instead of being devoted largely to detailed accounts of numerous species with discussions of control measures. The close limitations upon expenditures for control of various forest insects leaves no alternative course under present conditions, although experiences with large scale control work upon the gipsy moth in New England and minor though similar operations in relation to some other forest pests indicate that this limitation may not necessarily persist.

The student of forest entomology will find this work particularly valuable because of its discussion of the various factors which effect insect abundance, namely biotic potential, environmental resistance and the application of these facts in securing an indirect control of forest depredators. This last is exceedingly difficult owing to the large areas involved and the very close cost limitations imposed by the nature of the problem.

The chapter on leaf-eating insects summarizes in a most admirable manner the effect of such pests upon various trees and discusses the probable sequence of events following more or less complete defoliation.

The author naturally gives special attention to the more important forest insects in his discussion of general principles as well as in his accounts of various types of insect work. Throughout the volume, one may find numerous statements in relation to habits and behavior of many of these forms. There is a chapter on sap sucking insects dealing particularly with plant bugs, lace flies, the adelgids and various scale insects. There is a brief discussion of the insectivorous parasites and predators, including in the latter, a very brief summation in relation to birds. There is an excellent classified bibliography and a detailed index. The numerous illustrations add very materially to the value of the work. The volume is marred somewhat by errors in orthography and evidently through an inadvertence, the author refers to the Chironomidae instead of to the Cecidomyiidae.

This work occupies a distinct field and cannot but prove most helpful and suggestive to all interested in various phases of forest entomology.—E. P. FELT.

OBITUARY.

Harrison Gray Dyar.

Born at New York City, February 14, 1866.

Educated at Roxbury Latin School (Massachusetts), the Massachusetts Institute of Technology, Columbia University and in the field.

Lived and collected several years at Rhinebeck, New York.

Collected and reared insects in New York, Colorado, British Columbia, Florida, Panama and elsewhere.

Worked at the United States National Museum from 1897 till his death.

Editor of the *Journal of the New York Entomological Society* 1904-1907; *Proceedings of the Entomological Society of Washington,* 1909-1912.

Proprietor and editor of *Insecutor Inscitiae Menstruus,* 1913-1927.

Worked on the Lepidoptera, especially their larvae, larvae of saw-flies, mosquitoes, especially their larvae, and bacteria.

Died January 21, 1929.

The world has produced many entomologists with a good eye for species—a number who have been able to comprehend the major groups of insects—several who have carefully and intensively studied the biology and early stages of one or another group. There have been hardly any who could do all these three things, and see a group of insects as a whole.

Dyar was one, and almost the only one of those who worked on the Lepidoptera who excelled in all three of these fields and was able to make a synthesis of them.

First: He was a student of the life histories of Lepidoptera. From his college days and for years after he reared caterpillars, either independently or in collaboration with Miss Emily Morton, A. N. Caudell and others. The publications that have resulted, have included a larger number of full larval descriptions than the work of any other American entomologist,—perhaps more than all the rest together, if we leave out W. H. Edwards. His papers on the Eucleidae of New York in collaboration with Miss Morton[1] are a model that no one in this country (except Edwards, perhaps) has equalled.

Second: He was a systematic entomologist in the broadest sense of the term. On the basis of his knowledge of adults, eggs, and larvae—first stage and immature as well as mature—his work may perhaps be considered the basis of our modern classification of the moths. He was, I believe, the first to suggest from egg and larval characters the existence of a closely bound group surrounding the Noctuidae, and including the Notodontidae as well as the Arctiidae and their related families. Thoracic characters have since verified and strengthened this association. His work on larvæ, and especially first stage larvæ, has clarified our ideas on the classification of the micros, along lines first suggested by Herrich-Schäffer's work on the venation; and our recent further progress in the understanding of the micros has largely grown out of his work. In fact it is through the work of Dyar more than any one man that we can now say the classification of the Lepidoptera is probably the soundest and best understood of any of the large orders of insects. In the field of minor systematics—the synoptic classification of groups of species for convenient identification—his long series of papers are notable for combined clearness, condensation and convenience.

In biological theory his first paper laid down a rule that has since been referred to as "Dyar's law".[2] The preface to his doctor's thesis[3] contains a clear discussion of the nature of species and its relation to sexual and asexual reproduction which both entomologists and bacteriologists would do well to read. But most of his contribution to biological law has

[1] Journ. N. Y. Ent. Soc. iii-vii, with scattered papers later.

[2] The number of molts of lepidopterous larvæ. Psyche v, 420, 1890; Imms, Text Book of Entomology, p. 183.

[3] On certain bacteria from the air of New York City. Annals N. Y. Academy of Sciences viii, 322 ff., 1895.

been implicit. He understood how nature works, and was capable of applying his knowledge and of guiding others to its application.

As a curator he is largely responsible for the fact that the collection of Lepidoptera in the U. S. National Museum is probably the only large collection in the country where practically everything is named and arranged. Fortunately in this field he has found efficient successors.

As an editor he was always stimulating, and was more efficient than the average.

There is no one to take his place.

WM. T. M. FORBES.

Dr. Dyar's work on Diptera began with the larvae of the mosquitoes nearly thirty years ago, when he was chiefly interested in early stages of Lepidoptera and sawflies. This was about the time when Dr. Howard had begun to make plans for a monograph of North American mosquitoes, and he asked Dr. Dyar to become a colleague in this enterprise. The monumental work "The Mosquitoes of North and Central America and the West Indies," was published by the Carnegie Institution in four large volumes, 1912-1917. Dr. Dyar did the taxonomic work, writing practically two volumes. Before it appeared he published with Mr. Knab an important paper on "Larvae of Culicidae classified as Independent Organisms."[4] He also published many shorter papers. He continued to publish actively on the mosquitoes after the monograph appeared. In 1921 he published "The Mosquitoes of Canada,"[5] and on account of the edition of the monograph being sold out, "The Mosquitoes of the United States."[6] He reviewed the non-biting forms in "The North American Chaoborinae."[7] In the same period he began to take up other nematocerous Diptera, and published with R. C. Shannon a paper on the North American Simuliidae,[8] also several short papers on Psychodidae,

[4] Journal N. Y. Ent. Soc., vol. 14, 1906, pp. 169-230, with 13 plates.

[5] Transactions of the Royal Canadian Institute, vol. 13, part 1, pp. 71-120.

[6] Proceedings of the U. S. National Museum, Vol. 62, art. 1, 1922, pp. 1-119.

[7] Insecutor Inscitiae Menst., vol. 12, 1924, pp. 201-216.

[8] Proceedings U. S. National Museum, vol. 69, 1927, pp. 1-54, with 7 plates.

Thaumaleidae, and Dixidae. The last he considered a subfamily of Culicidae.

As considerable progress had been made in the study of South American mosquitoes, and the large monograph was no longer obtainable, the Carnegie Institution consented to publish a new volume covering all the known mosquitoes of both continents. This was Dyar's last large work, and appeared only a few months ago as "The Mosquitoes of the Americas," a volume of over 600 pages with 123 plates.

Even after this, although in frail health, he continued to publish, and only ten days before his death handed in a manuscript to the Museum giving an annotated list of the mosquitoes of Montana, with one new species.—J. M. ALDRICH.

A note in the *Journal of Mammalogy* for February, 1929, announces the death of Colonel WIRT ROBINSON, at Washington, D. C., on January 20, 1929, and refers briefly to his services in that department of zoology. His interests were much wider than that one field and included the insects. In the NEWS for January, 1903 (volume xiv, pages 17-21) is a paper of his authorship, entitled "A Trip After Papilio Homerus," extracted from a letter to Prof. E. J. Smith, Jr., describing the strenuous efforts made by him and his brother in Jamaica, resulting in the capture of 44 specimens of this rare butterfly. The visit to Venezuela made by him and Dr. M. W. Lyon, Jr., in 1900, referred to by the *Journal* quoted, yielded also a collection of insects now in the United States National Museum; the Odonata of this lot, with others, have been listed in the *Annals of the Carnegie Museum* for 1909 (volume vi, pp. 73-276). He was born in Buckingham County, Virginia, October 16, 1864, a region in which he collected in later years, sometimes accompanied by Mr. William T. Davis, of Staten Island. He graduated from the United States Military Academy in 1887, and entered the artillery service in that year as a second lieutenant, becoming a captain in 1898, major in 1907, lieutenant colonel and colonel in 1911. He was assistant professor of chemistry at the Academy, at West Point, New York, 1906-1911, and professor and head of the department since 1911.

P. P. CALVERT.

JUNE, 1929

ENTOMOLOGICAL NEWS

Vol. XL No. 6

Ezra Townsend Cresson
1838–1926

CONTENTS

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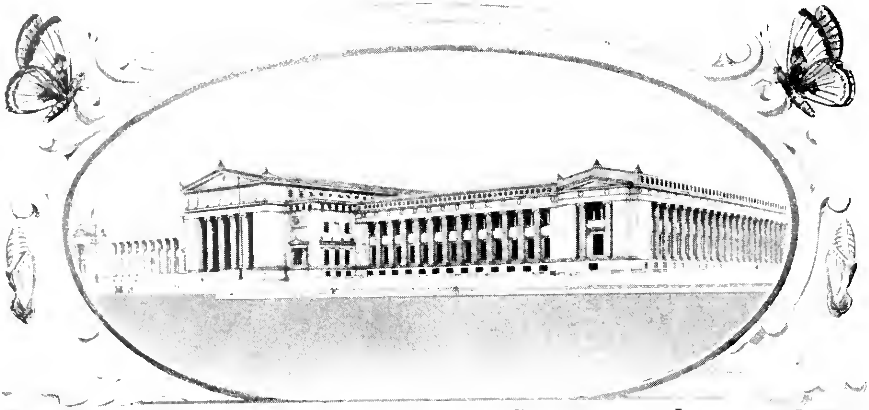


THE FIELD MUSEUM, CHICAGO, ILL.

EMIL LIDZEBLAD

EMIL LILJEBLAD   WILLIAM J. GERHARD

ENTOMOLOGICAL NEWS

VOL. XL. JUNE, 1929 No. 6

North American Institutions Featuring Lepidoptera.

V. The Field Museum, Chicago, Illinois.

By J. D. GUNDER, Pasadena, California.

(Plate VII.)

The World's Fair held at Chicago in 1893, brought together an unsurpassed amount of excellent display material suitable for museum purposes. There had been an era of artistic and industrial development on earth and competition and rivalry had led every nation to produce and exhibit its best. About this time a group of public-spirited citizens decided that at the close of the Exposition, the most important and valuable of these exhibits should remain in Chicago. Thus on August 21, 1893, was founded the original "Columbian Museum." A short time later the name was changed to the "Field Columbian Museum" and the most beautiful of the World's Fair buildings, the Palace of Arts in Jackson Park, was secured as a temporary home. This building was occupied for some twenty-seven years, however. In 1905 the museum limited its scope to the departments of Anthropology, Botany, Geology and Zoology and the name was finally and definitely designated as the Field Museum of Natural History in honor of Mr. Marshall Field, the Chicago merchant "prince" whose endowments made it possible.

The museum's new home (Plate VII) on the lake front in Grant Park, downtown Chicago, was opened to the public in 1921. The exterior is of Georgia white marble and is treated in monumental manner based on Greek architecture of the Ionic order. The interior of the building is very imposing and consists, in its general arrangement, of a great central hall or nave, flanked by transverse exhibition halls on both sides. The animal groups by the well known taxidermist and sculptor, Mr. Carl Akeley, are of special note. Mr. Stephen C. Simms is the present director, whose chief interest is popular education.

As mentioned above, the museum's activities are divided among four departments or sciences; one of these is Zoology, of which Dr. W. H. Osgood is the curator. The division of insects (or entomology) comes under this section, and since 1901, the date of the founding of the division, Mr. William J. Gerhard has been in charge under the title of Assistant Curator. He is shown in the accompanying illustration with Mr. Emil Liljeblad, coleopterist, who has been with the museum a long while and whose speciality is the Mordellidae. Although Mr. Gerhard has worked with all insect orders for over thirty-three years, he prefers the Hemiptera and has a good private library upon the subject as well as a specialized collection. A "List of Mosquitoes of the Chicago Area" is among his writings. In 1898-99 he was sent on a colletcing trip into Bolivia. Many tropical butterflies were secured, but his health was somewhat impaired by fever. Mr. Gerhard was born January 3, 1877, in Berks County, Pennsylvania, is married and has one daughter.

The Division (or Department) of Entomology consists of a spacious office and one long workroom with windows along one side and with the insect cabinets placed in parallel rows down the center. It is estimated that there are some seventy-five thousand butterflies (and some moths) altogether, with four hundred and thirty-five specimens representing two hundred and fifty-one types and cotypes. Aside from the general museum collection which is separate, the following collections of note are represented and kept individually intact as originally received: the Arthur J. Snyder collection of North American Lepidoptera, purchased in 1904; the well known Herman Strecker collection of Lepidoptera of the world, purchased in 1908; the O. C. Poling collection (moths in part), donated in 1914, and the August Sallé colection, donated in 1917. The wooden cabinets, which for the most part hold these collections, will shortly be replaced by a modern all-steel equipment.

Chicago has an active entomological society which holds regular meetings at the Chicago Academy or elsewhere. It is unfortunate that this society is not affiliated in some manner with the Field Museum. It is noticed that those local entomological organizations which are more closely in touch with their larger home institutions fare better in the long run than those continually working on an independent basis. This statement is suggested because the author was formerly a member of the Chicago Entomological Society when living in that city and he has the welfare of the old club in mind.

The Behavior of Macronychus glabratus Say (Coleo.: Helmidae).

By LUTHER S. WEST, Battle Creek College, Battle Creek, Mich.

Although an attempt to work out the life history of this species proved unsuccessful, it was my good fortune to observe certain features of adult behavior which have not apparently been hitherto recorded. These observations, though fragmentary, are presented at this time for the benefit of any who may be interested in the biology of aquatic Coleoptera.

Adult beetles were collected in May and early June from submerged and water-logged wood, boards seeming to be preferred over sunken branches by most individuals. The insects are evidently extremely adaptive, since they may be collected in almost equal numbers from slow flowing woods streams in which the water is colored with humous acids, and from bright, sunny, open water, where the current is swift. Sufficient, apparently, that they have partly decayed wood to which they may cling.

A considerable colony was kept under observation in a jar of natural water, placed near the window, and their behavior noted. Sticks of wood on which they had been taken were placed in the jar for them to crawl upon. At the posterior end of most individuals, as they climbed about beneath the surface, might be seen a tiny, silvery bubble of air. This is evidently a sort of reservoir which serves them for purposes of respiration while they are submerged. Each individual if observed long enough, could be seen to wander above the surface occasionally, where he always made much less satisfactory progress, for here his twelve claws seemed to stick exasperatingly into the wood, and the individual would be obliged to stop and clean the fore-legs with each other, very much after the fashion of the house fly. This performance was also occasionally seen when the beetle was below the surface.

The not infrequent excursion above the surface is evidently necessary in order to secure a fresh supply of air and judging from the difficulty with which the beetles crawl when out of the water, would not be indulged in so frequently were it not required. It may be that in flowing water their reservoir is replenished more or less automatically, but this can hardly be true in certain almost stagnant waters, in which they are also found.

Food Habits. One finds the beetles frequently in little grooves or burrows which appear to have been excavated by the insects themselves. A dissection of several individuals and careful examination of the contents of the alimentary tract, never revealed anything more definite than a finely divided brown "frass" with an occasional hint of algae, like those growing on the surface of the wood. I now believe that the adult beetles, and evidently the larvae also, feed exclusively on the partly decayed, water-soaked wood to which they are given to clinging, passing it through the body along with whatever other nourishment it may contain.

Copulation. Copulation was observed several times during the month of June, both in nature and among the captured specimens. The performance was usually as follows. The male would wander about beneath the surface until he came upon a second individual which he would examine in a preliminary way by use of the fore-legs. He would perhaps pass on to a second or even a third before finding a suitable mate, those passed by being doubtless other males. The position of copulation is quite normal, the male being above and facing the same direction as the female, which provides transportation for both, while the male clings to the dorsum of the female with all six feet. The genitals seem to be brought into contact only intermittently, but the position is maintained for a variable length of time. One pair was observed to separate after five minutes while another pair remained together for over twenty.

Copulating pairs were isolated in small rearing cages, through which flowing, natural water was caused to pass, and the beetles were provided with bits of wood on which to rest. No eggs were secured however by this method and since time did not permit further experimentation the project was finally abandoned. That the same pair may enter into copula more than once, at intervals widely separated is illustrated by the following note.

On June 9, a pair seen to be in copula was isolated in a small rearing cage, where, on daily examination they were found separate from each other until June 21. The pair was found to be in copula again on that date and was left undisturbed. On June 23, when the cage was next examined, the pair was found still in mating position. It is barely possible that union may have continued for forty-eight hours.

Hibernation: Mention of the larva. One point was clearly established and that is the fact that the *adults* overwinter. A colony of several, collected in July, lived through in rearing cages, where the water temperature approximated that of outside conditions, and remained active during the following summer, one after another dying off as the season came to an end. Two were still alive when the work was abandoned in October. They were, however, exceedingly sluggish and it is not to be supposed that they would have lived appreciably longer.

The larva usually associated with this species occurs in little crevices in the wood, sometimes more or less covered with surface debris. This larva is subtriangular in cross-section and seems to possess the ability to burrow short distances into the softer parts of the wood. Bearing in mind the life history of *Macronychus quadrituberculatus* Bull., as reported by Perez ('63)* we might expect that the pupae, as is the case with the European species, may ultimately be located within tiny burrows in the wood itself. I am not willing to commit myself as to the identity of this larva, since *Macronychus glabratus* is not the only species found in such situations. A more nearly cylindrical larva, like that of *Stenelmis bicarinatus* Lec. is also sometimes found associated with the adult *Macronychus.*

*Perez, Arcas 1863. Historie des metamorphores du *Macronychus quadrituberculatus* et de son parasite. Ann. Soc. ent. de France. (4e ser) T. 3. 621-636, pl. 14. 21 figs.

The Grapevine Sawfly (Hym.: Tenthredinidae).[1]

By William R. Horsfall, Department of Entomology, University of Arkansas.

(Plate VIII.)

The grapevine sawfly, *Erythraspides pygmaeus* (Say)[2], was listed as a pest of grape by Harris[3] in his Treatise on Insects. It is also included among the grape insects discussed in the popular manuals on fruit insects by Saunders[4] and by Slingerland and Crosby[5]. It occurs in Arkansas as a pest of porch arbors, but there is no record of its attacking grapes in vineyards in this state. The only host upon which it has been collected here is the sweet winter grape, *Vitis cinerea* Engel[6]. This species, so far as I know, is grown only as an arbor grape.

The following notes on the habits and life history of the grapevine sawfly were secured at Fayetteville, Arkansas, during the summer of 1928[7]. No attempt at completeness was made, since the studies were carried on as an incidental part of the insectary work with more important pests.

The adult sawflies show the greatest activity in the brightest part of the day,—i. e., between the hours of 10:00 a. m. and 2:00 p. m., when they may be seen flying swiftly around the arbor. The numbers vary, depending on the periods of greatest emergence. Some may be found all of the time in midsummer. The female selects a small tender leaf, preferably about an inch across, for oviposition. When she first alights on the leaf she is very restless and runs about over it until a place for oviposition is selected. The under surface is always chosen, and she locates a place for the egg by feeling about with her abdomen. She gradually becomes more quiet, and then inserts her

[1] Research Paper No. 113, Journal Series, University of Arkansas.

[2] Determined by Wm. Middleton.

[3] Harris, T. W. 1852. Insects injurious to vegetation, pp. 522-523.

[4] Saunders, W. Ins. Inj. to Fruit, p. 185.

[5] Slingerland, M. V. and Crosby, C. R. Manual of Fruit Insects, pp. 417-418.

[6] Determined by Dr. D. M. Moore, Professor of Botany, University of Arkansas.

[7] This study was carried on at the suggestion of Mr. Dwight Isely of the Department of Entomology. Also, I wish to thank Mr. David G. Hall for assistance in preparing the drawings and for the photograph of the feeding larvae.

ovipositor alongside a vein and deposits an egg. The eggs are laid singly along the lateral margins of the veins, thus giving the veins a knotty appearance. They are held in place by strands of fiber which surround the veins, and are covered by the floccose material on the under surface of the leaves. The leaf vein in which the egg is inserted is killed at the point of insertion.

Larvae of the first two instars feed individually, making small holes between the veins of the leaf upon which they hatched or upon adjacent ones. Most of the feeding is toward the edge of the under side of the leaf, causing the margins to curl downward. In the latter instars the larvae tend to be gregarious. They start feeding at the edge of a leaf and gradually move backward toward the petiole, leaving very little more than the petiole and midrib. When one leaf has been devoured, they migrate to another.

In the last instar the larva does not feed. The male has a total of five instars and the female six. As soon as it has hardened after molting, it drops to the ground and makes an elliptical cell for pupation about an inch below the surface. The walls of this cell or cocoon are quite firm so that it can easily be removed from the soil, although it appears to be made largely of sand or earth.

Duration of Stages.

Records on the duration of stages were taken in the period from July 10 to August 9, 1928, when the daily mean temperature in the insectary ranged from 73-82½° F.

The incubation period required from 3 to 5 days, with an average of 3.9, based on records of 71 eggs.

The duration of total larval feeding period of the male was from 8 to 16 days, with an average of 11.35, based on records of 18 larvae. The duration of the total larval feeding period of the female was from 9 to 20 days with an average of 14.30 days, based on records of 20 larvae.

The average duration of the different larval stages in days was as follows: first stage, 1.98, based on 93 larvae; second stage, 1.57, 49 larvae; third stage, 1.97, 49 larvae; fourth stage, 2.88, 81 larvae; fifth stage, 2.30 for females, 40 larvae, and 2.95 for the non-feeding males, 18 larvae; sixth stage, females only, 3.60, based on 20 larvae.

The total period spent under ground (the last larval period and pupa) was from 11 to 14 days, with an average of 11.75. Of the time spent in the ground, from 7 to 9 days were in the last larval instar, with an average of 7.50 days; and from 4 to 5 days were spent as pupae with an average of 4.19 days, based on records of 16 individuals.

All of the stages were apparently the same in the case of the male and female, with the exception of the larval feeding period. As above stated, the male has five larval feeding instars, and the female has six.

The preoviposition period is very short, being from 2 to 3 days, with an average of 2.5, based on records of 30 females. None of the females lived over six days after emerging, and some died as early as the fourth day.

Description of Stages.

Egg.—Length, .95 mm.; greatest diameter .65 mm. General shape ovoid, one end tapering more rapidly than the other. Color whitish translucent. The outer membrane is pliable, rather tough, and elastic.

The width in millimeters of the head capsule of the different larval instars is as follows: first instar, .35-.37; second instar, .60; third instar, .90; fourth instar, 1.15 to 1.20; fifth instar, 1.40 to 1.45; sixth instar (female only), 1.65.

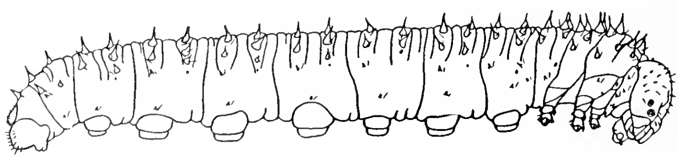
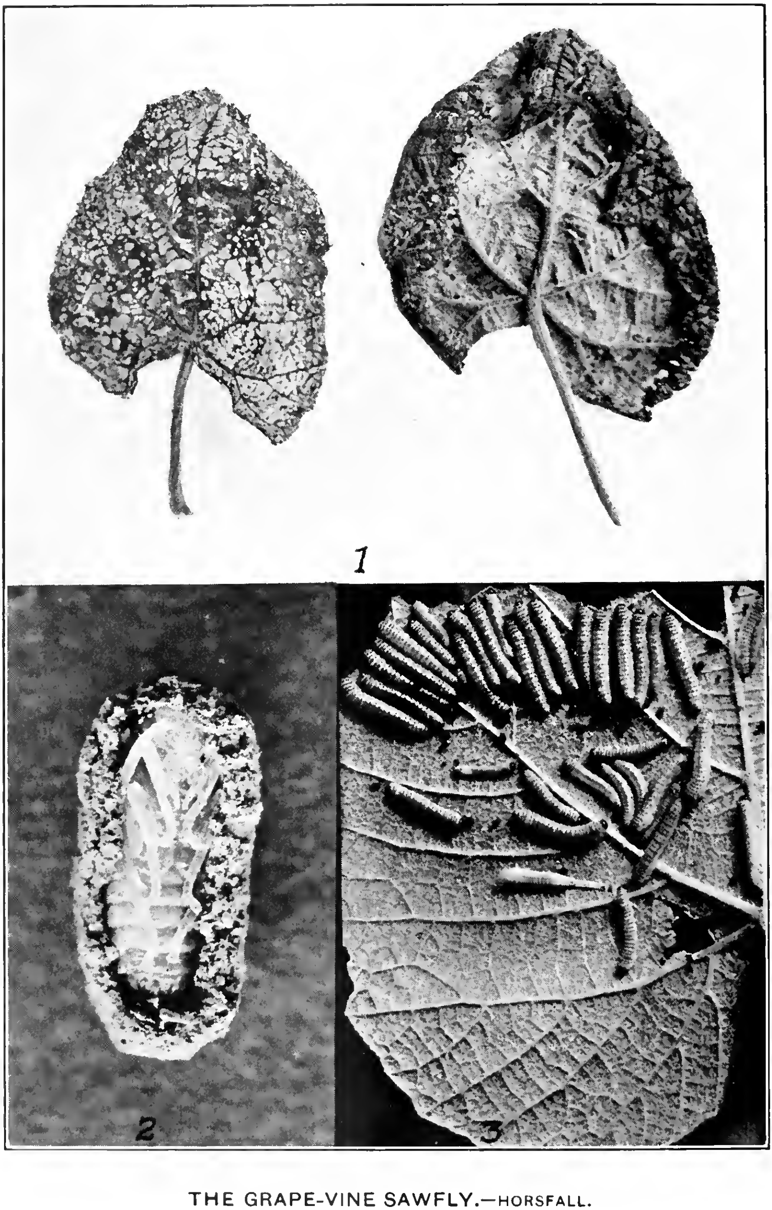


Figure 1. Larva of last feeding instar of grapevine sawfly.

Larva, last feeding instar.—Length, 12-15 mm.; width of head capsule, 1.40 to 1.45 mm. Head black, shiny, microscopically setiferous, smaller than thorax; ocellaria black; tips of mandibles and clypeus brown; glossae and paraglossae not fused, shorter than palpi; glossae without opening in center. Body greenish yellow, subcylindrical, slender, tapering slightly caudad; larvapods on all but first and ninth abdominal seg-



THE GRAPE-VINE SAWFLY.—HORSFALL.

ments. Spines, large, black, conical, not bifurcate, spinose, 1 seta at base of each spine; spines arranged typically in two transverse rows across each segment; third abdominal segment with five annulae, with three pairs of spines on second and fourth; spiracles black margined; tarsal claws brown; dorsal plate on tenth abdominal segment black. (See fig. 1.)

Larva of the last instar.—Length after molting 9 to 11 mm. Most apparent difference between this and preceding instars: head whitish yellow; body lemon yellow; spines absent. Only parts remaining dark colored are the black ocellaria and the brown tips of the mandibles and larvapods. The glossae and paraglossae are fused, with an opening in the center. The mandibles are non-functional and do not meet. Legs and larvapods functional until after cell is made.

After forming the pupal cell the larva gradually shortens and goes into the typical prepupal stage.

Pupa.—Length, 5 to 7 mm.; greatest breadth, 2.5 mm. Color, pale yellow. (See fig. 2.)

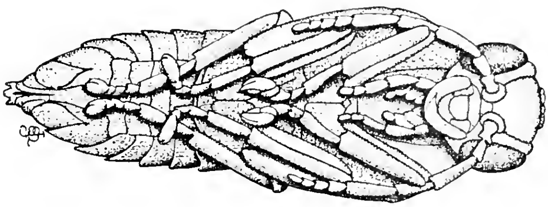


Figure 2. Pupa of grapevine sawfly.

Adult.—The original description of the adult, as *Tenthredo pygmaeus* by Say[8], is as follows:

"Black; thorax rufus before; feet white. Inhabits United States.

"Body polished; hypostoma obscure whitish; thorax anterior segment rufus, collar dusty; wings dusky; feet white; thighs blackish in the middle behind; posterior tibiae and tarsi black.

"Length ♂ one-fifth of an inch, ♀ rather more."

Explanation of Plate VIII.

Grapevine sawfly. (1) Feeding injury by larvae of first instar, showing characteristic curling of leaves; (2) pupa in pupal cell; (3) large larvae feeding gregariously.

[8] Complete writings of Thomas Say edited by J. L. LeConte, 1859, p. 213.

The Cicindelidae (Coleoptera) at Kartabo, Bartica District, British Guiana.

By Samuel H. Williams, University of Pittsburgh.

In point of individuals, the tiger beetles are numerous at Kartabo. Many of the woodland forms frequent the plants and are seldom taken on the ground. This may be accounted for by the fact that the density of the jungle roof prevents the admission of much light to the substratum while many of the leaves are illuminated by the rays of sunlight that trickle through the mass of foliage.

Of the eight species of Cicindelidae found at Kartabo, several are active at night. Among these are *Odontochila luridipes* Dejean, *O. cayennensis* Fab., *Tetracha affinis* Dejean, and *Aniara sepulchralis* Fab. I have also taken *Tetracha sobrina* subspecies *globosicollis* Horn, along the trails of the Coushi ants at night. In fact, this species inhabits these trails even when there are ant processions in both directions although no evidence of interrelationships could be detected.

Of all the species mentioned in this list *T. sobrina* subsp. *globosciollis* Horn, seems to be least common. Its resemblance to *T. affinis* caused me to overlook it for a time and it was placed among the latter species in the collection. However, on later examination, it proved to be a different form and I was unable to properly place it. While in Germany I submitted it to Dr. Horn at the Entomologisches Museum in Berlin-Dahlem and he informed me of its identity. Dr. Horn stated that he had originally described the species from male specimens and the females from Kartabo were the first he had received.

Cicindela argentata Fab., was taken from the tops of giant Mora trees which were examined immediately after they had fallen and remains of this species were also found in epiphytic plants more than one hundred feet above the ground.

The following list represents the Cicindelidae in the collection of the New York Zoological Society and in my personal collection. Through the kindness of Dr. William Beebe I was permitted to use the Society's collection. Specimens of all species were found in both collections and all were taken in the region of the Tropical Research Station operated for several years by the New York Zoological Society and later by the University of Pittsburgh. Kartabo, where the Station is located, is situated on the southern shore of the Cuyuni River near its junction with the Mazaruni River, more than sixty miles in the jungle.

The Zoological Society's collection was made at random and some specimens date back to 1921, while those in my personal collection were taken from June to October, 1925, and from July to October, 1927. It is interesting to note that I collected all species on both occasions. The list of species is as follows:

ODONTOCHILA *lacordairei* Gory. Ann. de la Soc. de France II, 1833, p. 172.

ODONTOCHILA MARGINEGUTTATA Dejean. "Species general des Coleopteres de la collection de M. le Comte Dejean" Paris 1825-31, page 24.

ODONTOCHILA LURIDIPES Dejean. 1. c. page 23.

ODONTOCHILA CAYENNENSIS Fab. Mantissa Insectorum I, 1787, page 187.

CICINDELA ARGENTATA Fab. Systema Eleutheratorium I, 1801, page 242.

ANIARA SEPULCHRALIS Fab. 1. c. page 233.

TETRACHA AFFINIS Dejean. 1. c. page 12.

TETRACHA SOBRINA subspecies GLOBOSICOLLIS Horn. Archiv für Naturgeschicte LXXIX, A11, 1913, page 5.

Of the above species *O. cayennensis* is the commonest.

The Hibernation of Uhleriola floralis Uhl. (Heteropt.: Lygaeidae).

During a recent collecting trip, March 23, to the foothills west of Fort Collins, several thousand lygaeids, *Uhleriola floralis* Uhl., were observed in hibernation. The insects were found massed together in three large clusters beneath a large rock on the south exposure of a sheltered bank. The clusters were several inches in diameter. These Hemiptera, formerly placed in the genus *Rhyparochromus*, are abundant during the summer months in certain localities in Colorado. I have observed them on a number of occasions in hibernation during the winter months, but never in such large numbers.

LESLIE B. DANIELS,
Colorado Agricultural College, Fort Collins, Colorado.

What Constitutes a Good Original Description.

By J. D. Gunder, Pasadena, California.

(Plate IX.)

I have written to a number of well known entomologists around the country, each of whom specializes in a particular or different order of insects and who, for the most part, have done a great deal of descriptive work.[1] I have tried to get their general ideas upon the question of, "What constitutes a good original description?" This subject, as put, was very broad, I admit, and left room for plenty of comment and suggestion. In the latter portion of this article, I have ventured to quote from a number of the replies received and from other sources of information. It was most interesting to note that practically everyone considered their own original descriptions "about as unideal as the average." This unsophisticated mental attitude and modesty of conclusion on the part of American workers is a good sign. It shows an open mind, susceptible of individual improvement, if improvement can be made, and yet does not imply an urgent need of such, but rather infers a broad hope of future advancement in the art of letting the other fellow know just what the new "bug" is like.

The ideal original description will never be one which is wholly in script, for it is next to impossible to convey to the majority or even to some specicalists, the desired or paratypical mental reproduction of a complex insect. Illustration is needed in conjunction with the written word, as a help toward a more clear and *rapid* communication of details, especially photographic reproduction or comprehensible drawings. This statement is not offered as a new suggestion for it has been discussed many, many times before; but each time, seemingly, there is more weight in its favor. Of course circumstances will decide as to when illustration or part illustration is advisable (see text elsewhere); but just the same, it must be borne in mind by all entomological authors that we are now living in what may be termed the beginning of a pictorializing era. Peo-

[1] In the insect orders of Coleoptera, Diptera, Hemiptera, Hymenoptera, Lepidoptera, Neuroptera, Odonata, Orthoptera, etc.

ple prefer to understand *via the graphic method.* This is exemplified by the movies, pictorial advertising, visible radio, picture telegraphy, etc. This modernistic manner of mental perception is undoubtedly quicker and more satisfactory. It is time, principally, and space which count nowadays and the busy specialist has come to consider superfluity of text as stupid, even unethical. He knows that the excess text matter now used in some wordy description would have been better replaced by a neat halftone or figure of some kind. One entomologist answered my query, in similarity with others, thus: "When I see new descriptions with good illustrations, I am tickled; I know just where I am at. To me, a picture saves reading half the text, which I can read anytime later, if I have to." One little angle of the situation which every describer of a new insect should think over and bear in mind is that—*it used to be* the reader who was considered stupid, if he could not understand, but now, it is apt to be the dilatory author who has to share this reputation, if his descriptions are not made comprehensible when known latter day devices to make them so are at hand.

I have come to the conclusion that doubtful descriptions may be laid to the doors of three kinds of authors, as follows:

FIRST: To those energetic beginners who haven't assembled much material as yet and who are unfortunate in being near antiquated collections which are in charge of "very busy" superiors working in other groups. There is plenty of hope for this coming generation and if they can only be encouraged to keep their specimens until they have a good collection, they will by that time know the right parties who will gladly help them. By a good collection, I mean an ample *specialized* collection, nothing less. A mixed general collection in any order gets the student no where, in this age of restricted endeavor.

SECOND: To those well known "Jacks of all Orders" who publish much at home as well as abroad and who are the bane of a specialist's life. No hope for these old boys—only a superficial reputation. They keep the abstractors busy as well as the synonymical check listers.

THIRD: To those "forgetful describers", who like myself, unintentionally leave out something of importance now and then. Everybody is in this class and there are no exceptions, if that is any consolation. Further, no excuse can be offered, for there is none. We only improve by recognizing our own faults. Let us try to know them, therefore!

On the accompanying plate, I have attempted to chart out a few important details which if disregarded constitute incomplete original description. There are undoubtedly many points not mentioned. The late Dr. H. G. Dyar recently wrote to me, "It is impossible to draw up a model description. That would do more harm than good. A poor student will muddle his description regardless of standards and an astute student will only be handicapped by a set form." Therefore, I believe that a recitation of a number of definite points to be observed by an author is better than attempting to work out a model or to write generalizations such as are usually offered.

I wish to thank the several specialists whose opinions, in brief, follow. Would that I had more space to devote to these.

A. Use standard American entomological journals. "Academically, it is better, of course, that American insects be published in American entomological publications. — C. W. Stiles." The use of foreign journals spells unavailability to the average reader. "Avoid publishing new descriptions in semi-private and one-man-edited sheets because the validity of these so-called publications is frowned upon by the Commission and new names may be rejected later as considered unpublished.— C. W. Stiles." Also it is better to publish in pure entomological journals in preference to those mixed bulletins featuring in part botany, astronomy, etc. These journals are too broad in scope to *always* reach the desired clientele of interested specialists or entomological libraries. Also for your protection, use only those journals which state "date of mailing." Prefer standard journals like the Entomological News, Canadian Entomologist and the Pan-Pacific Entomologist; they will be only too glad to enlarge and take care of all good text matter. This last statement is suggested for independent workers.

B. Write your editor a legible manuscript. "Editors, as well as printers, waste valuable time trying to decipher poor long-hand, and in correcting errors in spelling and grammar. We wonder sometimes if authors can read their own sentences. The use of a typewriter is recommended.—P. P. CALVERT."

C. Ask for author's "separates" and later distribute them. Use "extras" and save wear and tear on the bound volume. Don't let your friends have to ask for these things! You get them free, so return the courtesy.

D. Correct proofs carefully and return same promptly. Many errors have been avoided by proof reading. Never pigeonhole a proof which is marked—"return at once."

E. Join a bracketed subtitle to paper's title. For example—"New Nymphalidae (Lepid.: Rhopalocera)" or "New Butterflies (Lepid.: Nymphalidae)"; Nymphalidae being the family name. "It is very important that cataloguers and abstractors of entomological papers know the families to which the article refers; merely Heterocera or Rhopalocera, for example, is not enough.—P. P. CALVERT." This is a phase of title construction which authors frequently overlook. Every descriptive heading of importance should be bracketed in order to make yearly indexing more convenient and accurate.

F. Affix your address as well as your name under title. Sometimes readers wish to get in touch with authors and if the address is missing, the task is made more difficult. Anonymous articles or those signed with initials or by a "nom de plume" should never be submitted, much less accepted.

G. Latinize new names according to the Code. It is not good style any longer to write descriptions wholly or in part in Latin; however, it is better for science that Latin names, especially Latin terminations remain in use. "Write or print new names in bold face type.—E. T. CRESSON, JR."

H. Follow "new" or "nov" with a definable classification term. Forget the word "variety"; never use it in connection with new or nov. (see classification scale in November, 1927, Ent. News). Remember that "a form" is always found with, or is a part of, a species or a race; therefore to refer collectively to several species or to several races as "those forms" is bad entomological grammar, because it is the same as calling either species or race, a form. I noticed in the December issue of a journal recently that the word "form" was used eighty-two times by actual count and with various and different meanings! Moral: Don't abuse a good classification term by using it promiscuously and indiscriminately. Call a horse, a horse.

I. Illustrate more often by photographs or drawings. In all orders there are certain families which are considered difficult of identification. In Lepidoptera, for example, the genus *Euphydryas* of the Family *Nymphalidae* especially requires illustration at time of original description; otherwise the validity of the names "lie on ice" indefinitely, which is a selfish procedure and brands the author as a doubtful entomologist. It holds the name for him, but what a taxonomic farce! Isn't it about time to individually improve this situation? "The value of new names in original description will undoubtedly be increased if authors will accompany their text with phenomenally accurate illustrations or figures. Careful and accurately labeled illustrations are an enormous aid.—L. O. HOWARD." "The object of description is to convey by means of words or illustration, a direct picture of the object.—S. A. ROHWER." "The description should stand as a substitute for the object itself . . . . this ideal may be regarded as impossible on the basis of words alone. There remains but one way by which this ideal may be approached, and that is by means of some sort of pictorial or graphic representation.—G. F. FERRIS." "My idea is that a new species should be accompanied by . . . . figures of at least the parts used for diagnosis.—CHAS. W. LENG." "I believe that original descriptions should *always* be accompanied by figures illustrating the principal characters.—E. M. WALKER." "A good figure is better than pages of description.—W. J. HOLLAND."

J. Describe fully at first proposal of any new name. Today in Europe they are still troubled with authors who write all about a summer's vacation and some where in their sentences stick in a new name with a line or two of text, then *later* publish an illustration and perhaps a *real* description of it. Fortunately, we have no such work (or lack of work) in America. However, we do have some brief descriptions which are essentially diagnostic and which require the reader to have a key or a full description of the related species to know what the new one may be like. I believe, as a general policy, unless the specimens described represent a race or a form, that this character of description should be discouraged. There should be a happy medium. "The first essential for a proper description, I think, is that it should be complete within itself, so far as specific characters go.—A. N. CAUDELL." "Personally, I like to begin a description with a few of the most striking or salient features . . . . following these general statements with a systematic and pretty complete description of the insect . . . . (avoiding generic characters as much as possible) . . . . following this with a comparative review of neighboring species . . . . In this way the difficulty of a purely differential description is avoided.—H. T. FERNALD." "Even the absence of certain peculiarities should be expressly mentioned.—J. BEQUAERT." "I have come across some descriptions which lack everything but words.—E. T. CRESSON, JR."

K. Describe comparatively, specifically, coordinately and less generically. "A purely differential description, comparing one species to another, is useless unless you *have* the other species and *know* it to be the other.—H. T. FERNALD." "Careful comparison with the nearest allied species, I consider of paramount importance.—E. M. WALKER." "Clearness and conciseness are the first requisites of a good description.—J. G. NEEDHAM." "In the presentation of a specific classification, all data should be arranged in some logical and orderly fashion.—G. F. FERRIS."

L. Note primary sexual differences as well as secondary. "Pay careful attention to secondary sexual characters, if such exist . . . . primary characters are often very helpful.—H. C. FALL." "The genitalia may be all important in a final diagnosis.—E. M. WALKER."

M. Avoid informal "common names" of insects in a formal description. Common names are coined only for the use of laymen and tyros.

N. Use new-born structural terms elsewhere first. New terms, which are original with the author or which have not been previously defined, should not be used in original description.

O. Abbreviate less, especially when misunderstanding may result. For instance, a type locality given as—"Y. N. P." may mean Yosemite National Park in California or Yellowstone National Park in Wyoming. "I also wish to protest aginst the use of abbreviations, which tend to become a serious menace.—J. BEQUAERT."

P. Standardize color names according to Ridgway. To say yellow, for example, is indefinite because yellow is a fundamental color and there are many hues for each of the six distinct colors of the solar spectrum. Dr. Robert Ridgway of the United States National Museum is undoubtedly one of the best authorities on color nomenclature. "Personally I have used Ridgway's latest since it has appeared from the press.—J. A. G. REHN."

Q. Add authorship when mentioning other named insects. To add authorship following a name is to save the reader's time in looking it up; besides it is according to the Code and also an ethical courtesy due.

R. Assemble all "data" or details as a unit following description. I have in mind a paper containing a series of descriptions in which the disposition of the type material was hidden in adjoining text and quite separate from the descriptions themselves. Considerable time was wasted in trying to find this important information. "In the notes following the description and not in the body of the description itself, the type locality . . . . etc., should be given.—W. S. BLATCHLEY."

S. Mention probable "check list" position of new name. Makers of catalogues and check lists would probably appreciate any references, right or wrong, in this regard. By expressing your idea first, it would safeguard your knowledge or intention as to where the name should be inserted. "It is helpful to state the probable relationship in the genus. — J. A. COMSTOCK."

T. Designate holotype, next allotype, finally paratypes.

"All type material should be carefully listed.— J. M. ALDRICH." "A series (if possible) of specimens should be available from which a typical male should be designated, the holotype, and a typical female, the allotype. If possible, a good series of specimens should be set aside and consecutively numbered—Paratype 1, 2, 3, etc.—J. A. COMSTOCK."

U. Always give sexes of types, if known. Older collectors evidently could not determine sex or thought sex reference unnecessary, but this is hardly an excuse in regard to modern research. "Some descriptions lack a full account of the types. —J. M. ALDRICH."

V. Give accurate type measurements, plus known averages. "Measurements may be misleading, if only the extremes are given. Either the mean of a number of measurements of an average individual should be given, as well as the extremes I know I have not followed this rule consistently myself, but I believe it should be adopted.—E. M. WALKER." "List a definite set of comparative dimensions instead of merely 'broader than long' or 'third joint longer than second'. A micrometer grating in a low power microscope eye-piece will give fixed and definite standards, so that length and breadth can be stated as '25 to 21' or 'third joint to second, 23 to 17'.—J. A. G. REHN."

W. Invariably state explicit type locality with definite dates. Merely giving the month of capture without the date in that month or year is unsatisfactory information in the extreme. Field collectors, please take notice! "It is needless to emphasize the importance of exact locality data . . . . particularly in mountainous regions.—E. M. WALKER." "I have found the average entomologist to be rather weak on geography . . . . For a clear comprehension of distributional and evolutionary problems, a vigorous effort should be made to include all available locality data.—J. A. G. REHN."

X. Mention original collector's name. "The collector's name should be included as a matter of polite recognition and source of material information to others.—J. A. COMSTOCK."

Y. Specify disposition of types and paratypes. "The disposition of type material is very necessary.—A. N. CAUDELL."

"The real basis of conception, namely the holotype, must be consulted anew from time to time.—W. L. McAtee."

Z. Include, as known, food plant, host, life history, notes, etc. "The addition of biological notes and general remarks about the species is often helpful.—A. N. Caudell." "All good descriptions should include distributional notes, seasonal occurrence, habits, etc., where known.—J. A. G. Rehn."

In conclusion the writer understands, of course, that the above twenty-six suggestions try to cover a very broad entomological field. They need not necessarily be applicable to other fields, for in other groups of organisms different systems of description and publication may be required. Corrections, comments and discussion upon the subject of "What constitutes a good original description" will be welcomed.

Correction.

In an article, entitled "The development and present status of entomological courses in American colleges and universities", published in the December, 1928 issue of the Journal of Economic Entomology, there occurred a number of errors which have been called to the author's attention.

The University of Pennsylvania was omitted entirely from the list, which institution should have received credit for four graduate and two undergraduate courses. The University of Minnesota should be credited with eighteen courses, of which six are in apiculture. The staff at Minnesota numbers 13. To the list of Canadian institutions should be added the University of Saskatchewan, University of Alberta, University of Manitoba, University of Western Ontario, and Manitoba Agricultural College.

The main purpose in publishing this paper was to serve as an introduction to two succeeding studies, nevertheless the omissions are regretted, and thanks are extended to those kind enough to write regarding them. A more complete paper on this subject was published by Professor Roger C. Smith, in the Kansas State Agricultural College Bulletin, Volume 12, Number 1. The total institutions covered in this publication number 153. The above mentioned embraces only ninety-nine, fifteen of which are not listed in the latter, bringing the grand total to 168. By putting the information of the two papers together a good idea of the present status and development can be obtained.—Paul Knight, University of Maryland.

New Species and Varieties of Platytylellus from North America (Hemiptera: Miridae).*

By Harry H. Knight, Ames, Iowa.

Platytylellus nigripilus n. sp.

Runs in my key (Hem. Conn., 1923, p. 552) to the couplet with *borealis* Kngt., but differs from this species in color and pubescence; distinguished from *insignis* Say by the shorter second antennal segment which is barely equal (♂) or not equal (♀) to basal width of pronotum; also differs from both species in having stiff black hairs on the red areas of collar and pronotal disk. Differs from *eremicola* n. sp. in that antennal segment I is equal to width of vertex, and segment II is likewise longer.

♂. Length 6.2 mm., width 2.1 mm. Head: width 1.09 mm., vertex .58 mm. Rostrum, length 1.9 mm., only attaining base of hind coxae. Antennae: segment I, length .59 mm.; II, 1.83 mm.; III, (broken). Pronotum: length 1.05 mm., width at base 1.83 mm.

Dull black, base of head, collar, median line of disk, propleura, scutellum except basal angles, and venter except genital and eighth segment, red. Clothed with pale yellowish pubescence, dusky to black above, the dorsum interspersed with short, stiff black hairs, more noticeable on the collar and red median line of pronotal disk.

♀. Length 6.6 mm., width 2.7 mm. Head: width 1.18 mm., vertex .65 mm. Antennae: segment I, length .65 mm.; II, 1.95 mm.; III, 1.36 mm.; IV, .84 mm. Pronotum: length 1.24 mm., width at base 2.2 mm. Very similar in pubescence and coloration.

Holotype: ♂ August 14, 1917, Cranberry Lake, New York (C. J. Drake); author's collection. *Allotype*: July 21, 1920, type locality (C. J. Drake). *Paratypes*: ♀ July 7, base Mt. Washington, New Hampshire. 2♀, Aug. 17, Aug. 25, Slave Lake, Alberta (Owen Bryant).

Platytylellus eremicola n. sp.

Distinguished by the short antennae; segment I not equal to width of vertex, segment II much shorter than basal width of pronotum.

♂. Length 5.8 mm., width 2.4 mm. Head: width 1.18 mm., vertex .64 mm. Rostrum, length 2.1 mm., reaching to middle of hind coxae. Antennae: segment I, length .55 mm.; II, 1.72

* Contribution from the Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

mm.; III, 1.03 mm.; IV, .63 mm. Pronotum: length 1.14 mm., width at base 1.95 mm.

Dull black, collum, median point at base of vertex and at basal angles of eyes, collar above, dorsal half of propleura, median line of pronotal disk, scutellum except more or less on basal angles, dull red; sometimes with the collar and propleura median line of pronotal disk, scutellum except more or less on basal angles, dull red; sometimes with the collar and propleura black, and more rarely with median line of disk uniformly black. Clothed with fine, pale to black pubescence, interspersed with short stiff black hairs, more prominent on lateral margins of pronotum and hemelytra; pubescence pale over the red areas; surface coated with fine, pale to reddish, granular excretions.

♀. Length 6.1 mm., width 2.6 mm. Head: width 1.18 mm., vertex .67 mm. Antennae: segment I, length .62 mm.; II, 1.67 mm.; III, 1 mm.; IV, .65 mm. Pronotum: length 1.23 mm., width at base 2.1 mm. Very similar to the male in pubescence and coloration.

Holotype: ♂ August 7, 1927, Shoshone National Forest, WYOMING (H. H. Knight); author's collection. *Allotype*: same data as the type. *Paratypes*: 12 ♂ ♀, taken with the types by sweeping mixed herbaceous growth in an open glade. WYOMING—8 ♂ ♀ July 20-25, 1920, Yellowstone National Park (A. A. Nichol). COLORADO—♂ Aug. 12, 1925, Wolf Creek Pass (H. H. Knight). ♂ Aug. 1, Lizzard Hill; ♂ Aug. 1, 1900, Rices Spur (E. D. Ball). ♀ July 15, Ute Creek (L. Bruner). 14 ♂ ♀, "COLO." with various numbers (C. F. Baker). ♂ "COL." (Uhler coll.), probably represents the chirotype of Uhler's (1872) manuscript name *cremicola* (U. S. N. M.). IDAHO—♂ July 11, 1926, Big Meadows; ♂ July 10, 1926, Stanley (R. W. Haegele). MONTANA—♂ ♀ July 14, 1919, alt. 7500 ft., Gallatin Co. NEW MEXICO—♀ Aug. 15, 1900, Beaulah (T. D. A. Cockerell). ALBERTA—♂ July 23, 1928, alt. 6000 ft., Laggan; ♂ ♀ June 26, 1928, Kannanaskis (Owen Bryant). ♂ June 21, 1919, Edmonton (F. S.Carr).

This is the species to which Uhler gave the manuscript name *cremicola* but failed to publish a description. It has been taken chiefly at the higher altitudes in the Rocky Mountain region.

Platytylellus concisus n. sp.

Runs to *nigricollis* Reut. in my key (Hem. Conn., 1923, p. 551) in that antennal segment I is equal to twice the lateral width of an eye, but differs in the type of pubescence and coloration. Differs from *cremicola* n. sp. in the relatively longer antennal segments; segment II equal to basal width of the pronotum.

♀. Length 6.5 mm., width 2.5 mm. Head: width 1.33 mm., vertex .74 mm. Rostrum, length 2.3 mm., reaching to middle of hind coxae. Antennae: segment I, length .70 mm.; II, 2.03 mm.; III, 1.48 mm.; IV, 1.02 mm. Pronotum: length 1.2 mm., width at base 2.04 mm.

Dull black, base of head, margins of vertex bordering eyes, genae, gula, basal half of bucculae, collar, xyphus, propleura, ray between calli and extending to middle of disk, narrow median line of scutellum, sides of sternum, pleura, venter except last three segments and a triangular area on the sides of each segment below the spiracular line, red. Clothed with fine yellowish and blackish pubescence; dorsum with very fine, short, decurved pubescence; surface coated with very fine reddish, granular excretions.

Holotype: ♀ July 29, 1927, Deadwood, South Dakota (H. H. Knight); author's collection.

Platytylellus rubroscutellatus n. sp.

Suggestive of *persignandus* Dist., but differs at least in having the collar, pronotum, and sternum uniformly black.

♂. Length 5.6 mm., width 2.2 mm. Head: width 1.14 mm., vertex .59 mm. Rostrum, length 2.2 mm., attaining posterior margins of hind coxae. Antennae: segment I, length .50 mm.; II, 1.79 mm., cylindrical, equal in thickness to segment I; III, 1.21 mm.; IV, (broken). Pronotum: length 1.11 mm., width at base 1.78 mm.

Black, opaque, scutellum, base of head (collum) and venter except genital segment and distal margin of the eighth segment, red; basal angles of scutellum usually black. Clothed with black pubescent hairs, yellowish on red area of the venter; coated with fine, white granular excretions.

♀. Length 6.4 mm., width 2.7 mm. Head: width 1.21 mm., vertex .65 mm. Antennae: segment I, length .54 mm.; II, 1.66 mm.; III, 1.15 mm.; IV, .69 mm. Pronotum: length 1.3 mm., width at base 2.1 mm. Similar to the male in coloration, pubescence and granular coating; genital segments black, also the distal half of segments six and seven.

Holotype: ♂ August 1-15, 1916, alt. 6400 ft., Jemez Springs, New Mexico (John Woodgate); author's collection. *Allotype*: same data as the type. *Paratypes*: 3 ♂ 2 ♀, taken with the types. ♀ July 12, 2 ♂ July 15, 1915; ♂ July 7, ♂ July 30, 1919, type locality (J. Woodgate). 2 ♂ June 22, 1925, Ft.

Wingate, New Mexico. ARIZONA—2 ♂ June 1, 1926, alt. 6000 ft., Chiricahua Mts. (A. A. Nichol). ♂ Aug. 9, 1927, Yavapai Co. (R. H. Beamer). COLORADO—2 ♂ Aug. 7, 1925, Stonewall, near Trinidad (H. H. Knight).

PLATYTYLELLUS RUBROSCUTELLATUS **nigriscutis** n. var.

Similar to the typical *rubroscutellatus* except the scutellum is uniformly black; venter with red as in the typical form.

Type: ♂ July 12, 1915, Jemez Springs, NEW MEXICO (J. Woodgate): author's collection.

When a key is prepared for all the species this form will probably run to a separate couplet, hence the desirability of a varietal name.

PLATYTYLELLUS BIVITTIS **evittatus** n. var.

Perhaps only a variety of *bivittis* Stal, yet it may prove to be distinct. Distinguished from *bivittis* at least in color aspect; pronotum uniformly red without trace of vittae. Color suggestive of *atripennis* Reut., but the pronotum set with prominent, stiff black hairs.

♂. Length 6.6 mm., width 2.1 mm. Head: width 1.19 mm., vertex .64 mm. Rostrum, length 2.12 mm., reaching to base of hind coxae. Antenna: segment I, length .64 mm.; II, 1.98 mm.; III, 1.23 mm.; IV, .72 mm. Pronotum: length 1.24 mm., width at base 1.92 mm.

Color bright red, wings, antennae, frons, tylus, rostrum, mesosternum, legs, and genital segment, black. Pronotum and scutellum set with prominent, stiff black hairs.

Type: ♂, Beaver Valley, UTAH; author's collection.

PLATYTYLELLUS BOREALIS **notatus** n. var.

Structurally very similar to typical *borealis* Kngt., but differs in the median red vitta on pronotum and scutellum, also more broadly red on head and ventral surface.

♂. Length 6 mm., width 2.2 mm. Head: width 1.15 mm., vertex .61 mm. Antennae: segment I, length .65 mm.; II, 1.88 mm.; III, 1.36 mm.; IV, .89 mm. Pronotum: length 1.09 mm., width at base 1.77 mm.

Black, base of head, collar, propleura, median line of pronotum and scutellum, sides of thorax, and venter except the eighth and genital segments, red.

Type: ♂ August 8, 1920, Eddy Co., NORTH DAKOTA (T. H. Hubbell); author's collection.

The Identity of Aphis rubicola Oestlund and Aphis rubiphila Patch (Homop.: Aphididae).*

By J. D. Winter, University of Minnesota.

Aphis rubicola was described by Oestlund (1887) from specimens collected on the wild red raspberry in Minnesota and *Aphis rubiphila* was described by Patch (1914) from specimens collected on the same host plant in Maine. Both species are recorded as common on the raspberry.

A slide containing three alate viviparous *rubiphila* taken on black raspberry at Wooster, Ohio, was compared to *rubicola* in the Oestlund collection, including the type slide.

Measurements of the Ohio specimens were as follows: antenna, total length, 0.86-0.88, III 0.21, IV 0.13-0.19, V 0.14-0.16, VI 0.07-0.11+0.17-0.21; cornicles, 0.19-0.20; cauda, 0.13; body, 1.33-1.46; fore-wing, 2.15-2.30; width of stigma, 0.12-0.13. Corresponding measurements of three alate viviparous *rubicola* were: antenna, total length, 0.84-0.86, III 0.21-0.23, IV 0.13, V 0.14, VI 0.09-0.11+0.19-0.21; cornicles, 0.16; cauda, 0.11-0.12; body, 1.06-1.22; fore-wing, 1.91-1.98; width of stigma, 0.11-0.13. All specimens examined had 4 to 5 large circular sensoria in a row on III, mostly on distal two-thirds; the cornicles were cylindrical, not reaching tip of cauda; the cauda was conical, with many long hairs; the stigma was elongate, pointed and dusky.

The specimens from Ohio were slightly larger than the type *rubicola* but were within the variation in size found in collected material of *rubicola* in Minnesota. The slide of *rubiphila* was later submitted to Dr. Edith M. Patch to confirm the identification, this confirmation being obtained through the courtesy of Dr. Patch.

From the examination of this material the writer concludes that *Aphis rubicola* Oestlund and *Aphis rubiphila* Patch are identical and that this species should be known as *Aphis rubicola* Oestlund.

Published descriptions of *Cerosipha rubifolii* (Thomas) indicate a very close resemblance of this species to *Aphis rubicola*. Specimens were compared and no significant difference could be found except that *rubifolii* has only 5 antennal segments as described by Thomas (1879). The type slide of *rubifolii* undoubtedly is lost. Dr. C. W. Bennett states, in a letter to the

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writer, that *rubicola* usually will not satisfactorily live and reproduce on any variety of blackberry with which he has worked, while no difficulty is found in this respect with the common blackberry aphid. The blackberry aphid referred to by Bennett (1927) as *Aphis rubi* is undoubtedly *rubifolii* although no material is available for examination. Evidently *rubicola* and *rubifolii* are distinct species.

The writer is indebted to R. B. Wilcox for the slide of *rubiphila*, to Dr. T. L. Guyton for the slide of *rubifolii* and to Dr. O. W. Oestlund for the loan of slides of *rubicola*.

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Two New Wasps from North Carolina (Hym.: Cerceridae).

By C. S. BRIMLEY, Ent. Div. N. C. Dept. Agric., Raleigh, North Carolina.

Cerceris zobeide n. sp.

Black; face, base of mandibles, scape beneath, underside of flagel and its apical joint, two large narrowly separated spots on pronotum, tegulae, broad band on scutellum, postscutellum, large spot on each side of propodeum, broad even band on second abdominal segment, very narrow apical bands on segments 3-6, hind coxae, mid and hind trochanters, narrow tips of all femora, line on underside mid femora, base of hind femora, four front tibiae, underside and base of hind tibiae, and all tarsi, reddish yellow, the hind tarsi somewhat darkened above especially toward apex

Clypeus decidedly convex with three blunt, black teeth below; enclosure transversely striate on apical half, obliquely striate on sides at base. Length 9 mm.

In Banks' key to eastern Cerceris (Ann. Ent. Soc. Am. V. 12-15, 1912) this form runs to couplet 19 (males) but is distinguished from all the species to which that couplet leads by the broad reddish band on the scutellum.

Type, male, Raleigh, NORTH CAROLINA, July 28, 1928, C. S. Brimley, collector.

Cerceris zosma n. sp.

Black; large spot on each side of face, spot on base of mandibles, large spot on clypeal process not reaching tip or edges, line on underside of scape, postscutellum, broad band completely divided in middle on second abdominal segment, yellow; tegulae, faint markings at apex pronotum, tips of all femora, narrowest on hind pair, four anterior tibiae and tarsi, lower side and base of hind tibiae, reddish or reddish yellow; hind tarsi mostly dusky; wings slightly smoky, darker at tip, stigma yellow.

Clypeal process erect, about as long as broad, of even width, truncate at tip; enclosure wholly striato-rugose; punctuation moderately coarse, about as in *prominens*. Length 10 mm.

In Banks' key to eastern Cerceris, (females) runs to couplet 3, but can be distinguished from all the species under that couplet by the combination of a rugose enclosure with a wholly unmarked first abdominal segment and a broad but completely interrupted yellow band on the second.

Type, female, Raleigh, North Carolina, May 31, 1928, C. S. Brimley, collector.

The types of this and the preceding will be retained for the present in the Entomological Collections of the N. C. Department of Agriculture.

The E. H. Blackmore Collection of Lepidoptera.

The well-known Lepidopterist, Mr. E. H. Blackmore, of Victoria, British Columbia, died March 2, 1929, as noted in the News for May, page 136, with an accompanying portrait. He left a large and carefully mounted and labeled collection of British Columbia Lepidoptera. It contains roughly 180 named species of Butterflies in 900 specimens, 1100 species of Heterocera in 6500 specimens, of which the Micros probably constitute the most important half part. There are, besides these, some 42 named species of *Eupithesia* in about 200 specimens and a large number of unnamed specimens. The collection includes some thirty odd types and cotypes and will be a valuable asset to any museum, as a whole or in parts. His widow is anxious to dispose of it. Parties interested will please address Mrs. F. Blackmore, 2645 Work Street, Victoria, Br. Columbia, and it is suggested that they signify the price they are willing to give, as Mrs. Blackmore is not herself able to properly estimate the value of the collection.

August Busck, U. S. National Museum, Washington, D. C.

Air Routes, German Dirigible "Graf Zeppelin" and Plant Quarantines.

Speed and still more speed is the trend of modern transportation. With more and better roads in all parts of the world and with the increasing number of motors, the more rapid railroads and steamboats, all replacing the pack mules, oxcarts, camels, sailing vessels, slow steamers, etc. of yesterday, the most remote parts of the world are now but a few days' time from our ports. Needless to state, that with this rush against time there is a corresponding increase in the danger of new insect pests and plant diseases being shipped alive and virulent with such plants or plant products as may comprise the cargos, baggage or stores of these carriers.

Now these potential dangers are still more threatening with commercial and private airplane travel. Dr. J. H. Montgomery writes of such new airplane routes bringing new pests from Cuba and South America to Florida and the United States. ("Changed Conditions in Reference to Plant Quarantines", pages 196-204, Monthly Bulletin of the State Plant Board of Florida, XII (10) April 1928.) California has also expressed a fear of the introduction of new pests into that State and the United States via airplane routes from Mexico, Central America, etc. (See page 516, Report of the Bureau of Plant Quarantine and Pest Control; Monthly Bull. of the Dept. of Agric., State of California, XVII (9) Sept. 1928.) Mr. E. R. Sasscer referred to a weekly schedule of three passenger planes between Porto Rico and Haiti (Journal of Economic Entomology, Vol. 21, No. 3, June, 1928).

Still another air vehicle must be considered as a potential carrier of live insect pests and virulent plant diseases new to the United States, namely the dirigible or vessels lighter than air.

Toward dusk of October 15, 1928, the first foreign commercial passenger and cargo carrying dirigible, "Graf Zeppelin," threw a tow line toward the mooring mast at the U. S. Navy Air Station at Lakehurst, N. J. All the details such as inspections made by officials of the U. S. Public Health Service, Immigration Bureau, U. S. Customs and the Plant Quarantine and Control Administrator were undertaken in the same way as on a vessel arriving at an American port from any foreign port. How to treat or dispose of any dangerous fruit or vegetable in the stores of this vessel is an absolutely new problem, especially since these are actually landed on our territory. To destroy all such materials by burning at once would be the only solution. All such provisions on this first trip of the Graf

Zeppelin had been consumed before the vessel reached Lakehurst. On account of the storms encountered and the delays due to strong adverse winds the passengers and crew had been reduced to a diet of canned and preserved food. The cargo was carefully examined by an Inspector of the Plant Quarantine and Control Administration in cooperation with a Customs Examiner but no plants or plant products were found. No plant material was found in the passengers' baggage, but three passengers from Germany had each a bouquet of flowers, one of roses, another of chrysanthemums and still another of carnations. These were found in the passengers' quarters, the cuttings still green though beginning to wither. The first two bouquets were readily abandoned but the owner of the carnations claimed to have brought these to distribute as souvenirs of the flight to American friends and relatives. These, however, were finally abandoned.

Interceptions made from this material were as follows:

Insects	Plant Diseases
Myzus persicae Sulz.	*Heterosporium echinulatum* Berk.
Tritogenaphis sonchi Linn.	Sterile leaf spot, possibly *Septoria chrysanthemi*
Undetermined Aphid	*Sphaceloma rosarum*
Coccinae, possible *Lecanium corni* Bouche	
Thrips tabaci var *pulla*	
Typhlocyba rosae Linn.	
Eggs of sp. of Noctuidae	
Cocoon of Noctuidae	
Undetermined spider	

MAX KISLIUK, JR.,
Associate Plant Quarantine Inspector, Philadelphia, Pa.

Gillette Club Meeting.

On March 28, a banquet in the form of a "surprise party" was held for Dr. C. P. Gillette, in honor of his seventieth birthday, at the Armstrong Hotel. The party was held under the auspices of the Gillette Club, which is an entomological organization composed of students and co-workers of Dr. Gillette. A large number of members was present to celebrate the occasion. Dr. Gillette, in his years of service as Professor of Entomology and State Entomologist at Colorado Agricultural College, has endeared himself to many, and it was felt most fitting to express in this form, our regard for him. The club has planned to have a large oil painting made of Dr. Gillette, to be placed in the hall of the anticipated new science building.

LESLIE B. DANIELS,
Colorado Agricultural College, Fort Collins, Colorado.

List of the Titles of Periodicals and Serials Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annals of the Carnegie Museum. Pittsburgh, Pa.
4. Canadian Entomologist. London, Canada.
5. Pysche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Entomologische Zeitschrift. Frankfurt a. M., Germany.
15. Natural History, American Museum of Natural History. New York.
16. American Journal of Science. New Haven, Conn.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Internationale entomologische Zeitschrift. Guben, Germany.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
20. Societas entomologica. Stuttgart, Germany.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bollettino del Laboratorio di Zoologia generale e agraria della R. Scuola superiore d'Agricultura in Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
26. Entomologischer Anzeiger, hersg. Adolf Hoffmann. Wien, Austria.
27. Bolletino della Società Entomologica. Genova, Italy.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. The Maine Naturalist. Thornaston, Maine.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janiero. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles.
34. Zoologischer Anzeiger, hrsg. v. E. Korschelt. Leipzig.
35. The Annals of Applied Biology. Cambridge, England.
36. Transactions of the Entomological Society of London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chileña de historia natural. Valparaiso, Chile.
45. Zeitschrift für wissenschaftliche Insektenbiologie. Berlin.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
48. Wiener entomologische Zeitung. Wien, Austria.
49. Entomologische Mitteilungen. Berlin.
50. Proceedings of the U. S. National Museum. Washington, D. C.
51. Notulae entomologicae, ed. Soc. ent. helsingfors. Helsingfors, Finland.
52. Archiv für Naturgeschichte, hrsg. v. E. Strand. Berlin.

53. Quarterly Journal of Microscopical Science. London.
54. Annales de Parasitologie Humaine et Compareé. Paris.
55. Pan-Pacific Entomologist. San Francisco, Cal.
56. "Konowia". Zeit. für systematische Insektenkunde. Wien, Austria.
57. La Feuille des Naturalistes. Paris.
58. Entomologische Berichten. Nederlandsche ent. Ver. Amsterdam.
59. Encyclopédie entomologique, ed. P. Lechevalier. Paris.
60. Stettiner entomologische Zeitung. Stettin, Germany.
61. Proceedings of the California Academy of Sciences. San Francisco.
62. Bulletin of the American Museum of Natural History. New York.
63. Deutsche entomologische Zeitschrift "Iris". Berlin.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
66. Report of the Proceedings of the Entomological Meeting. Pusa, India.
67. University of California Publications, Entomology. Berkeley, Cal.
68. Science. New York.
69. Comptes rendus hebdoma. des séances de l'Académie des sciences. Paris.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
73. Quarterly Review of Biology. Baltimore, Maryland.
74. Sbornik entomolog. národniho musea v Praze. Prague, Czechoslavokia.
75. Annals and Magazine of Natural History. London.
76. The Scientific Monthly. New York.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
80. Lepidopterologische Rundschau, hrsg. Adolf Hoffmann. Wien.
81. Folia myrmecol. et termitol. hrsg. Anton Krausse. Bernau bei Berlin.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
85. Genetics. Princeton, New Jersey.
86. Zoologica, New York Zoological Society. New York.
87. Archiv für Entwicklungs mechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
96. La Cellule. Lierre, Belgium.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
99. Mélanges exotico-entomologiques, Par Maurice Pic. Moulins, France.
100. Bulletin Intern., Académie Polonaise des Sci. et des Lett. Cracovie, Poland.
101. Tijdschrift voor entomologie, Nederlandsche Entomol. Ver., Amsterdam.
102. Entomologiske Meddelelser, Entomologisk Forening, Copenhagen.
103. Journal of the Kansas Entomological Society, Lawrence, Kansas.

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

GENERAL.—Arribálzaga, F. L.—Biografía. [Rev. Soc. Ent. Argentina] 3 No. 6: 5-12, ill. **Aurivillius, O. C.**—In memoriam. [51] 8: 110-113. **Berger, J. F.**—Obituary. [64] 14: 13-15. **Brues, C. T.**—Present trends in systematic entomology. General discussion. [5] 36: 13-20. **Chapman, R. N.**—The potentialities of entomology. [68] 69: 413-418. **Cockerell, T. D. A.**—Insects flying to ships. [31] 123: 528. **deJoannis, J.**—Quelle importance faut-il attacher à l'examen des "types"? [Lambillionea] 29: 34-38. **Forbes, W. T. M.**—Present trends in systematic entomology. Scientific names. [5] 36: 21-27. **Herms, W. B.**—The experimental method as applied to entomological investigations. [12] 22: 45-61. **Ingles, L. G.**—The seasonal and associational distribution of the fauna of the upper Santa Ana River Wash. [13] 21: 1-48, ill., cont. **Johnson, C. W.**—Meeting place of the insects. [Nat. Mag.] 13: 333-335, ill. **Lutz, F. E.**—Experiments with "Wonder Creatures". [15] 1929: 160-168, ill. **Maack, C. J.**—Beifütterung von Jod an Raupen. [26] 9: 100-101. **Pic, M.**—De l'utilité des noms pour les variétés. [25] 1929: 80-82. **Reverdin, J. L.**—Obituary. [9] 62: 93-96. **Reverdin, J. L.**—Ein nachruf. [18] 23: 13-18. **Smith, R. C.**—The tray system for insect collections. [Trans. Kansas Acad. Sci.] 31: 77-80, ill. **Strand, E.**—Schach dem typenkult! [Ent. Nachricht.] 11: 61-63. **Thompson, W. R.**—On the relative value of parasites and predators in the biological control of insect pests. [22] 19: 343-350.

ANATOMY, PHYSIOLOGY, ETC. — **Davidson, J.** — On the occurrence of the parthenogenetic and sexual forms in Aphis rumicis with special reference to the influence of environmental factors. [35] 16: 104-134, ill. **Denis, J. R.**— Études sur l'anatomie de la tête de quelques Collemboles suivies de considérations sur la morphologie de la tête des insectes. [Arch. Zool. Exp. Gen., Paris] 68: 291pp., ill. **Faber, A.**—Die lautäusserungen der Orthopteren. (Lauterzeugung, lautabwandkung und deren biologische bedeutung sowie tonapparat der geradflügler.) vergleichende untersuchungen I. [46] (A). 13: 745-803, ill. **Fischel, W.**— Wachstum und häutung der spinnen. I. Mitteilung: Studien an retitelen spinnen. [94] 133: 441-469, ill. **Gadeau de Kerville, H.**—Action de différentes substances chimiques et de températures élevées sur les couleurs métalliques de quelques Coléopteres. [25] 1929: 73-76. **Handschin, E.**—Praktische einführung in die morphologie der insekten ein hilfsbuch für lehrer, studierende und entomophile. [Samml. Nat. Praktika] 16: 112pp., ill. **Jeschikov, J.**—Zur frage über die entstehung der vollkommenen verwandlung. [89] 50: 601-652. **Kästner, A.**—Bau und funktion der fächertracheen einiger spinnen. [46] (A) 13: 463-558, ill. **Keeler, C. E.**—Thelytoky in Scleroderma immigrans. [5] 36: 41-44, ill. **Martini & Achundow.**—Versuche über farbenanpassung bei Culiciden. [34] 81: 24-44, ill. **Masing, R.**—Die vererbung der quantitativen merkmale bei Drosophila melanogaster. [Trav. Soc. Nat. Leningrad] 58: 41-43. **McArthur, J. M.**—An experimental study of the functions of the different spiracles in certain Orthoptera. [42] 53: 117-128. **McIndoo, N. E.**—Tropisms and sense organs of Lepidoptera. [Smiths. Misc. Coll.] 81: 59pp., ill. **Mitrofanova, J.** —On the growth of the head in the larva of Anopheles maculipennis. [22] 19: 361-366, ill. **Muir, F.**—The tentorium of Hemiptera considered from the point of view of the recent work of Snodgrass. [8] 65: 86-88. **Pulikowsky, N.** Die respiratorischen anpassungserscheinungen bei den puppen der Simuluden. [46] 13: 655-664, ill. **Ripper, W.**—Die puppen der beiden knospenwickler. [64] 14: 18-21, 25-28, ill. **Roubaud, E.**—Caractére obligatoire de l'hibernation chez les reines de Vespides annuels. Consequences biologiques. [25] 1929: 83-84. ***Sacharov. P.**—

Contributions à l'étude de la transmission héréditaire de la forme du corps chez la Musca domestica, réduite sous l'influence d'inanition des larves. [Comptes Rendus, Acad. Sci. U. S. S. R.] 1928: 5. **Samtleben, B.**—Zur kenntnis der histologie und metamorphose des Mitteldarms der stechmückenlarven. [34] 81: 97-109, ill. **Saveliev, V.**—On the manifold effect of the gene vestigial in Drosophila melanogaster. [Trav. Soc. Nat. Leningrad] 58: 85-88. **Schwarz, I.**—Untersuchungen an mikrosporidien minierender schmetterlingsraupen, den "Symbionten" Portiers. [46] (A) 13: 665-705, ill. **Stegemann, F.**—Ist die insektenkutikula wirklich einheitlich gebaut? Untersuchungen an Cicindeliden. [89] 50: 571-580, ill. **Teodoro, G.**—Apparati di uncinamento negli omotteri ["Redia"] 16: 139-144, ill. **Thienemann, A.**—Chironomiden-metamorphosen. II. Die sectio Tanytarsus genuinus. [Archiv für Hydrobiologie, Stuttgart] 20: 93-119, ill. **Weber, H.**—Kopf und thorax von Psylla mali (Homoptera). Eine morphogenetische studie. [46] 14: 59-165, ill.

ARACHNIDA AND MYRIOPODA. — Chamberlin & Woodbury.—Notes on the spiders of Washington County, Utah. [95] 42: 131-141, ill. **Mello-Leitão.**—Oxyopideos do Brasil. [Rev. Mus. Paulista, Sao Paulo] 16: 491-536, ill. Mometideos do Brasil. [Rev. Mus. Paulista] 16: 539-568, ill. ***Mello-Leitão.**—Hersiliideos da America tropical [32] 4: 43-46. ***Mello-Leitão.**—Novas notas arachnologicas. (S). [32] 4: 49-54, ill. **Newcomer & Yothers.**—Biology of the European red mite in the Pacific Northwest. [U. S. Dept. Agric.] Tech. Bull. 89, 1929: 70pp., ill.

THE SMALLER ORDER OF INSECTS.—*Ewing, H. E.—Notes on the Siphonapteren genus Catallagia, including the description of a new species. [95] 42: 125-127. ***John, O.**—A new Frankliniella (Thysanoptera) from Brazil. [33] 68: 152-154, ill. ***Moulton, D.**—New California Thysanoptera. [55] 5: 125-136. **Pearman, J. V.**—Additional notes on psocid biology (Oviposition). [8] 65: 89-90. **Schoenemund, E.**—Ueber die larven der ephemeropterengattung Chitonophora. [48] 45: 158-163, ill.

ORTHOPTERA.—Arlington, L. C.—Cricket culture in China. [China Jour.] 10: 135-142, ill. ***Caudell, A. N.**—Cocconotus schunkei, new name [for C. similis Caudell] (Tettigoniidae: Pseudophyllinae). (S). [10] 31: 64. ***Hubbell, T. H.**—Two new species of Ceuthophilus from the southeastern United States. [39] 13: 8-20, ill. *Rehn, J. A. G.—Studies in Costa Rican Dermaptera and Orthoptera. Paper two. New genera and species of Acrididae. [1] 55: 9-77, ill.

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SPECIAL NOTICES.—Biological Abstracts.—Vol. 2. Nos. 6-8. This number contains over 500 abstracts of entomological titles. **Evolution** of the wing pattern in Palaearctic Satyridae by B. N. Schwanwitsch. [46] 13: 559-654, ill. [This paper will probably prove of interest to American students.]

OBITUARY.

An entomologist of world-wide reputation, Dr. HANS BRAUNS, M.D., died at Willowmore. Many discoveries bear his name. The Stellenbosch University conferred on him the honorary degree of Doctor of Science last year, and part of his collection was bought for the Pretoria Museum by the Union Government at a cost of several thousand pounds. Dr. Brauns was a corresponding member of many societies in various countries, and his death will be deplored by entomologists and collectors in general.—*The African World,* March 2, 1929.

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J. D. G.—1929

WHAT CONSTITUTES A GOOD ORIGINAL DESCRIPTION.—Gunder.

JULY, 1929

ENTOMOLOGICAL NEWS

Vol. XL No. 7

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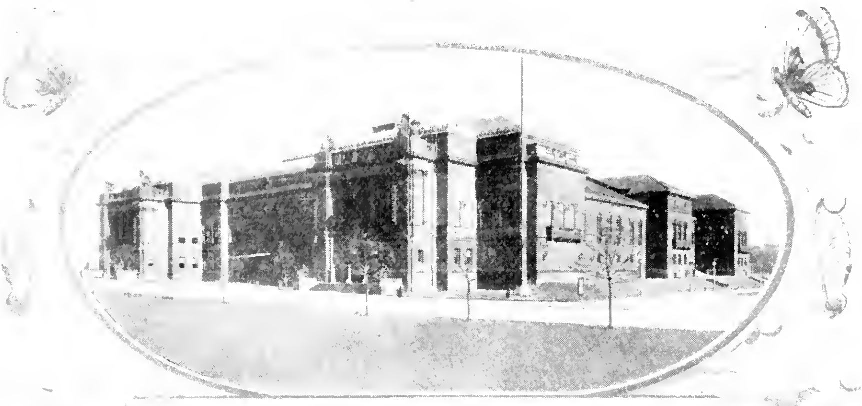


CARNEGIE MUSEUM, PITTSBURGH, PA.

DR. ANDREY AVINOFF DR. W. J. HOLLAND

ENTOMOLOGICAL NEWS

Vol. XL. JULY, 1929 No. 7

VI. The Carnegie Museum, Pittsburgh, Pennsylvania.

By. J. D. Gunder, Pasadena, California.

(Plates X, XI)

It has been truly said that none of the makers of great fortunes began their industrial careers closer to absolute zero than did Andrew Carnegie. Shortly after emigrating from Scotland with his parents to Allegheny, Pennsylvania, in 1848, he became their sole support at the age of fourteen, working first as an engine-room clerk and then as a telegraph boy in Pittsburgh. Through steady labor and sheer ability, he rose, step by step, to the superintendency of the Pennsylvania Railroad in 1860. Already a small capitalist, he foresaw about this time the possibility of iron and steel over wood, especially in bridge construction and therefore entered that business, introducing the Bessemer ore smelting process from England to America in 1868. As a result the Carnegie Steel Corporation was eventually founded and he became in the early '90s a world financier.

With the accumulation of vast wealth, Mr. Carnegie decided to retire and to consecrate the remainder of his life to public service; thereby returning, first to the people of Pittsburgh and then to Americans generally, what he had in personal profits drawn from them. As a youth he craved books and really made use of the knowledge obtained from the few which he could get hold of. He also knew by experience how difficult it was in the early days of the poor man to have access to good volumes, particularly to works upon technical subjects. Consequently the free public library idea was conceived and in 1895 the great Carnegie Library of Pittsburgh in Schenley Park was opened unreservedly to the public. Shortly afterwards he realized the need of building, in conjunction with this library, a museum for the Arts and Sciences; thus what is termed as a whole, the Carnegie Institute, came into being. The latest or more recently enlarged portion of this building was formally opened to the public in April, 1907. The total gifts from Mr. Carnegie to the Institute for all purposes amount to well over $36,000,000. It is his largest single foundation among his many and varied bequests. Mr. Carnegie had no special private hobby or zoological collection of any kind, though he was interested in paleontology and natural history at large. At one time, however, he personally bought and presented to Dr. Holland, a collection of Indian lepidoptera. Mr. Carnegie passed away at Lenox, Massachusetts, on August 11, 1919.

I believe that the Carnegie Museum is considered the most beautiful museum edifice, both inside and out, of any in America. Certainly the interior decorations are costly and in exquisite artistic taste. The Hall of Sculpture, for example, is beautiful in itself and leaves with the visitor a lasting impression of real architectural harmony and quiet grace of design. Some one has said that, "the walls of a museum should be to its contents what the frame is to a good picture"; certainly the generosity of the founder has made this ideal a reality.

In 1898 Dr. W. J. Holland became the first director, retiring as Director Emeritus in 1923 in favor of Dr. Douglas Stewart. Upon the lamented death of that gentleman some three years later, Dr. Andrey Avinoff was chosen to fill the vacancy. He is a man of great personal charm and culture and fortunately for entomology has always made that branch of science a favorite study. In Europe he had published many papers upon Lepidoptera, dealing especially with the *Parnassius* and *Eurymus* (Colias) groups. Quite recently several have appeared in co-authorship with Dr. Holland. I predict a continued and bright entomological future for the Carnegie Museum.

Dr. Avinoff was born February 14, 1884, at Tulchin in the province of Volynia. He belongs to one of the oldest families of the Russian nobility, his ancestors having played a distinguished part in Russian affairs as far back as the fourteenth century. Cape Avinoff on the coast of Alaska bears the name of his paternal grandfather. During boyhood his father, who was a Lieutenant-General in the Imperial Army, was for a time stationed at Tashkent, the capital of Russian Turkestan. Here young Andrey began to take an early interest in entomology and to collect butterflies and moths. Usually his summer vacations were passed amid the mountains of Tian-Shan. He was matriculated in the College of Law of Moscow in the year 1905. While pursuing legal studies, he never failed to devote himself whenever possible to the study of natural history and took a full course in botany and biology in that University. After graduation Dr. Avinoff was appointed a member of the Tribunal of the district of Poltawa, his duties corresponding to those of an Assistant District Attorney in the United States. In 1907 he was transferred to the staff of the Chancellory of the Senate in St. Petersburg and in 1909 was made Assistant-Secretary-General of the Senate in the Department of Administrative Control. His appointment as Gentleman-in-Waiting to the Czar came in 1911. Those duties related mostly to the ceremonious presentation of distinguished personages at the Court. Later he was elected Marshall of Nobility in the district of Poltawa where his mother's estates were located. In this capacity he was in charge of all local judicial, educational, and charitable institutions. The outbreak of the World War in 1914 found him at the front with the Red Cross, but a year later he was sent to the United States to purchase supplies, partly for the army and partly for the relief of the sick and wounded. When the Revolution occurred in 1917, he was again sent to this country and while here the Bolshevist coup-d'état took place. Realizing the hopelessness of returning to his native country Dr. Avinoff took the necessary steps and became an American citizen, working for sometime with the War Industries Board clearing up matters involved under the old regime. His first connection with the Carnegie Museum came in 1924 as associate curator of entomology.

Dr. Avinoff had one of the largest private collections of Lepidoptera in Europe. For example, there were represented about ten thousand specimens of *Parnassius* and an equal number of *Eurymus*, including many types and variations *Eurymus* *imperialis, Parnassius loxias,* etc. At the time of the Bolshevist revolution this material was all seized and "nationalized" by the new government. It is at present in the possession of the Leningrad Academy of Science. Unfortunately his great entomological library was destroyed when his country home was looted and burned to the ground. Beginning in about the year of 1906, Dr. Avinoff continually sent expeditions throughout Europe and Asia. He financed nearly forty collecting parties through all parts of arctic and temperate Asia. He, himself, in 1908, visited the Pamir district (Central Asia) as a naturalist, accompanied by a noted young hymenopterist. In 1912, he went to India and explored Kashmir, Little Thibet, traversed the Karakorum and entered Chinese Turkestan by way of Yarkand and Kashgan. The whole expedition was made in company with two companions, one a distinguished European entomologist, the other an ornithologist and mammalogist. Upon his return from this journey, Dr. Avinoff received the Gold Medal of the Imperial Geographic Society of Petrograd in recognition of his Asian zoogeographic researches. He was a member of the Entomological Society of St. Petersburg and still holds fellowships in the Societies of London, France and the Netherlands. His executive ability, his broad knowledge of science, as well as his fine attainments as a linguist, all coupled with his personal acquaintance with scientific men and institutions, both in Europe and America, make him a most competent leader to carry on the difficult tasks as head of this great Pittsburgh institution.

The entomological department of the Carnegie Museum came into being when the institution was established and occupies a rather large, well lighted and slightly L-shaped room on the third floor. A gallery over one portion gives access to a number of the cabinets which extend to the ceiling. All the insect drawers are of uniform size with neat looking drawer pulls and convenient contents signs. Dr. Holland has been Honorary Curator for many years. Dr. Hugo Kahl is curator and besides being an all-around entomologist, he specializes somewhat in Diptera and Odonata. Mr. Henry Klages, coleopterist, and Mr. Bernard Krautwurm, lepidopterist, are permanently employed as assistants. The following collections of lepidoptera of note are the property of the Museum:—those of A. V. Knyvett of Indian material, Henry Engel, H. A. Smith, Frank Kneehtel, H. L. Weber, J. A. Reis, A. J. Good, African, Steinbach and S. M. Klages from South America; Fred Marloff of local micro-lepidoptera; Krautwurm, Geo. A. Ehrman, both local and exotic, C. B. Antisdel and Dr. Holland's, especially African.

The B. P. Clark collection (Boston, Mass.) of world Sphingidae is gradually being transferred to the Museum as a permanent deposit. Mr. Clark wishes to retain actual ownership during the remainder of his lifetime. Some of this material is being held in Boston as a working basis. The well known W. H. Edwards' collection of North American Lepidoptera is still the property of Dr. Holland and is kept in the Museum in its original cabinets, which are about in the same condition of arrangement as Mr. Edwards left them in 1889. At sometime in the past, numbers of the specimens became molded and turned blackish therefrom, but luckily this condition has not affected any of the major types as far as I can find out. For the most part the type specimens have the word "type" written across the principal labels in red ink. Some lepidopterists visiting Pittsburgh are disappointed at finding only a relatively small proportion of United States and Canadian diurnal lepidoptera represented, but it must be remembered that Dr. Holland, though editing books upon American lepidoptera, has been for years specializing on exotic material, leaving the boreal American work to such students as Barnes, Skinner and others. The recently acquired Ehrman collection is general in scope, but unfortunately many of the specimens have never been in what would be called first class condition. Generally speaking, the Museum may be termed especially strong in equatorial African and Central and South American material and this is due entirely to Dr. Holland's energetic and persistent efforts in those directions. It is estimated that there are between four hundred and five hundred thousand mounted lepidoptera altogether in the Museum's collections.

Dr. Holland has very kindly given to me the following, especially written biographical sketch of his life and I am pleased to place it on record for the readers of the ENTOMOLOGICAL NEWS. His is a life full of action, romance and accomplishment.

"My father, Rev. Francis Raymond Holland, when I appeared upon the scene, August 16, 1848, was a Moravian missionary in Bethany, Jamaica. He was descended from one of the early settlers of Salem, North Carolina (now Winston-Salem). My mother, Augusta Eliza (Walle) Holland, was the only child of Jacob Wolle of Bethlehem, Pennsylvania, a well-known citizen of that town and long the President of its Council. On the maternal side I am descended from the earliest settlers of New England, Manhattan and Pennsylvania, whose names are not unknown and who acted well their parts in their day. Both my parents were highly respected and deeply interested in natural history. My mother's cousin was Dr. Thomas Horsfield, for fifty years the Director of the India Museum in London. He wrote extensively upon the fauna and flora of the East Indies. My father's father was an amateur botanist and a keen sportsman. His hobbies were the hybridization of cacti and apiculture. My father himself was a conchologist and botanist. My mother's father was the friend and correspondent of most of the American botanists of the last century, among them De Schweinitz, Short, Mead, Darlington, Sprague, and Asa Gray. He also corresponded and exchanged with many of the botanists of Europe, especially Grisebach, the author of the 'Flora of the British West Indies'. His herbarium has been deposited by me as a loan in the Museum.

Father's home in Jamaica seemed to be headquarters for naturalists and sooner or later lovers of nature found their way there. C. B. Adams, Professor of Zoloogy at Amherst College, lived for a long time with us while pursuing his studies on the Island. My mother told me he often rocked my cradle when I was an infant. Philip H. Gosse, the author of 'The Birds of Jamaica', was one of my father's friends and in his old age I myself corresponded with Mr. Gosse about butterflies and we made several exchanges. His son was Edmund Gosse, the poet and Librarian of the House of Lords whom I later learned to know in London.

On returning to the United States in the spring of the year 1851, my father was appointed the pastor of the Moravian Church at Dover, Ohio, and sometime later to a rural charge, known as the Sharon Church, near what is Tuscarawas, Ohio. He had brought back with him from Jamaica a large number of shells, plants and insects and these found a place in the manse. As a child I was permitted the examination of these collections and on rainy or snowy days I delighted to look them over and gradually came to know some of their Latin names. My mother taught me to draw and to paint and I still have among my papers a number of sketches of those Jamaican shells and butterflies which I drew from life before I entered my teens. Our life in the country charmed me. My father, whom I accompanied as he went his pastoral rounds, encouraged me to collect plants, the scientific names of which he gave me as he could. We explored together the woods and the fields about the home. I collected land shells on the hillsides and from the brooks the Unionidae, and gradually I became acquainted with the living things about me. Fish were abundant in the streams in those early days and one of my boyish triumphs, although I was not yet ten years old, was to capture a big Channel Catfish, weighing about twenty pounds and which I took upon an outline which I had set in the Tuscarawas River.

In the fall of 1858 my father was transferred to the pastorate of the Moravian Church at Salem, North Carolina, and I was sent for a time to a parochial school for boys. Later my education was committed to private tutors. All the spare time I could command was devoted to collecting birds, birds' nests and eggs and to fishing or shooting. My father taught me how to prepare bird-skins and to rear and mount insects. The back verandah of our house was covered in the summer and fall with breeding boxes in which I reared many lepidoptera. The librarian of the Salem College for Women was Mrs. Mary L. Denke, the widow of a distinguished missionary to the Indians. She had lived long in France and was a highly cultivated woman. Through her I was permitted the use of Wilson and Bonaparte's great work on the birds of America. I possessed myself of Say's 'American Entomology' and of whatever books relating to entomology I could lay my hands on at the time and from these I made fairly faithful water-color drawings of many of the illustrations. Being provided with a carpenter's bench and tools I learned to make my own insect boxes, a few of which I still possess.

About the time the Civil War broke out I was ready to take my examinations for entrance into college. My father thought of sending me to the University of North Carolina, but the war closed the doors of that institution, so I went on with my studies in the forenoons under a most capable tutor and the afternoons were given over either to sport or some natural history diversion. In the fall of 1863 the family came north by the 'Underground Route', a trip full of adventure for a boy, as well as for the adults. We arrived at Bethlehem, Pennsylvania, late in November, my grandfather having meanwhile died. We found our home under the roof of the old house in Bethlehem and I immediately entered the Moravian College to an advanced standing, for I had already mastered an elementary knowledge of Latin, Greek and mathematics. German and French were in a measure 'mother-tongues' to me, for from my earliest childhood I had been taught to use those languages. Mrs. Denke spoke French like a native, as she had been in early life the governess and companion of the daughters of Mr. Munroe of Paris and she insisted upon speaking French with me at all times, which was to my advantage.

I pass over the years spent at Bethlehem, but I might add that my Saturday afternoons and vacations were given over to drawing and painting in oil and water-colors under the tutelage of Gustav Grunewald, a celebrated German artist then living in America. I had completed my course in the Moravian College by June, 1867.

As I was too young after completing this college course at Bethlehem to think of entering the clerical calling, which my dear father insisted I should follow, he sent me to Amherst Colloge, where I matriculated in the middle of the Junior year in the class of 1869. The work I was called upon to do in Amherst, so far as the languages were concerned, laid no burden upon me whatever. I was excused from attendance

Best Wishes

to

DR. W. J. HOLLAND

on his eighty-first birthday

August 16, 1929

upon classes in German, but at Commencement I was required to give the 'German Oration' and I chose as my theme, Bismarck, who was then at the height of his glory. At Amherst I became deeply interested in chemistry, physics and geology; also taking a course in astronomy under Professor Esty. Dr. Edward Hitchcock gave me some practical instruction in paleontology. My greatest debt was to Professor Julius Seelye, who later became President of the College. He was a sort of second father to me and set me delving into the writings of Kant, Hegel and Fichte. My room-mate during my senior year was Neesima, the first Japanese educated in America. He taught me Japanese in return for assistance given him in the study of Greek. Later he played a great role in Japan, founding the Doshisha, the University of Kyoto. At the end of my senior year I was elected Principal of the Amherst High School (1869-70), and then became the Principal of the High School at Westborough, Massachusetts (1870-71).

In the fall of 1871 I entered Princeton Theological Seminary, at last giving away to my father's wishes that I take up preaching. I studied there for three years, devoting myself more particularly to Hebrew, Chaldee and Arabic. Writing in my eightieth year, I may say that my Arabic has largely evaporated, but that my Hebrew still abides with me in some strength!

By 1874 I had learned enough about religion to hold down the pastorship of the Bellefield Presbyterian Church in Pittsburgh. Fortunately, and as a relief from pure clergical work, I was almost immediately thereafter made a Trustee of the Pennsylvania College for Women. There, as an act of charity, I became the Professor of Ancient Languages, which position I held for sometime. I went to Europe in 1877 as a delegate to the Pan-Presbyterian Council held in Edinburgh. It gave me a chance to see and travel through some of the countries not before visited.

With my newly-wedded wife I again went to Europe in 1879 to attend a meeting of the Evangelical Alliance held at Basle, Switzerland. Later we made an extensive tour of the Continent.

About this time I again renewed my interest in natural history and resumed the collection of insects. I felt I needed diversion from the narrowness of the ministerial profession. Some of my young missionary acquaintances were going to Africa, Asia and South and Central America and they were induced by me to collect in those parts of the world. My collections grew rapidly and I kept adding to my entomological library. I soon discovered that I had accumulated quite a few species new to science evidently, so I began my first attempts at publication.

In 1887 I went to Japan as the Naturalist of the Eclipse Expedition sent out by our Navy Department and the National Academy of Sciences. Again in 1889 I went on a similar expedition to West Africa.

About this time I purchased from William H. Edwards his collection of butterflies of North America which he was on the point of selling to Europe. I agreed in exchange for the collection to pay all the expenses of producing the third volume of his celebrated work, 'The Butterflies of North America'. By this time my collections of exotic lepidoptera had grown by leaps and bounds. I had in my employment, Mr. Wm. Doherty, one of the ablest collectors who ever lived. He collected extensively for me in the Himalays, Burmah and elsewhere. I was his first patron. Long afterwards he died in East Africa while in the joint employment of Lord Rothschild and myself.

In 1891 I accepted the Chancellorship of the Western University of Pennsylvania (now the University of Pittsburgh). While there I taught anatomy and lectured upon zoology. Teaching was a 'relief' from my former duties. The following year, fortified with letters from the U. S. Commissioner of Education, I went to England, France and Germany to study their technical schools. I took with me at the time several thousand lepidoptera from Africa and spent about a month identifying these at the British Museum and at the museums in Paris and Berlin. The result of this trip was very gratifying as I made many good friends among the scientific men of those countries.

During all these years there had been a close friendship between Mr. Andrew Carnegie and myself and he often honored me by confidentially discussing with me his plans for the development of the cultural institutions which he wished to establish in Pittsburgh and elsewhere. Thus in 1898, though still the Chancellor of the University, I was elected Director of the new Carnegie Museum, the formulation of the plans for that institution having already for some years been largely entrusted to my care by my associates on the Board of Trustees because of my knowledge of such institutions in Europe and in America.

While carrying on paleontological investigations in the Rocky Mountains of Wyoming in 1899, I suffered an attack of appendicitis which nearly proved fatal. While slowly recovering, Mr. Carnegie persuaded me to give up the Chancellorship and devote my entire time to the Museum and to scientific research. This I did, but continued as a member of the Board of Trustees of the University, a position I still hold, being at the present writing, the senior member of that body. I should not forget to mention that about this time I devoted much study to a system of water purification for the City of Pittsburgh, making a couple of European trips to find out what they were doing over there. As a member of the Filtration Commission, plans were prepared and as a result the city is today practically free from the typhoid scourge. If I had done nothing else for Pittsburgh than this, I should be happy.

The *Butterfly Book* was published by me in 1898. I recognized the fact that there was no compendium of information about the general diurnal lepidoptera of North America in existence. I knew that the youth, as well as the scientific workers, would welcome such a volume. The plates were carefully made in Chicago and I dictated the text at odd moments. It was rapidly prepared. Nearly sixty thousand copies have been sold and I followed it with the *Moth Book* which I feel was equally well received. I have tried to popularize the study of lepidoptera in America and by editing a reasonably priced book, I believe I have helped along the cause. The *Butterfly*

Guide, a small condensed volume, has also caught the fancy of many budding amateurs.

Among the many entomological papers published in the past, the following may be worthy of note:

'The Diurnal Lepidoptera of Celebes', (Proc. Boston Soc. Nat. Hist., Vol XXV, 1900).

'The Lepidoptera of Buru', (Novitates Zoologicae, Vol. VII, 1900).

'New Genera and Species of African Lepidoptera', (articles in Psyche, 1893-94).

'A Preliminary Revision and Synonymic Catalog of Hesperiidae of Africa and Adjacent Islands, etc.', (Proc. of Zoological Soc., London, 1896).

'The Lepidoptera of the Congo', (Bull. Am. Mus. Nat. Hist., XLIII, 1920).

'Epipaschiinae of the Western Hemisphere', (Ann. Carn. Mus., XVI, 1925).

I have had the pleasure of writing numerous papers upon paleontology and have always taken a special interest in dinosaurs. Under my direction the Carnegie Museum has acquired one of the largest collections of these curious reptiles in existence.

Speaking of Museums again, I undertook in 1906 the task of organizing the American Association of Museums and succeeded. That body, which has continued a useful existence since its origin, will soon celebrate its twenty-fifth Anniversary.

During my long life, I have known personally every President of the United States since Grant (excepting Hoover) and most of the Presidents of the Republic of France. During the World War I served as Belgian Consul in Western Pennsylvania and had the pleasure of helping to entertain King Albert and his Queen on the occasion of their visit to Pittsburgh. Various degrees and honors have come to me in the past and I hope I am worthy of their bestowal. Several foreign governments have seen fit to present Orders for the work in paleontology and as an educator. I am particularly proud of the degree of D.D. received from my *alma mater*, of the degree of LL.D. from the St. Andrew University, Scotland, and the degree of L.H.D. bestowed in June, 1928, by the University which I have so long served. Perhaps the greatest honor I ever received was on my eightieth birthday, last year, when the hundreds of delegates to the Fourth International Entomological Congress made me by acclamation an Honorary Life Member of that and following Congresses. I appreciated that real token of esteem and especially as coming from those whom I had known for so long.

Personal hobbies? Well, in my youth I loved all outdoor sports and was a good swimmer. I was fond of horses and rode a great deal. In the last few years I like a good game of golf, but rarely get the chance to swing the clubs! I always enjoy a game of whist, but have grown rusty as a chess-player. Years ago in Japan I achieved quite a reputation over the chess board. They were fine players over there, too.

You ask me about my outstanding mental traits. It seems that nature has always endowed me with a good memory, not quite so good today perhaps as it used to be, but I still retain a reading knowledge of a number of the ancient languages and can remember where many lepidoptera species, for example, were figured and described. I am naturally of an active and industrious turn and the only thing that troubles me is lack of time in which to do the things I would like to do. My favorite motto since childhood has been: 'Get wisdom, get understanding!'; coupled with the other text: 'Whatsoever the hands find to do, do it with might!'."

The accompanying portrait-photo of Dr. Holland was taken March 18, 1929. He is shown sitting at his desk, busy as usual and looking over a sample butterfly proof plate which is one of several going into the new revised edition of *The Butterfly Book* shortly to appear. Who among us but does not envy "that grand old man of the Carnegie" who at 81 is as fit and as active as ever and who is an inspiration to us all? His name will ever live as the one who popularized the study of American lepidoptera.

All hail, dear old Dr. Holland!!

Some New Siphonaptera.

By Carroll Fox, Surgeon, United States Public Health Service.

Hectopsylla suarezi n. sp.

Near *H. stomis* Jordan 1925. Frons without angle, posterior margin of occiput without lateral lobe, ventral genal lobe and genal process close together, pygidium and anal tergite short.

We have a series of these fleas all ♀♀ collected by Dr. V. A. Suarez, Director General of Public Health, Ecuador.

Host: Guinea pigs (Cobaya), also taken from *Rattus norvegicus* and *Rattus rattus,* Quito, Ecuador.

Type: ♀, U. S. National Museum Collection. Cat. No. 41819.

Anomiopsyllus falsicalifornicus n. sp.

In April 1926, the writer described a flea in the Pan Pacific Entomologist Vol. 11, No. 4 as the male of *Anomiopsyllus californicus.* Recently Dr. Karl Jordan has had an opportunity to study these specimens and to compare them with the material in the Tring Museum.

He states as follows: "Among the specimens of *A. californicus,* from California, which you kindly gave me, there are two species: one agreeing with *nudatus* and being true *californicus,* and the other being the species you figured as *californicus.* This second species requires a name: * * * The female of this new species is different from our Californian female, which agrees with *nudatus,* as does the before-mentioned male from California."

Types ♂ U. S. National Museum Collection. Cat. No. 28921.

Ceratophyllus nepos **dieteri,** n. subsp.

♂ Immovable process of claspers narrow. ♀ Similar to *C. latens* Jordan 1925, sinus of VII sternite very narrow, head of spermatheca longer.

Host: *Lynx ruffus.* Los Angeles County, California.

Type: ♂, U. S. National Museum Collection. Cat. No. 41820.

Studies in Oxybeline Wasps (Sphecidae, Hymen.).

I. Enchemicrum, an Annectant between Belomicrus and Oxybelus.

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

ENCHEMICRUM gen. nov.

(ἔγχος, τὸ, spear + μικρός, small)

Head as wide as, or wider than, the thorax. Face moderately wide. Eyes reaching the bases of the mandibles, moderately divergent above and below, with dorsal and posterior facets smaller than anterior ventral ones. Ocelli arranged in a low isosceles triangle; posterior pair nearer the compound eyes than each other; an oblique impression between the lateral ocelli and the compound eyes. Mandibles acute at apex, with a blunt tooth at about the middle of the inner margin and, in the male, excised at the middle of the outer margin. Median area of clypeus more or less produced in the male. Antennae 13-jointed in the male, 12-jointed in the female, inserted just above the posterior margin of the clypeus and about as far from each other as they are from the eyes; flagellum short, joints, except the last, about as wide as long. Face more or less flat, with two smooth impressions on the lower half to accommodate the scapes when laid back. Temples wide above, rapidly narrowing below. Occipital carina wanting.

Thorax moderately stout. Pronotum short, linear, nearly level with the mesonotum, its anterior face vertical. Mesopleurum with a well defined epicnemium (prepectus) and without a distinct crest or ridge before the middle coxae. Scutellum and postscutellum without a median longitudinal carina. Postscutellum produced on the hind margin into membranous lamellae. Dorsum of propodeum with a small straight mucro or median process below which is a well defined enclosed median area.

Abdomen ovate, widest at second segment. First and second tergites subcarinate along the edge of the dorso-ventral fold, but not sharply flexed as in *Belomicrus;* sternites not flat. Tergites without lateral teeth in the ♂. Pygidial area defined in both sexes, triangular in the ♀, more or less trapezoidal in the ♂.

Wings: Stigma distinct. Forewing with radial cell broadly truncate at apex, and with distinct appendiculate cell; first cubital and first discoidal cells confluent, separated at most by a *vena spuria.*

Legs moderately spinose. Middle and hind tibiae with three rows of spines; middle tibiae with one spur apically. Middle coxae far apart and sunk into the sternum. Tarsal comb weakly developed in the ♀, quite rudimentary in the ♂. Last joint of tarsi moderately swollen; pulvillus large; claws unarmed.

Puncturation of body similar to *Belomicrus*, much finer than *Oxybelus*.

Genotype: Enchemicrum australe sp. nov.

Enchemicrum australe sp. nov.

♂. 4.5 mm. long. Black. Mandibles lemon yellow, apex red. Scapes yellow with a black line internally; flagellum black becoming rufous apically. Tarsi, anterior and middle tibiae, posterior tibiae externally, anterior and middle femora beneath, posterior femora at apex, pronotum with tubercles, and postscutellum stramineous. First and second abdominal tergites with broad yellow bands laterally, those of the first segment twice the size of the second; last two segments rufous. Tegulae, squamae, tip of mucro, and posterior margins of abdominal tergites and sternites subhyaline.

Front and clypeus clothed with short appressed silvery pubescence; thorax, abdomen and legs sparsely clothed with quite short silver hairs.

Head finely but distinctly punctured; occiput striato-punctate. Medially produced portion of clypeus tridentate; front slightly crested medially and with a shallow sulcus on each side parallel to the inner orbits of the compound eyes; anterior ocellus situated in a shallow fossa.

Thorax with puncturation similar to that of head. Pronotum transversely carinate anteriorly and with a median longitudinal sulcus. Mesonotum with a very fine double stria on the anterior two-fifths. Squamae linear, without lateral or terminal points. Epicnemium and mesepisterna carinate anteriorly; metapleura with oblique rugae. Mucro short, straight, scarcely exceeding the level of the squamae, canaliculate anteriorly and dorsally, apex acute. Propodeum with oblique rugae and reticulations above; median area wedge-shaped, shining within; lateral areas finely punctured and with a few transverse rugae; lateral faces shining, finely punctured and with very fine oblique striae.

Abdomen shining, with fine well separated punctures; without any indication of lateral spines; last tergite (pygidium) emarginate apically; sternites each with a low, rounded, polished ridge preapically.

Wings hyaline, nervures testaceous.

Legs with calcaria of hind tibiae at least three-fourths the length of the hind metatarsi.

♀. 5.4 mm. long. Differs from ♂ as follows: Scape of antennae yellow apically only; maculations of abdomen smaller; only last segment of abdomen rufous. Clypeus with a polished, impunctate bevel; truncate apically, lateral angles prominent, median area gently curved, anteriorly with a rounded protuberance. Mandibles not excised externally, at most shallowly sinuate.

Holotype.—♂, Tulsa, OKLAHOMA. July 18 (J. C. Bradley) [Cornell University, Type no. 944.1]. *Allotype.*—♀, Tulsa, OKLAHOMA. July 18 (J. C. Bradley) [Cornell University, Type no. 944.2]. *Paratypes:* OKLAHOMA—2 ♂ ♂, Tulsa, July 18 (J. C. B.) [C. U., no. 944.3-944.4]. LOUISIANA—1 ♀, Darrow, June 19 (Jos. Bequaert) [C. U., no. 944.6]; 2 ♂ ♂, Logansport, June 1 (J. C. B.) [C. U., no. 944.7-944.8]. TEXAS—1 ♀, Feodor, July 6 (Birkmann) [Academy of Natural Sciences of Philadelphia]; 1 ♂, Galveston, May 30 (J. C. B.) [C. U., no. 944.5]; 2 ♂ ♂, Richmond, Brazos River, June 22 (J. C. B.) [C. U., no. 944.9-944.10]. ARIZONA—1 ♂, San Suor (sic!), July 14 (J. C. B.) [C. U., no. 944.11]. ALABAMA—6 ♂ ♂, Burkville, June 10 (J. C. B.) [C. U., no. 944.12-944.17].

All specimens were apparently caught on low ground in the near vicinity of streams. The specimens from Burkville, Ala., and Richmond, Tex., have the maculations cyanided.

Enchemicrum is an annectant between *Belomicrus* Costa and *Oxybelus* Latr. Its affinities with Belomicrus are evidenced by the fine puncturation of the body, the armature of the postscutellum and propodeum, the impressed ocular-ocellar groove and the absence of a distinct crest or ridge on the mesepisterna before the middle coxae. Were it not for the well developed squamae and mucro, the presence of a well defined, enclosed median area on the propodeum and the tarsal comb, *australe* might be considered a New World representative of that interesting Æthiopian subgenus, *Brimocelus* Arnold.

Until further material is forthcoming, the following key will serve to separate the Nearctic genera of Oxybeline wasps:

1. Tergites 1-5 (and 6 in the ♂) abruptly flexed under at the sides, so that the ventral and dorsal portions of the

tergites form a sharp edge at their junction; the sternites are flat. Last tarsal joint not swollen. Appendiculate cell of the forewing, if present, very small, so that the radial cell appears lanceolate or acute at apex .... *Belomicrus* Costa.

Tergites not sharply flexed under at the sides; the sternites are convex. Last tarsal joint swollen. Appendiculate cell of the forewing wide so that the radial cell is truncate at apex .... (2)

2. Mesepisternum with a precoxal carina; scutellum and postscutellum longitudinally carinate in the middle; puncturation of body coarse .... *Oxybelus* Latreille.

Mesepisternum without a precoxal carina; scutellum and postscutellum not carinate; puncturation of body fine *Enchemicrum* Pate.

A Method for Rearing Mushroom Insects and Mites.*

By C. A. Thomas, Pennsylvania State College.

While conducting studies on the biology and control of insects and mites affecting cultivated mushrooms, it was necessary to rear large numbers of these pests. Various rearing methods were tried, including the use of soil in salve boxes, manure in vials, etc., but none was found more satisfactory than the following.

The insects and mites were obtained in as pure a culture as possible. They were then introduced in small numbers into fresh one-quart bottles of commercial mushroom spawn, and allowed to breed and develop. This spawn is made of chopped straw and manure thoroughly mixed, sterilized in an autoclave, and later inoculated with mushroom mycelium, grown from spores. With incubation at room temperature, the mycelium penetrates to the bottom of the bottles and completely fills the interstices of the medium. This spawn is thus pure-culture and is uncontaminated with molds.

It is very important that the flies and springtails to be reared should be free from mites, the hypopi of which are often carried on their bodies. Otherwise the mites may breed so rapidly as to destroy the mycelium and perhaps starve the insects.

*Publication authorized by the Director of the Pennsylvania Agricultural Experiment Station as Technical Paper No. 475.

Contamination with molds should also be prevented as much as possible.

These bottles of insect colonies should be kept in a somewhat humid atmosphere, as many species of Springtails cannot withstand drying of the cultures. After the cultures have been developing for awhile the insect excreta, as well as bacteria entering with the insects, will usually make the medium moist enough so that further additions of moisture are unnecessary. Tight cotton plugs are used in the bottle mouths.

Most of the rearing experiments were carried on at temperatures between 50 and 65 degrees Fahr., as these represent the usual temperature limits of the bearing mushroom houses.

The mushroom mycelium furnishes an excellent food for these mushroom pests, and they gradually eat it out, leaving the original straw-manure medium. Feeding begins at the top of the spawn, and as it progresses, the portion destroyed is sharply differentiated from the uneaten part. Eggs are laid and the stages develop right next to the glass, where they are easily observed with a binocular microscope. In studying the development of any particular eggs or groups of other stages, a circle is drawn around them on the glass with a wax pencil. They are thus readily referred to.

The following insects have been successfully reared in spawn bottles of this type:

DIPTERA: Sciaridae, Mycetophilidae.

Sciara coprophila Lintner.—det. by O. A. Johannsen.

Neosciara pauciseta Felt.—det. by Johannsen.

Many generations of these flies have been reared in these spawn bottles, one series for over one and one-half years in the same bottles. Three generations of a parasite of these flies were also reared. This parasite is a species of the Hymenopteron *Calliceras* (*Ceraphron*), near *ampla* Ashmead, as determined by Gahan, who says it is probably a new species.

DIPTERA: Cecidomyiidae. Small orange-colored flies of this family, the larvae of which were collected in mushroom caps and mushroom beds, have been reared successfully. These flies have not yet been identified.

COLLEMBOLA (Springtails)—These tiny insects are sometimes rather difficult to rear under experimental conditions, due to their susceptibility to dessication, but in these spawn bottles they thrive remarkably well, and large numbers of the following species have been reared.

Achorutes armatus Nic. Very large numbers of these tiny gray springtails are commonly found in manure piles and in mushroom houses. In the latter they sometimes do considerable damage by feeding on the mushroom caps and on the mycelium in the beds. They thrive in the spawn bottles but are quite susceptible to drying. Immense numbers of these springtails gather in the aisles of the mushroom houses where they form piles sometimes a foot in diameter and several inches deep, containing probably millions of individuals. It is presumed that these are breeding piles, although pairing has not actually been observed.

Proisotoma (Isotoma) minuta Tullb. Collected in soil. Usually breeds rapidly in spawn bottles.

Isotoma sp. Probably a new species, according to Dr. J. W. Folsom.

Lepidocyrtus cyaneus Tullb. This species breeds very readily in spawn bottles. It is usually common, sometimes abundant in mushroom houses, where it feeds on the mycelium in the beds. It can withstand somewhat dryer conditions than can some of the other springtails.

L. albus Pck. Breeds readily in spawn bottles. Collected from soil in cultivated field, Bustleton, Pa.

Sminthurus caecus Tullb. Breeds slowly in spawn bottles. This is a very interesting little white species, dotted with red. It was collected at Bustleton, Pa. Are there any other Pennsylvania records for this species?

ACARINA (Mites). There usually is no trouble in rearing Tyroglyphids and numerous other mites in the spawn bottles. In fact it is often difficult to obtain pure cultures of mushroom insects because of infestation by these pests. The chief species feeding on mushrooms and mycelium are Tyroglyphids, chiefly *Tyroglyphus lintneri* Osborn, another *Tyroglyphus* species and sometimes a species of *Histiostome* which feeds on the decaying tissues of injured or diseased mushrooms.

All of the above mites have been reared through many generations in the spawn bottles, and all stages, including the very interesting hypopi of the Tyroglyphids, have been found in the spawn. Abundance of moisture is no deterrent to the development of these mites as they may often be found partly submerged in the moist surface of the spawn medium.

From the notes given above it is evident that mushroom spawn forms an excellent medium for rearing and observing mushroom insects and mites. It is probable that other fungus insects could be reared in these bottles provided the moisture and other factors were regulated to suit the species. In order to make smaller cultures the spawn may be removed to smaller bottles or vials. However, it is necessary to avoid contamination with molds and with mites during this process.

Arachnara subcarnea Kell. (Lepidop.: Noctuidae) a Host of Masicera senilis Rond. (Dipt.: Tachinidae).

At Monroe, Michigan, during the summer of 1928, the author collected from a stalk of cat-tail (*Typha latifolia*) one specimen of *Arachnara subcarnea* Kell. in the larval stage, from which emerged two specimens of *Masicera senilis* Rond. both of them females. The parasites, feeding internally at time of collection, pupated externally some four days later, and emerged on August 21, having been reared under laboratory conditions (Temperature 80°F; Humidity 74%). The host was determined by the late Dr. H. G. Dyar and the parasite by Dr. J. M. Aldrich, both of the U. S. National Museum at Washington. *Masicera senilis* Rond. is an imported parasite of the European corn borer (*Pyrausta nubilalis* Hubn.) and has only recently been found identical with *Masicera myoidea* Desv., a native of this country.

It might be of interest to know that the base of the *Typha* stalk from which the host larva was dissected was submerged in water at a depth of approximately 18 inches. It was therefore necessary to insure a very moist condition while rearing the parasites.

A. C. Cole, Jr., Ohio State University.

Orphan Nests of Polistes (Hym.: Vespidae).

By Phil Rau, Kirkwood, Missouri.

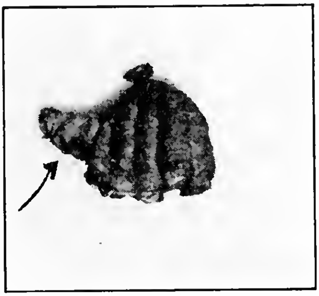
The nest known as 108 was an orphan nest of *P. pallipes* taken from Wickes, Mo., June 19, 1920. At that date it comprised eight closed cells. Just one week later I discovered, at 6 a. m., that three adults had emerged and were clinging to the nest. It had been on the table at the time of their emergence, and was now moved to a west window; after a few minutes one and then another flew away, the first taking a flight of orientation. The third one was faithful and remained on the nest.

There has been some doubt as to whether the young adults bite their way out, or whether others on the nest assist them in emerging. In this case, at least the first one must have bitten its own way out unaided.

The next morning, June 27, this one was still acting as queen. One other cell had been opened, but whether an adult had emerged and flown away, or whether the first had turned cannibal, I do not know. It was by this time evident that this one was acting queen; she assumed full charge of the nest, and, when I came too near, flew down promptly with defiant air, and stung me, then flew high into the air and dashed away. She had evidently explored the neighborhood, for she flew directly back after ten minutes. A little later a second one flew in and alighted on the nest, perhaps the one whose open cell had just been discovered. This now made two on the nest; the critical question arose, which was to be queen?

By July 4 there were on the nest three adults, two closed cells, and one full-grown larva about ready to spin its cap. There were also some small cells and thriving young larvae; this condition indicated that the workers had been faithful to duty. For the several days following, these three adults continued to assume the care of the nest. One of them was constantly on duty. One would bring in a ball of pulp, divide it in half and both or all would do the masticating preparatory to applying it to the walls. They gave much attention to strengthening the point of attachment to the wall. This nest was pinned to the wall; they entirely covered the pin with pulp, even that part above its entrance into the nest where the added material obviously was of no value. Some very effectual braces of paper pulp were built around the base of the pin to the woodwork. Even an additional thin petiole was inserted, connecting the nest with a projecting strip of wood only a quarter-inch away. Their activities in general seemed to be quite the same as though the wasps had emerged in normal homes with parents and sisters.

Besides this work of bracing up the nest, several of the unfinished cells were completed and three new ones added; the colors of the material showed clearly where the additions had been begun. On July 23, ten of these new cells contained eggs.



Polistes pallipes nest. Arrow indicates portion built by orphan workers.

Orphan wasps often add cells to the nest, not in a circle around those already existing, but to one side as seen in figure 1. The fact that they build cells without ever having been shown how to do the work, places this activity in the category of instinct. Yet the fact confronts us that these cells are all built at one side, whereas *pallipes* always places the cells in a circle with the petiole in the center. This digression from the usual form by the orphan workers leads one to suspect that while cell making is instinctive, the placing of the cells in symmetrical position is either learned or acquired by imitation.

The material for nest-building was all brought in from the outside, and not lazily obtained, as might be expected, by tearaway old parts of the nest to build new sections.

During this period, while I could not give them constant attention, I failed at any time to find the nest alone; one guard was always in attendance. A series of markings in paint were placed on these wasps on July 21, in order to determine whether or not it was always the same one, or whether more than one assumed the duties of queen or guard.

I suppose some of the earlier ones got lost; it was really surprising that they could find their way home. All their relatives and immediate ancestors had homes in sheds, less than ten feet above the ground; here these nests were pinned to a window sash on a third-floor window at more than three times their normal height, in a row of city houses which looked enough alike to confuse any person. Then there were three windows in a row, about three feet apart, yet the wasps learned to come not only to the abnormal height, but also to the right house and the right window of the series. At first they would often enter the wrong window, and sometimes even though they flew out again by the right one they would reenter the first wrong one, and so on. Thus at first they displayed great difficulty in locating their nest, but later they became very skillful at it.

Thus as the colony grew, these three orphan adults still had charge of the nest. They were marked, and the details of their conduct were recorded. The nest at this time comprised two sealed cells, six half-grown larvae and ten eggs.

At 9:05 a. m., "blue-dot" was manipulating a ball of food-pulp; at intervals she poked her head into the various cells of the larvae. At 9:22, she distributed the remainder of the ball, but the hungry larvae gulped it down so quickly that I could not see what it was.

At 9:15, "small-dot" flew out; at 9:17, "yellow-wing" flew away. Up to 11 o'clock neither of them had returned, but "blue-dot" never left the nest during that period.

At 11:15, "small-dot" returned, passed a ball of brownish material which proved to be food, to "blue-dot"; two hours she had spent in search of a mouthful. "Blue-dot" chewed and rolled the caterpillar in her jaws for three minutes, and then made the rounds of the cells, poking her head inside and leaving a bit of meat in each, as I could see by creeping up under the nest and peering into the mouths of the larvae. This was devoured with the eager haste that is characteristic of most young creatures. Meanwhile, "small-dot", the one which had brought it in, made her toilet, poked her head inquiringly into two of the cells, and flew away again at 11:22, presumably to fetch the remainder of her caterpillar. I watched closely for her, thinking that if she had noted the place, she could easily find it without being gone two hours this time. In just three minutes she returned with her load, but did not pass it to "blue-dot", whom I had begun to regard as provisional queen, but instead she walked nervously over the nest. By this time I had discovered that the material was after all not food but paper pulp; soon she found the unfinished cell and worked it in. A few seconds after "small-dot's" arrival with the load, "blue-dot" flew away, but when she returned empty-handed in five minutes, I realized that this was only a queenly flight for exercise and not for work. She returned before "small-dot" left, however, so as to be on guard.

Twelve-thirty arrived, and in all that time "yellow-wing" had not returned, excepting that once at about 10 o'clock she flew in at the window and right out again, without even stopping on the nest. She was then empty-handed.

At 12:35, "small-dot" returned with a large mass of green caterpillar-meat. This was chewed or malaxated in partnership for some time and then divided. "Small-dot" broke off about one-fourth of the piece, manipulated it and then fed it to the larvae, while queen "blue-dot" took the larger portion, worked it a longer time and disposed of it likewise. There were several larvae to be fed, and each received a small portion which it rapidly consumed. One that I watched closely actually disposed of its portion in three gulps. I think that during this kneading process, some of the food is swallowed by the workers, either accidentally or intentionally. I watched "small-dot" working up her small portion, which fed three larvae. She would manipulate it each time more before feeding it and during the process the mass grew smaller, so I suspected that she was swallowing some of it. The food may merely have been rendered more compact, but at least I am sure that in mere bulk the larvae would have gotten three times as much if she had not worked it thus so long in her jaws. The fore-feet hold the mass while the jaws work it, and after it is distributed, the process of cleaning the legs gives the worker some of the fragments which cling to the feet.

The toilet process is very complete; the hind legs clean the abdomen, and the two pairs of front legs and the pair of hind legs clean each other by rubbing and scraping one leg against another. The front legs also clean the head, eyes and face, while the mouth-parts clean the front legs also. If anyone wonders about the utility of the spines on the legs of Polistes, let him see this cleaning process, where one leg is passed under the spine of another in the cleaning, and their use is apparent.

Immediately after this "small-dot" left again and returned at 12:52 with another large piece of caterpillar. The process of malaxating and feeding was repeated, but this time it took only two minutes. Again she left. Only once did queen "blue-dot" leave the nest when the worker was absent, and then she was gone for only three minutes.

I was obliged to be absent until 6 p. m.; at that time I found "blue-dot" on the nest, as usual. At that time of day the nest, on the outside of the west window, was in the full glare of the sun. This wasp was ventilating the nest by standing on it with the body motionless and rapidly vibrating the wings, for many minutes at a time. At 6:58, "small-dot" returned with a large ball of green caterpillar, and the process of working and dividing it and feeding the young was repeated, and in addition the drinking of saliva, described elsewhere*. A drop of molasses placed on the nest was promptly cleaned up by "small-dot".

It seemed at that time that "yellow-wing" must have met with tragedy, for she did not return all day or at night. "Small-dot" also remained out all night July 25-26, and had not yet come back at 9 a. m., but at 11 p. m., when I returned, she was back on the nest.

On August 3 there were two new adults on the nest; queen "blue-dot" was still faithful. This nest was now established and in good working order, so I pinned nest 255 a few inches above it on August 6. On August 10, at midnight, an examination revealed that "blue-dot" had gone to this nest, and was holding and chewing in the darkness an immense ball of larva meat, which had evidently been taken from one of the cells. Two hours before she had not been on the nest. Further survey

*Psyche **35:** 153-156, 1928.

discovered "small-dot", also from the nest below (No. 108) on nest 260, which was pinned to the opposite window. Such marauding was really becoming alarming! Were these the acts of individuals under abnormal conditions, or were they instances of a common depredation which, under cover of darkness, had not been discovered? On August 12, 8 a. m., "blue-dot" was still on the nest, and at that time I also found two other marked adults from nest 108 there devouring the larvae, while the five others, one to two days old, on this nest did not show these cannibalistic tendencies. These five young showed a lively war spirit when I came close; they did not launch a direct attack, but stood erect, vibrated the wings and made much threatening commotion. The old queen took my visits coldly; I could almost poke my nose into one of the cells without agitating her. All of the workers had at this time deserted nest 108. Their action could not have been because they had naught to live for inasmuch as the cells still contained eight eggs, seven larvae and two pupae. During the next day, August 13, "blue-dot" was coming and going and apparently doing as she pleased on nest 255, while her old nest (108) was completely deserted.

Let us for the time shift our attention to a *P. variatus* nest, which now entered into the complications. In the story just finished I record the disappearance of "yellow-wing" from her nest, her last appearance there being the time when she casually passed by on the wing without stopping. A little later I discovered a *P. pallipes* female with the unmistakable yellow paint on her right wing, on this orphan nest of *P. variatus!* She stood on the nest, poked her head into the cells, and gave every indication of being mistress. From her mark and also from her species it was evident that she belonged elsewhere. I gave her half a *P. pallipes* larva; she took it and walked with it to the roof of the nest where she went through the usual work of squeezing out the inside portion. Three of the cells of this *P. variatus* nest contained one-fourth grown larvae, with no one to feed them, and I thought that her conduct indicated that she intended to nourish them. She carefully worked the meat for fifteen minutes, gathering the muscle tissue into a large neat ball and discarded the entrails, then she astonished me by taking up her burden and flying out of the north window, returned at the south window and began a diligent search—she was searching for her old nest! Once more she flew out of the window and came back, this time to the middle window, where she found her old nest 108 and handed over her load of provisions to one of the workers then present! She did not return again to the *P. variatus* nest, either to get the rest of her provender, or to enjoy the privilege of playing queen.

Such conduct is difficult to interpret. Some people would probably say that she merely got lost and thought this was her own nest. That seems unlikely in view of the fact that when she had a food ball to dispose of, she soon found her own. It is hard to say why she remained on this nest, apparently quite content, for several hours. One might say that she came to rob it of its larvae, but if that were true she had ample opportunity to do so, she was there alone and undisturbed for a sufficient length of time to act. I wonder if she could have been swayed by an impulse to want to start things anew, but like many of us she lacked the strength of purpose to carry it through.

Another nest of *P. variatus* was brought in from Wesco, Mo., on August 3, 1920. The nest comprised 44 sealed cells, 16 with larvae and 35 containing eggs, about a dozen adults had been routed and left behind. Two days later, August 5, three orphan adults emerged; one was a male! These wasps emerged while the nest was lying inverted on the table; it was then pinned to the inside of a wooden box, to afford it some protection from the intense sunshine. The wasps were then picked up with forceps and placed upon it, but the two workers walked away indifferently and escaped. The male lingered, but showed no purposeful interest in anything; rather, he appeared too stupid to do anything else.

(To be continued.)

Benacus griseus at Electric Light (Heterop.: Belostomatidae).

On Sunday, April 7, 1929, at 10.15 P.M., the giant water bug *Benacus griseus* (Say) was very abundant, flying about a very powerful electric light, some twenty feet high, at the corner of North Broadway and Gay Street, Baltimore, Maryland.—ROBERT M. STABLER, Zoological Laby., University of Penna., Philadelphia, Penna.

Notice to Contributors to the News.

As the Editor of the NEWS expects to be absent on a visit to Europe from July 10 to September 30, it is requested that all manuscripts, advertisements and other material for insertion in the NEWS be expressly addressed to ENTOMOLOGICAL NEWS, Zoological Laboratory, University of Pennsylvania, Philadelphia, Penna., and, as far as possible, sent well in advance of the earlier date named.

Corythucha decens Stal. in Pennsylvania (Heteropt.: Tingididae).

While collecting on the County line separating Philadelphia and Montgomery counties, I took a single specimen of *Corythucha decens* Stål. with my sweep-net on June 26th, 1927. *C. marmorata* Uhl. was very abundant and I did not notice the specimen of *decens* until I was mounting it. After making several more visits to the same locality I was unsuccessful in securing any more specimens. Due to the fact that there had been some confusion as to the occurrence of *C. decens* in the United States due to wrong determinations and also that it was confused with *C. marmorata* before, I sent the specimen to Dr. Carl J. Drake, of the Iowa State College, and after he had carefully examined it and compared it with the Central American specimens of *C. decens* he had in his collections, he wrote in part as follows:—

"I believe that it would be best to call this species *Corythucha decens* Stål as you have done. The triangular process of the pronotum seems to be slightly long and the hood not quite so strongly inflated as in the Central American species of *C. decens* before me. However, I believe that these differences are only slight variations."

In view of the above, *C. decens* Stål can now be definitely recorded from the United States.—JOHN C. LUTZ, Philadelphia, Pennsylvania.

Notes on Hesperiid Nomenclature (Lepid.).

Lindsey (Ent. News 39:239, 1928) states that "since Hübner's Tentamen has been officially discarded *Urbanus* cannot be used in place of *Hesperia* Auct. *Pyrgus* is the next available name." As previously shown by Lindsey (Ann. Ent. Soc. Am. 18:75, 1925), the generic name *Hesperia* has been wrongly applied since 1872 when both Crotch and Scudder cited *malvae* Linn. as genotype instead of *comma* Linn., thrice cited as genotype before that date. *Hesperia* reverts to the subfamily containing *comma* Linn.; this division of the family taking the name *Hesperiinae* (nec *Pamphilinae*). Barnes and

Lindsey (Ann. Ent. Soc. Am. 15:89, 1922) used the Tentamen name *Urbanus* for Scudder's *Hesperia* (type *malvae* Linn.), and chose the subfamily name *Urbaninae*. As a result of the dropping of *Urbanus* in favor of the next available name, *Pyrgus*, this subfamily should be termed the *Pyrginae* (nec *Hesperiinae* Auct.) (See Article 5 of the International Rules of Zoological Nomenclature.)

Considerable confusion has existed in the use of the generic names, *Goniurus* Hübner (1820) and *Eudamus* Swainson (1831-32). Skinner and Williams (Trans. Am. Ent. Soc. 48:114, 1922) summarize the usage of these names since Watson's citation of *coelus* Cram. as type of *Goniurus* in 1893. They however wrongly assume that Lindsey's usage of *simplicius* Stoll as type of *Goniurus* is based on the first mentioned species; this species was designated as type by Butler in 1870. It appears to the writer however that even Butler's citation was unnecessary. Westwood, in 1852 (Gen. Diurn. Lep., p. 510), in speaking of the species included in *Goniurus* (misspelled "*Goniuris*"), refers to "these species (of which Papilio Proteus may be considered as the type) . . ." In 1875 Scudder (Hist. Sketch Gen. Names) does not mention Westwood's citation but makes the remark under *Goniurus* that "neither Proteus nor Simplicius can be taken as the type, since they are congeneric, and Proteus has been taken as the type of Eudamus." Since *proteus* not only *could* be but *was* taken as type of *Goniurus* by Westwood in 1852, *Eudamus* and *Goniurus* have had the same type from that time. Hence *Eudamus* Swains. (1831-32) falls as synonymous to *Goniurus* Hübn. (1820).—HAROLD H. SHEPARD, Bur. of Ent., Washington, D. C.

Rocky Mountain Conference of Entomologists.

The sixth annual meeting of the Rocky Mountain Conference of Entomologists is to be held in Pingree Park, Colorado, August 19 to 24, 1929. Notices to this effect have been sent to a number of entomologists, but it is impossible to reach all, so readers of ENTOMOLOGICAL NEWS are cordially invited.

Arrangements are such that other members of the family can be accommodated. The meetings are usually quite informal with time permitted for recreation and collecting. The collecting in the mountain area is usually at its best at this season of the year. As arrangements must be made in advance for the taking care of a crowd more than 50 miles from supplies, it is important that the secretary be notified in advance by all who expect to attend. We would also appreciate having subjects for papers or discussions sent at an early date.—GEORGE M. LIST, *Secretary*, Fort Collins, Colorado.

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

GENERAL.—Bequaert, J.—Present trends in systematic entomology; Descriptions. [19] 24: 98-102. **Brues, C. T.**—Present trends in systematic entomology. General discussion. [5] 36: 13-27. **Calder, E. E.**—Obituary. [19] 24: 115. **Doll, J.**—Obituary. [19] 24: 104-109, ill. **Essig, E. O.**—Man's influence on insects. [76] 1929: 499-506, ill. **Friederichs, K.**—A collecting vial. [12] 22: 420. **Frost, C. A.**—The unexpected acid test. [Acid ejected by Carabus vinctus]. [5] 36: 59. **Gunder, J. D.**—Mounted genitalia attached to specimens. [4] 61: 97-98, ill. **Haase, J.**—Die lichtfalle, ein hilfsmittel zur erforschung der lokalfauna. [18] 23: 89-107, ill. **Headlee & Burdette.**—Some facts relative to the effect of high frequency radio waves on insect activity. [6] 37: 59-64. **Heikertinger, F.**—Was ist zu tun in der entomologie? [79] 14: 208-227. **Locke, D.**—The tragic account of the fall of a thriving community of Bolivian umbrella ants. How the supplies they garnered caused their dramatic end. [15] 1929: 296-306, ill. **Neave, F.**—Reports of the Jasper Park Lakes Investigations 1925-1926. Plecoptera. 159-173. Aquatic Insects. 185-195. The Beetles by J. B. Wallis. 221-225. [Contr. Canad. Biol. & Fish.] Vol. 4. **Stiles, C. W.**—Amendments to the international rules of zoological nomenclature. [Norsk Ent. Tidsskrift] 2: 259-261. **v. Tunkl, F. F.**—Kulturgeschichtliche notizen zur heuschreckenplage. [26] 9: 173-176. **Weiss, H. B.**—The entomology of Martin Lister, physician, naturalist and antiquarian. [6] 37: 43-48.

ANATOMY, PHYSIOLOGY, ETC.—Barnes, H. F.—Some remarks on Paedogenesis in gallmidges (Cecidomyidae). [8] 65: 138-139. **Bidder, G. P.**—Geotropism and antennae. [31] 123: 799. **Brohmer, P.**—Schülerübungen über die mundwerkzeuge der insekten als mittel phylogenetischer erkenntnisbildung. [Mikrokosmos] 22: 130-133, ill. **Bugnion, E.**—Les organes bucco-pharyngés de la fourmi coupe-feuilles du Brésil Atta sexdens. [34] 82: 55-78, ill. **Dolley & Wierda.**—Relative sensitivity to light of different parts of the compound eye in Eristalis tenax. [42] 53: 129-139, ill. **Donisthorpe, H.**—Gynandromorphism in ants. [34] 82: 92-96. **Eidmann, H.**—Die koloniegründung von Formica fusca nebst untersuchungen über den brutpflegeinstinkt von Formica rufa. [34] 82: 99-114, ill. **Gerould, J. H.**—History of the discovery of periodic reversal of heart-beats in insects. [92] 56: 215-225. **Headlee, T. J.**—An apparatus for the study of comparative effects of constant versus variable temperatures on the speed of insect metabolism. [6] 37: 25-27. **Hirschler, J.**—Sur la relation entre le noyau et les composants plasmatiques (appareil de Golgi, vacuome) dans les spermatocytes des Lépidoptères. [69] 101: 82-85, ill. **Hosselet, C.**—Les éléments du chondriome dans les espaces nerveux intercellulaires et dans le nerf, chez les insectes. [69] 101: 85-87, ill. **James, H. C.**—On the post-embryonic development of the female genitalia and of other structures in the chalcidoid insect Harmolita graminicola. [93] 1928: 661-695, ill. **Lopez, A. W.**—Morphological studies of the head and mouthparts of the mature codling-moth larva Carpocapsa pomonella. [67] 5: 19-36, ill. **Merker, E.**—Die pigmentverschiebungen im netzauge der insekten unter dem einfluss von ultraviolettem. [89] 46: 297-372, ill. **Nabours & Foster.**—Parthenogenesis and the inheritance of color patterns in the grouse locust Paratettix texanus. [92] 56: 129-155, ill. **Panu & Verrier.**—Contribution a l'etude du pigment et des variations chromatiques de Phyllium siccifolium (Orthoptère phasmide) [77] 100: 1118-1120. **Phillips, E. F.**—Variation and correlation in the appendages of the honeybee. [Cornell Univ. Agric. Exp. Sta.] Mem. 121: 52 pp., ill. **Pierantoni, U.**—L'organo simbiotico di Silvanus surinamensis. [Atti Reale Accad. Naz. Lincei, Roma] 9: 451-455, ill. **Prell, H.**—Die vereinheitlichung der bezeichnungsweise für die verschiedenen generationsfolgen von insekten mit mehrjähriger generation. [34] 8: 203-219. **Rudolfs, W.**—Studies on chemical changes during the life cycle of the tent caterpillar (Malacosoma americana) IV. Glycogen. [6] 37: 17-23, ill. **Salman, K. A.**—The external morphology of Pepsis elegans (Psammocharidae). [1] 55: 119-153, ill.

Timon-David, J.—Action du brome sur les huiles d'insectes. [69] 188: 1122-1124. **Verlaine, L.**—L'instinct et l'intelligence chez les Hyménoptères. IX.—La notion du temps. [33] 69: 115-125. **Whedon, A. D.**—Muscular reorganization in the Odonata during metamorphosis. [92] 56: 177-192, ill. **Woods, W. C.**—The integument of the larva of the alder flea beetle. [19] 24: 116-123, ill. **Zernoff, M. V.**—Essai de sérothérapie chez Galleria melonella. [69] 188: 1321-1323.

ARACHNIDA AND MYRIOPODA.—***Chamberlin, J. C.**—Dinocheirus tenoch, an hitherto undescribed genus and species of false scorpion from Mexico (Chelonethida). [55] 5: 171-173. ***Crosby & Bishop.**—Three new species of spiders (Linyphiidae). [4] 61: 101-105.

THE SMALLER ORDER OF INSECTS.—***Kimmins, D. E.**—Coryphaeschna longfieldae sp. n., from Brazil, and its allies. [75] 3: 489-493, ill. **Moll, F.**—Termiten als Schädlinge am Holz und der Schutz gegen sie. [Zeit. Pflanzenkrankheiten und Pflanzenschutz] 39: 177-180, ill. **Neave, F.**—Plecoptera. See under general. **Nevin, F. R.**—Larval development of Sympetrum vicinum (Libellulidae; Sympetrini). [1] 55: 79-102, ill. ***Snyder, T. E.**—New termites from the Antilles and Middle America. [10] 31: 79-87, ill. **Stäger, R.**—Der ameisenlöwe tötet sein opfer durch gift. [Kosmos] 26: 176-178. **Walker, E. M.**—The Odonata (dragonflies) of the Lake Abitibi region. [Univ. Toronto Studies Biol. Ser.] 1928: 37-44.

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SPECIAL NOTICES.—**Opinions** 105 to 114 rendered by the International Commission on Zoological Nomenclature. [Smiths. Misc. Coll. Vol. 73. No. 6, 26 pp.]. Containing opinions, on Type of Oestrus; and on Sarcoptes Latr.

A HANDBOOK OF THE DRAGONFLIES OF NORTH AMERICA. By JAMES G. NEEDHAM and HORTENSE BUTLER HEYWOOD. Chas. C. Thomas, Springfield, Ill., and Baltimore, Md. Pp. viii, 378, 149 figs. $7.00 net, by post $7.24.

This work represents the first attempt since the publication in 1861 of Hagen's "Synopsis of the Neuroptera of North America" to cover the entire North American dragonfly fauna in a single descriptive treatise. The need of such work is indicated by the fact that the number of species recorded from North America, north of Mexico, has nearly doubled since Hagen's work appeared. The "Handbook", however, is much more than a mere manual for the identification of species. The introductory part contains an excellent general account of the characteristics and life history of dragonflies, together with special sections on the collecting and rearing of these insects and on their relations to fish culture; while the special part contains tables for the identification of both larvae and adults, as well as descriptions and ecological notes on all of the species.

Perhaps the best part of the book is the general section (Part I) in which we recognize the facile style and vivid descriptive powers of the senior author. Following a short historical sketch of American odonatology the life history of a well known species (*Anax junius* Dru.) is described to illustrate that of the order as a whole. Then follow sections of the Adult Dragonfly, the Immature Stages, the Eggs, and the Relation of Dragonflies to Fish Culture. The first two of these sections are each divided into several parts, descriptive of structures, habits and methods of collecting and rearing. These sections are well illustrated by some of Professor C. H. Kennedy's fine drawings and also by some attractive little diagrams showing methods of flight and oviposition.

The general plan of the Handbook is admirable and much of this plan is well carried out. The sections on the Zygopterous genera *Enallagma* and *Ischnura*, by C. F. Byers, are particularly thorough. One of the attractive features, which relieves the descriptive part of the dryness usually associated with systematic treatises, is the introduction of copious notes on the habits and habitat of each species, where the data are available, these notes being largely in the form of quotations from the original records. An attempt is made to introduce common names for a number of the better known species.

One does not look in a work of this sort for new features of taxonomy, but we note in the genus *Gomphus* a few changes in the composition of the subgenera, which we believe express better than in previous groupings the relationships of the species. *G. spicatus*, *e. g.*, is removed from *Arigomphus* to *Gomphus*, *G. abbreviatus*, *brevis*, and related forms, as well as the *fraternus* group, from *Gomphus* to *Gomphurus*. *G. scudderi* and *amnicola* are also placed in *Gomphurus*, although in the opinion of others, including the reviewer, their relationships are with the *Stylurus* group.

The book is well supplied with keys to all the taxonomic groups both in the larval and adult stages. These keys are necessarily made as concise as possible consistent with the proper fulfilment of their purpose, and on the whole they seem to function excellently. But in the keys to species in certain genera too much has been sacrificed for the sake of brevity and simplicity and characters are sometimes used which are trivial and unreliable or even incorrect. This is notably the case in the treatment of *Aeschna* and *Somatochlora*. For instance, *Aeschna coerulea* and *A. sitchensis* are separated by the length of the stem of the T-spot, a character based apparently upon a badly copied figure, since it does not exist in reality. The distinctions given between *Somatochlora whitehousei* and *S. septentrionalis* are likewise unsound, a particularly unfortunate case, inasmuch as the figures of these two species have been transposed.

Again, in the key to *Leucorrhinia*, *L. glacialis* is separated from *frigida* and *proxima* by supposed difference in the colour of the thoracic pleura, a difference which, so far as *glacialis* and *proxima* are concerned, is merely a matter of age.

One more instance of this kind may be given. In the key to the females of *Lestes* the two related species *forcipatus* and *disjunctus* are distinguished by length only. This difference in size is by no means constant, for *L. forcipatus* decreases in size northward, while *L. disjunctus* becomes larger in the northwest. The relative size of the ovipositor affords an easy means of separating these two species.

Another series of errors, mostly of only minor importance, is found in connection with the tables in which certain larval characters are given. Some of these pertain to the characters themselves while others are concerned with the references to descriptions.

As to the first of these we have noted only a few cases. In the genus *Leucorrhinia*, *e. g.*, three of the six species have well developed dorsal spines, while in the other three they are either wholly lacking (the usual condition) or are vestigial (some individuals of *hudsonica*). In the table they are indicated as being present in all the species, and, in the key to the genera of Libellulinae, *Leucorrhinia* is separated from *Sympetrum* by the possession of "dorsal hooks as long as the segments which bear them", and does not appear elsewhere in the key. The character used to separate *Cordulia* from the Somatochloras without dorsal hooks is also invalid, the teeth of the lateral lobes being about equally developed in these genera.

Concerning the references to descriptions of nymphs the value of citing the first published description is not apparent. What is really wanted is the best available description, as in pioneer descriptions the distinctive characters are ofted omitted.

In these references to the first descriptions of nymphs some curious errors occur. *Aeschna constricta*, *e. g.*, is credited to Needham, the nearly related *A. umbrosa* to Cabot. Both of the descriptions referred to were published under the name of *constricta* before *umbrosa* had been recognized as a separate species, but both really belong to *umbrosa* and the nymph of *constricta* was first described by the present writer.

In the table to the nymphs of *Somatochlora* Needham is again credited with the description of *S. elongata* as well as *S. linearis*, though the references are to the selfsame description. This description, referred by Needham himself to "*Somatochlora* sp. 2" really belongs to *elongata*, as pointed out by the writer in 1924. Since his description was published, however, Needham found *S. linearis* in transformation at Lake Forest, Illinois, and believing the exuviae to be identical with his "species No. 2" referred the latter to *S. linearis*. He had already described as *S. elongata* the nymph of *S. williamsoni*. So that, on this basis, Needham is given the credit of describing the nymphs of all three species.

The nymph of *Enallagma vesperum*, credited to the present writer, was first correctly described by Garman (1917).[1]

The use of trinomials is avoided and this is probably a wise practice in a book that is not intended primarily for the advanced specialist, but there have been some unfortunate consequences of this omission. In the genus *Sympetrum*, *e. g.*, *S. assimilatum* appears as a species while *S. decisum* is not mentioned at all. Both names have been commonly quoted as subspecies of *rubicundulum*, but *assimilatum* has long been known as a mere colour phase of the latter species, while *decisum* has constant structural characters and deserves to rank as a distinct species. Another instance is that of *Aeschna interrupta*, a transcontinental species consisting of several well-marked races. In this case only the name *interrupta* is used, but the distribution given is that of the *race interrupta*, not of the species as a whole.

This brings us to the question of distribution and one of the most obvious defects of the book is the manner in which the ranges of the various species are given. A few examples will make this clear. *Hetaerina americana*, which is absent from the northern half of North America, being confined in Canada practically to the extreme southern part of Ontario,[2] is said to inhabit "N. Am. generally". British Columbia is included in the range of *Lestes forcipatus*, a species which in Canada is confined to the eastern provinces, while *L. disjunctus*, the commonest British Columbian species, is not mentioned as occurring west of North Dakota. The only locality given for *Coenagrion interrogatum* is the type locality "Sask.", whereas it has been recorded from Newfoundland to the Rocky Mountains, including most of the provinces. The distribution of *Cordulia shurtleffi* as stated (Alaska, B. C., N. J., Pa. and N. Y.) is also misleading as its main range is from Newfoundland

[1] Bull. Ill. State Lab. Nat. Hist. 12:550.

[2] There is an old record from Montreal, Que.

to Hudson Bay, British Columbia and Alaska, occupying the entire Canadian zone, where it is a dominant species. *Macromia illinoiensis* is recorded only from "N. E., N. Y., Pa., Del., N. C." and yet on the same page is a quotation from Williamson in which this species is mentioned as having been taken in large numbers in Sandusky, Ohio. Similarly *M. magnifica* occurs in "Calif., Ariz." although we read a little further on that Kennedy observed it at Satus Creek in Oregon. Both of these species occur in Canada, but Canadian records in particular have been largely ignored. Lastly we may note the case of *Ladona julia*, whose range is given as "N. Y. to Md." This is very incomplete and misleading as *L. julia* is a transcontinental species and ranges northward to the Hudson Bay watershed.

Besides those already mentioned a number of miscellaneous errors have been noted. These are chiefly misprints and misspelled words but the following are more serious:

P. 116. The figures of *Gomphus furcifer* and *G. villosipes* are transposed.

P. 135. The nymph of *Aeschna sitchensis* is omitted from the list of known nymphs of this genus.

P. 181. The figure of *Tetragoneuria spinosa*, referred to under this heading has been omitted.

P. 198. Under *Dorocordulia* appears the statement "Only the nymph of *D. lepida* has been made known (Ndm. '01, p. 505)". This reference is to *D. libera* not *lepida*.

P. 236. The figures of the vulvar laminae of *Sympetrum rubicundulum* and *S. obtrusum* are transposed.

P. 310. Under *Coenagrion* appears the statement "The nymphs of none of our American species have been as yet made known." The nymph of *C. resolutum* was described by the writer in 1914 and by Kennedy in 1915.

The quality of the illustrations is variable. Those of Part I are excellent, as are also all the venational drawings. The figures of appendages and genitalia, however, are of a lower standard and are frequently crude. In some cases where appendages are very similar it would have been better if more distinctive characters had been figured.

As the "Handbook" will doubtless be more generally used for many years than any other work on North American dragonflies it is unfortunate that it is marred by so many inaccuracies. In spite of these it will serve a very useful purpose not only to teachers and general students but also to advanced specialists and more particularly to those in regions where the local fauna is not yet well known.—E. M. WALKER.

OCTOBER, 1929

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BARNES MUSEUM OF LEPIDOPTERA,
DECATUR, ILLINOIS

DR. WM. BARNES

ENTOMOLOGICAL NEWS

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North American Institutions Featuring Lepidoptera.

VII. Barnes Museum of Lepidoptera, Decatur, Illinois.

By J. D. Gunder, Pasadena, California.

(Plates XII, XIII, XIV.)

Dr. William Barnes of Decatur, Illinois, has the largest collection of North American lepidoptera in existence and it can also be said that he has accomplished more general taxonomic work in the order[1] than any other living man. There is no doubt that the best work in lepidoptera is always done by those having adequate material and that the poorest is offered by those whose collections cannot back up their observations. "Get long series from the type localities and you will know what you are doing" has been the Doctor's motto and objective. Perhaps this is one of the reasons why in the last few years he is looked upon as the American authority.

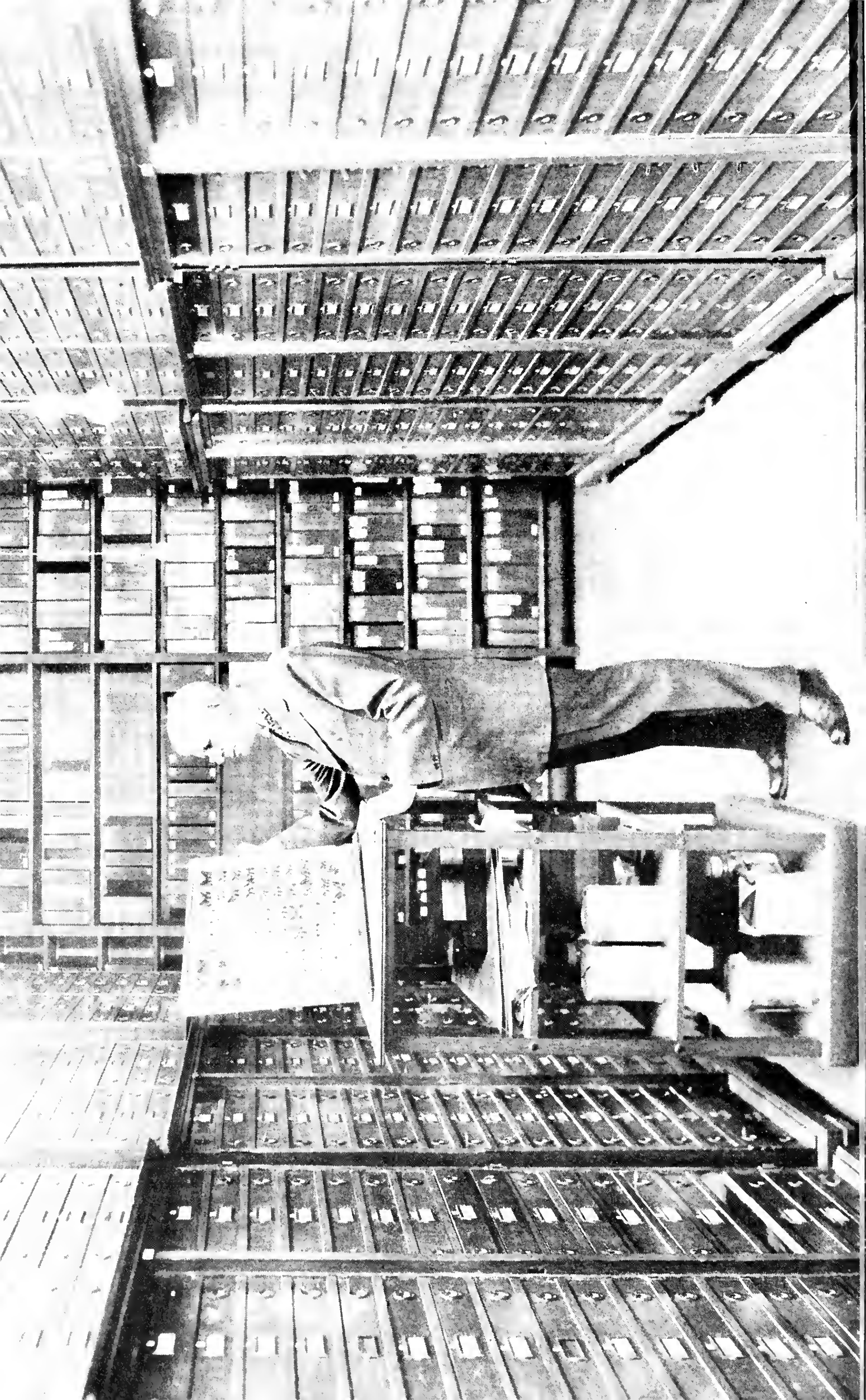
Decatur is a prosperous town of some seventy thousand inhabitants in the central part of the State of Illinois and Dr. Barnes has always lived in this community. His people are old settlers and owned hundreds of acres of some of the best agriculture lands in the district. Born September 3, 1860, he graduated in 1877 from the Decatur High School and later in 1883 from Harvard University. Following in his father's footsteps as a physician, he graduated from the Harvard Medical School in 1886 and has since specialized in surgery, being one of the founders of the great Decatur and Macon County Hospital at Decatur and one of the best known surgeons in the state. He was married to Charlotte Lancraft Gillett at Elkhart, Illinois, on June 18, 1891. A married son, Wm. Barnes, Jr., and a married daughter, Joan Gillett McArthur, live in or near Decatur and the old gentleman is a very happy grandparent indeed

[1] Strictly Boreal American, north of old Mexico.

when all the youngsters happen to gather around the house or in his entomological work rooms. Doctor is a stanch Republican and does not care much about the blue-law church people. He is broad shouldered and athletic despite his years. His conversation and letters are always to the point and he has a pleasing definiteness of character which is appreciated by his entomological friends and others. Whenever there is a Community Chest, a new baseball field or some other civic event to "put over", Bill Barnes is called upon to take charge, for they know he can make a success of almost any undertaking.

"No one in particular first interested me in lepidoptera, as far as I can remember", says Dr. Barnes, "but when I was ten or twelve years old, I used to pin butterfly specimens on wooden strips and tack these on the wall in my room. A little later I kept them in segar boxes and still later in wooden boxes which I made myself. About this time I caught a transition form (aberration) of *Pyhciodes tharos* (Dru) which I sent to the Museum of Comparative Zoology in Boston and I suppose it is still there. While a student at Harvard, I knew Oliver Wendell Holmes and Louis Agassiz. It may be it was these gentlemen who fired my zeal to seriously continue entomology and eventually make some contribution to the science".

For many years Dr. Barnes kept his collection in several rooms in his residence, but as these became too small and the destruction hazard for types too great, a special detached building was put up on the rear of his lot. This unique structure cost upward of twelve thousand dollars and is partly shown in the circle at the top of plate XII. It is isolated, fire-proof, forty feet long, thirty feet wide and fourteen feet high and built of hollow tile, steel and concrete. To insure against dampness the walls have two air spaces. An interesting feature is the cement floor, which is heated from beneath. To provide abundant light there are three plate-glass windows along one side, each fifty-two inches wide. On plate XII Dr. Barnes is shown sitting at his desk before one of these windows. Additional light is afforded by three large sky-lights in the ceiling, sloping



to the north. All electric wiring is in conduit and plenty of adjustable drop cords furnish illumination on cloudy days.

Regarding the collection. Altogether there are 42 oak cabinets of nearly uniform size containing 1232 drawers. These are arranged in parallel rows, double-decked, down the center of the room. (See illustration showing one of three aisleways.) The drawers are double walled for insecticide with triple-ply bottoms and have plate glass tops. They average 20 x 24 inches in size. These drawers hold the real mounted collection and contain upwards of 35,000 butterflies and 170,000 moths. These specimens are all well mounted and labeled and as stated before are all of strictly United States and Canadian origin. Duplicates and not-worked-up specimens are kept in 2160 Schmidt boxes on shelves along one side of the room. (These can be seen in the background on the large plate XIII.) It is estimated that these boxes contain from 250,000 to 260,000 reserve specimens, enough to make four or five complete collections. From this stock the "exchange" or "trade" wants are taken. Summed up, the Barnes Collection may be estimated to contain about 465,000 specimens, a figure which cannot be far from wrong.

Regarding the type material. There are 1915 straight types, 1078 co- or paratypes and 3714 homo-types, totaling 6707 examples. Each of these represents a different name in the checklist, i. e., species, race, form, transition form or synonym as the case may be. In addition to these there are, of course, quite a few other types such as paratypes, etc. When the Guenée Collection is carefully worked up, probably there will be found a few more labeled type specimens. All types are kept in the general collection and not segregated. One style of type label has always been used by Dr. Barnes. Types of the following authors are included in the collection: Barnes, Barnes & Busck, Barnes (& curators), Benjamin, Beutenmüller, Biedermann, Bird, Blackmore, Boisduval, Boisduval & LeConte, Braun, Brehm, Busck, Cassino, Cassino & Sweet, Comstock, Curtis, Dod, Dyar, Ehrman, Ellsworth, Engel, Engelhardt, Fletcher, French, Graef, Grinnell, Grossbeck, Grote, Guenée, Guerin, Gunder, Heinrich, Herrich-Schäffer, Heylaerts, Hill, Holland, Hulst, Kerfott, Leussler, Lindsey, Lyman, McDunnough, Morrison, Murtfeldt, Nakahara, Nixon, Newcomb, Oberthür, Ottolengui, Owen, Pearsall, Poling, Putnam-Cramer, Ragonot, Reiff, Smith, Sweet, Taylor, Verity, Worthington, Wright.

The following collections of lepidoptera have been purchased by Dr. Barnes and incorporated into his collection:—

Oberthür Collection. All North American specimens excepting the Sphingidae acquired by Clark of Boston and the *Parnassius* and Hesperidae acquired by R. Oberthür. The Boisduval and Guenée collections were previously mixed in with the Oberthür collection. Among others this collection contained the types of certain specimens of Guerin, Curtis, Heylaerts, Ragonot, Verity, Herrich-Schäffer, Oberthür and Boisduval-LeConte.

Taylor Collection. Mostly Geometridae with many types.

Kearfoot Collection. Micro collection complete, excepting the Tortricids. Of these the types went to the New York Musuem, but one-half the specimens, including co-types, when present, went to the Barnes collection.

Poling Collection. Only a few types.

Lacy Collection. A few co-types.

Field Collection. Quite a few co-types.

Hill (Los Angeles) Collection. Noctuidae only. All types and other desired specimens as wanted. Remainder of collection was bought by the Los Angeles Museum of Los Angeles, Calif.

Longley Collection. Only one type.

Spalding (Utah) Collection. No types, but a few co-types.

Merrick Collection. Only one type and a few co-types.

Dr. Barnes considers the three rarest butterflies in his collection to be *Eurymus boothii* Curt., *Cercyonis stenele* Bdv. and *Euphydryas helvia* Scud. and the three rarest moths as probably *Spinx dolli* Neum., *Hemileuca sororius* Hy. Edw. and *Sthenopis auratus* Grt. He still has his "wants", as has every collector and would like to find someone who has *Papilio ammoni*

Behrns[2], or *Eurymus moina* Stkr. among the butterflies and perhaps *Hyphantria aspera* Grt. among the moths.

A system of complete disinfection has been inaugurated for the collection and all drawers and boxes are inspected periodically, usually twice a year. If any signs of infection are found, the drawer or box is fumigated; then a small blue sticker is stuck on so that for a year or more frequent examination may be made until the trouble is ended. Napthalin is used in the drawers and naphalin cones in the duplicate boxes. This has proven quite satisfactory. All in-coming material is kept in an air-tight drum filled with bi-sulphide of carbon for several days. This drum is of good size and will hold several large express shipments at a time.

The Doctor has, of course, a very large entomological library and he has probably received during his lifetime more complimentary authors' "extras" than any other living man. Among his books he considers "Illustrations of North American Entomology", Vol. 3, 1878, by Towend Glover, as very interesting. For years he has been a steady subscriber to over thirty entomological serials, which is quite an item of expense.

Revisional workers and compilers of books on lepidoptera have made valuable use of the Barnes collection. Hardly a month passes without a visit from some one interested scientifically in lepidoptera and Dr. Barnes has been very kind in this regard. Very recently Dr. Holland has borrowed certain specimens to illustrate in his new "Butterfly Book", as the W. H. Edwards collection, though good in its day, did not cover the field by any means. When John Comstock published the "Butterflies of California" a few years ago, much assistance in western identification was afforded and specimens lent for figuring. The collection was liberally drawn on for the original specimens shown in Seitz and the specimens thus used are marked in the collection with the Seitz plate and figure number. After leaving Washington Prof. John B. Smith used the Barnes material extensively on Noctuids. Whenever he had

[2] The Author has two fine examples of this from San Diego County, California, one of which is figured in Comstock's "Butterflies of California". It is probably a larger and darker race of *Papilio rutulus* Luc. coming north from the mountains of western Mexico.

two specimens before him when describing new species, one was deposited in the Barnes collection. If the specimens came originally from this collection, the types were supposed to be returned, but in many cases this was not done and after Smith's death no effort was made to retrieve any of this material.

In the past Dr. Barnes has employed several all-time assistants or curators to continually work over and help build up the collection. Among these were Dr. A. W. Lindsey and Mr. Foster H. Benjamin, whose portraits accompany this article. Dr. Lindsey accomplished a "Revision of the Pterophoidae", etc., and did valuable work on the Hesperidae, in which field he always took an active interest. He is at present with the Denison University at Granville, Ohio, and will shortly publish a textbook on "Evolution". Dr. Lindsey was with Dr. Barnes from April 2, 1919, to August 19, 1921. Recently the popular press has given Mr. Foster H. Benjamin nationwide notice in connection with his Government work fighting the Mediterranean Fruit Fly. At present he is in Orlando, Florida, having come from Brownsville, Texas, after leaving Dr. Barnes in August, 1927. A "Revision of the Rynchagrotis" is one of several of his papers on lepidoptera. Mr. Benjamin has a fine collection of Noctuids, preferring that group among the moths. Dr. Jim McDunnough was Barnes' first assistant, prior to 1919. He is at present with the Canadian Government at Ottawa, and editor of the *Canadian Entomologist*.

Innumerable papers have been published in various journals by Dr. Barnes during the last twenty years. Personally, I believe the Check Lists of 1917 and 1926 have afforded the most lepidopterological popularity. Five volumes of "Contributions" were privately published and are a valuable asset to any library upon butterflies and moths, being well illustrated and containing many descriptions in addition to much revisional text matter. These volumes sell for about $45 when obtainable through book dealers.

"Probably the rarest butterfly which I was most thrilled by capturing", says Dr. Barnes, "was *Erebia magdalena* which is a beautiful black diurnal found only at very high elevations in


A. W. Lindsey
Foster H Benjamin

Colorado. It is taken in places where one doesn't have much room to move about in. *Brenthis alberta* and *Brenthis astarte* are also both very difficult to catch in perfect condition and are taken only at extreme altitudes in the Canadian Rockies. For many years I personally made collecting trips each summer. These were usually to the type localities of some species which it was desirable to get more material of, in order to be certain of identifications. Many of these trips were made with the veteran collector Bruce, also with Oslar and Elwes. Hall Valley and Glenwood Springs in Colorado were always two of the most prolific fields. Southern Utah used to be good until the sheep killed off most of the vegetation. Personally, I have never had any narrow escapes, but the Apache Indians got two of my collectors in an early day in Arizona. On one trip Bruce broke a leg when we were in a difficult high region and this caused some concern. On another occasion when we were collecting in a remote valley where lived only an old lady and her son, when we were packing up to leave their ranch the lady complained of a very severe abdominal pain. As Bruce and I had to be going, I left her a small bottle of laudanum with instructions to take a prescribed number of drops every 3 or 4 hours until relieved. Just before we got to the railroad which was out next destination many miles away, her boy came tearin down the road from the valley on a horse, bare back, saying his mother had taken the whole bottle and that he thought she was dead. I sent him back with word of what to do. It was impossible to do more under the circumstances. I never heard whether she died or not".

"Among the older collectors I personally knew W. H. Edwards, Henry Edwards, McGlashan, Graef, Hulst, Packard, Scudder, Strecker and most of the others in their time. Strecker was a very peculiar man when visiting you and it was better to stay close by his side as a protection to valuable specimens! He had a most peculiar habit of crawling in between the sheets with his boots and clothes on. When Bruce was around it was also very essential to keep your eyes open. He was always in the habit of stopping off in Decatur on his way home from his collecting trips so that I could have the privilege of going over his catch and selecting what I cared for. On one of these occasions I was unavoidably called East, leaving him where he had access to the collection. At that time I had a number of new species on a spreading board. Among others *Rhododipsa masoni*. On my return I found these specimens had disappeared and very shortly afterwards I noticed Smith had described them, naming them after Mr. Mason of Denver. It seems that Mr. Mason was a very wealthy man, quite a little interested in Lepidoptera and Bruce was very anxious to get in his good graces, thinking that Mason would help finance his expeditions. *Masoni* is such a beautiful species that Bruce thought Mr. Mason would be pleased to have it named after him, so he sent the specimens to Prof. Smith, requesting him to name them after him"!

"I have made several trips through Italy, Germany, France, Austria and England studying types and various collections. On these trips I have always been very materially assisted in the work by Oberthür, Verity, Hampson, Prout, Merrick, Talbot, Riley, Bang-Haas, Durrant, LeCerf and many others. It is a real pleasure to know and correspond with most of these gentlemen".

In 1920 Dr. Barnes deeded the entire collection as a gift to the Decatur and Macon County Hospital, the collection to be sold and the money realized to be used by the Hospital Board to promote the cause of child welfare. Dr. Barnes practically founded this hospital and its directors are guided entirely in the matter of the collection's sale by him. The Doctor would like to see the collection go eventually to either Washington or Cambridge, but there should be an all-time curator placed in charge wherever it may go. There is enough unworked-up material available to keep one party busy for at least five years.

Dr. Barnes has not been so well this last spring and summer and he has practically given up all medical practice; however, each afternoon finds him busy among his butterflies and moths, keeping the records up to date or answering important correspondence. Such is the life of an entomologist and what more can any of us ask. At that, I think we get more satisfaction out of our existence than the average human being.

A Remarkable New Chilean Genus of Grasshopper (Orthoptera, Crytacanthacrinae).

By Morgan Hebard, Philadelphia, Pennsylvania.

(Plate XV.)

During a recent visit to the British Museum the author noted three specimens of a large and strikingly colored grasshopper, labelled simply "Chile", unlike any previously seen. The loan of these for study enables us to say that a new genus and species is represented, nearest *Litoscirtus insularis* Bruner, known only from Cerros Island, Lower California, but widely separated by many important characters.

These genera agree in general structure of head, short antennae, moderately hairy limbs, serrate dorsal carina of caudal femora and armament of caudal tibiae. Presence of apical spines on both dorsal margins of the caudal tibiae and fastigium declivent with lateral margins declivent cephalad are other important features in determining their position in the Cyrtacanthacrinae.

The new genus, *Aucacris*, combines with the above characters, the following. Frontal costa narrowed and moderately sulcate at juncture with fastigium. Pronotum with very low medio-longitudinal carina, which itself is finely longitudinally sulcate, interrupted by the transverse sulci and absent on the metazona; lateral carina indicated only by nodes; latero-caudal angles of lateral lobes distinctly flaring in dorsal aspect, rounded but distinctly angulate, rectangulate in male, obtuse-angulate in female. Tegmina reduced to very large pads. Caudal femora robust, genicular lobes rounded. Prosternal spine heavy, blunt conical, slightly transverse in male, more decidedly so in female.

Genotype,—Aucacris eumera new species.

The brilliant color of the caudal femora and tibiae and striking bands on the former constitute the most distinctive features of coloration.

Aucacris eumera new species. Plate XV, figure

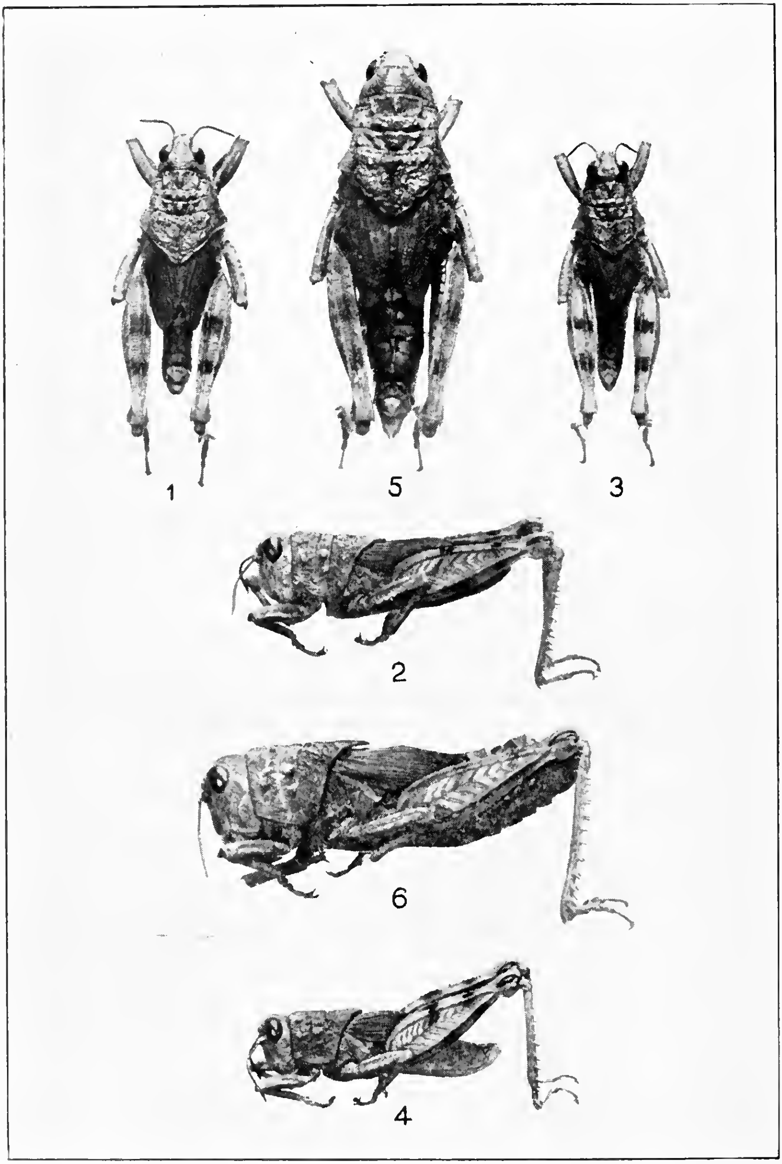
This remarkable insect has the appearance of a large brachypterous Oedipodid, but examination shows that it belongs instead to the Cyrtacanthacrinae.

The closer relationship of *Litoscirtus insularis* Bruner is evident from a number of characters, though that genus superficially suggests a greatly modified condition, with fully developed organs of flight, of the highly specialized type developed in the species of *Dracotettix* Bruner, the latter belongs to a very different phylum.

Type: ♂ ; Chile[1]. [British Museum.]

Size large, form robust. Antennae short and heavy, with (seventeen or eighteen) joints, of which all are very short except the ultimate, which is elongate conical. Fastigium declivent, rounding at slightly more than a right angle into the weakly oblique face; its lateral carinae distinct from just beyond the eyes, convergent and continued as those of the frontal costa; dorsal surface shallowly concave and smooth, back of which the occiput is feebly roughened and shows a very feeble, fine, medio-longitudinal carina. Eyes of moderate size and prominence. Lateral ocelli very small, smaller than in *Litoscirtus insularis*. Frontal costa sulcate throughout, narrow at juncture with fastigium, then expanded slightly with the lateral carinae percurrent to clypeus, faintly convergent just below median ocellus, elsewhere nearly parallel. A decided but slightly irregular vertical carina extending from between eye and antennal socket to clypeus, flanked by depressions, those toward the cheeks becoming sulcate ventrad. Pronotum rugose with decided transverse sulci dorsad; prozona with lateral and mesozona with lateral and meso-lateral larger nodes, metazona more coarsely, thickly and generally nodulose and bluntly sub-rectangulate produced caudad with lateral margins undulate. Tegmina represented by very large, overlapping pads which leave more than half the abdomen (when in normal position) exposed, their apices broadly rounded, their surfaces very thickly and regularly supplied with longitudinal veins and a multitude of cross-veinlets, dorsal very faintly defined from lateral fields. Wings vestigial, atrophied, lying wholly beneath the tegminal pads. Supra-anal plate as broad as long, lateral margins convex then concave convergent to the acute apex; dorsal surface raised meso-proximad and including a short medio-longitudinal sulcus, the raised area extending latero-caudad as two narrow rays which gradually narrow and disappear. Styles very short and slender. Subgenital plate small, convex-conical. Caudal femora with dorsal carina of external pagina finely serrate, not as thickly or as heavily as the dorsal carina. Caudal tibiae with ten external and nine slightly longer internal spines, regularly spaced except that the three disto-internal are closer than any of the others.

[1] This and the allotype undoubtedly came from the same locality. Both bear the number 81 over 56 on a circular label. The paratypic male is smaller, darker and more brilliantly colored and was probably secured at a different place.



AUCACRIS EUMERA—HEBARD.

Allotype: ♀; Chile. [British Museum.]

Generally similar to male, differing as follows. Size much larger. Fastigium and frontal costa broader and shallower, the latter showing stronger narrowing at dorsal extremity and just below median ocellus. Pronotum with prozona and mesozona with median carina and nodes less heavy, metazona less thickly and evenly nodulose but with a few larger scattered nodes which are longer than wide, much like those found in certain species of *Leprus*. Tegmina separated by a brief interval and showing scarcely a trace of differentiation between the dorsal and lateral fields. Ovipositor valves small, hairy, disto-external margins of dorsal valves very bluntly toothed, of ventral valves forming a short proximal lobe, all apices weakly curved and not elongate.

Body and tegmina mummy brown, head, antennae and pronotum heavily but not evenly overlaid with cinnamon in type and with clay color in allotype. Cephalic and medium limbs clay color. Caudal femora with external surfaces individually bright cinnamon buff, cinnamon and dull clay color, with three bands of black dorsad, first absent latero-externally, second and third weak on external pagina and there obsolete in the female, but continued across the ventral surface heavily in all, the first and second there connected broadly and the second and third narrowly by the same color along the ventral carina; these bands also crossing the internal face but there interrupted by the ventro-internal carina; internal surface and internal half of ventral surface brazil red (very rich) in males, peach red (pinkish) in female. Caudal tibiae and tarsi light scarlet red in males, the former paling to light orange yellow proximo-externally in the paratype, much duller, carnelian red in female with external surface and tarsi dull apricot buff.

The measurements of a male paratype from Chile, taken by H. L. Elwes and belonging to the author, follow those of the type. Length of body ♂ 24.8 and 23.2, ♀ 36.8; length of pronotum ♂ 9.1 and 7.2, ♀ 12; greatest dorsal width of pronotum ♂ 5.8 and 4.3, ♀ 7.8; exposed length of tegmen ♂ 9.7 and 7.2, ♀ 11.7; greatest width of tegmen ♂ 4.7 and 3.9, ♀ 6; length of caudal femur ♂ 15.8 and 14.2, ♀ 19; greatest width of caudal femur ♂ 5.6 and 4.7, ♀ 5.9 mm.

Explanation of Plate XV.

(Figures 1⅓ natural size.)

Aucacris eumera new species. Fig. 1 and 2.—Type. Male.
Fig. 3 and 4,—Paratype. Male.
Fig. 5 and 6,—Allotype. Female.

Orphan Nests of Polistes (Hym.: Vespidae).

By Phil Rau, Kirkwood, Missouri.

(Continued from page 232).

On August 7, about six more adults had emerged. I could not be sure of the exact number, since there was evidence that one or more of the open cells had been broken into violently; fragments of the paper and debris and even parts of *P. variatus* pupae were scattered on the floor of the box. The next day, one adult was caught red-handed at its cannibalism; it was calmly eating a pupa which it had just pulled out of its cell. Verily, of wasps too it may be said, "There's no accounting for tastes." These young cannibals heartily relished molasses, but flatly refused the larvae of *P. pallipes* when offered them on the forceps. This was indeed strange, since at this very time they were robbing the cells of their own young. Their refusal was not due to shyness, for they very readily accepted molasses offered on the forceps in the same way, often stretching out so far to reach it that they lost their balance. While some ate the molasses at once, others removed it from the forceps in as large a mass as they could handle and kneaded it in the forelegs and jaws, just as they do with a ball of caterpillar flesh. Later, these would go from cell to cell, feeding the young in the usual way. During this time the solitary male spent most of his time hiding in a nook on the roof of the nest next to the wall. He was a heavy feeder, and seldom came out of his hiding-place for other purposes. On August 8 he disappeared; whether he was careless or met with disaster, or whether he went forth in quest of his career, I do not know.

Another orphan nest of *P. variatus* was observed for some time. The three oldest workers were marked, "left-dot", "center-dot" and "yellow-tail", the younger ones which emerged later were left unmarked. The reader will note, throughout the story, how these three oldest ones gained and held the leadership in the management of the nest's affairs, while the younger ones never came to the fore.

A green caterpillar, held in the forceps, was offered to the group of wasps. Several of them snapped and bit at it, as though it were a common enemy. Even when it was placed under the very noses of several, it was always refused. It was then laid on the roof of the nest. After about ten minutes it was sniffed at by "yellow-tail", then it was taken up, manipulated for a moment and dropped to the floor; whether by accident or with purpose, I do not know, but at least no effort was made to regain it or even go after it, though it was only fifteen inches away. So after a time I replaced the caterpillar on the roof. "Yellow-tail" again took it in her jaws, stood head downward on the side of the nest with the caterpillar dangling in mid-air while she malaxated it for a time, then kneaded it into a ball and fed it to the larvae, going from cell to cell, leaving a bit here and a bit there.

A little later, with a great deal of insistence, I got "yellow-tail" to accept a larva of *P. pallipes;* while she was malaxating it, "center-dot" took it away from her and completed the job. "Left-dot" now became interested also, and when the viscera was almost squeezed out and ready to be discarded, she took hold of the dangling refuse, with a quick jerk severed it from the good meat, and dropped it below. Then she succeeded in gaining possession of the food portion, and worked it over and over in her jaws. It should be reported that just before "left-dot" offered her assistance in this task, she was seen handling parts of a broken pupa which she had torn from its cell under her feet; whether she was actually robbing a cell for food, or merely finishing the task of clearing a cell of a dead pupa, I could not declare.

Another piece of food, this time a half-grown *pallipes* larva, was proffered to the group, and again "yellow-tail" took it, and artistically squeezed out the entrails. At the conclusion of the task, however, she had the wrong end of the mass in her mouth, so the food portion was in danger of being lost. She attempted to change its position, and to do so tried to drag it to the roof of the nest, but it was unwieldy, she lost her grasp and it fell.

Another *pallipes* larva, a mutilated one, was placed on the roof of the nest. After a half hour it was discovered by a wasp which I thought, judging by its coloration and manner, was a male. Unlike the others, it stood on the roof beside the larva and with its jaws inserted, ingested lustily both juices and muscular tissue, without malaxating it or dividing it. Presently "left-dot" discovered the feast in progress and haughtily confiscated his victuals, literally taking the food out of his mouth, leaving him licking his chops and cleaning up any crumbs that adhered to the sides of his face. One such particle, a little speck no larger than a pin-head, he scraped from his cheek and seemed to cherish for a minute; then he carried it below and went seriously about peddling the lone crumb from cell to cell where the larvae were. I was eager to find out if the male plays any such part in the economy of the nest, so I watched all this closely, and at the end, took up the wasp to see if it really was a male. The sting clearly proved it to be a worker, but with the white face and coloration of a male. I do not know whether to say that this new worker was handicapped by male coloration and a male mind, or merely that she was young and had never learned the fine art of nursing.

The queen of another colony was lost in some homing experiments in June, so her small nest was taken into the laboratory. It contained, on July 1, five sealed cells, and another was sealed on July 4. Attention could be given to this only intermittently, but in a comparative way the notes are of value.

In just three weeks, on July 21, there were four adults on the nest; all of the activities of a well-appointed and queenly nest were in evidence. Pulp was being brought in, new cells begun, and some of the unfinished old ones were being completed, eggs were being deposited, and the attachment of the petiole to the wall strengthened. The instincts displayed here are indeed interesting. Imagine these young workers, coming out of their cells into their first light of day, and promptly taking up the task of completing the old unfinished cells where their unseen mother had left them! In reinforcing the support of the nest, there followed a new method. In nest 108, described above, the workers added more pulp all around the pin and at its base, and even built props or guy-ropes from it to the wall. In this case the pin was entirely disregarded and a new petiole was made, connecting the nest with the wall, but this was rather a matter of form, because it was so weak that without the aid of the pin, it could not possibly have held the weight of the nest. Here we had proof also that their engineering estimates are not always correct because these workers thoroughly covered and reinforced with paper the head and upper part of the pin, above the point where it entered the nest and hence where the work was utterly useless.

Eggs were being deposited by the unfertilized workers in the shallow new cells, so it was easy to observe oviposition. One egg is deposited in each cell, but I had occasion to see a wasp lay a second egg in one cell. She placed the tip of the abdomen in the shallow cell and quietly held the position for a minute or two until the egg appeared and it immediately stuck to the wall. I say it stuck to the wall, because no effort was made to stick it there; it left the body already moist with glue, and it adhered to the wall where it touched. After the performance the wasp walked away, but returned after a few minutes, discovered the two eggs in the cell, pulled the last-laid one out, chewed it up carefully and swallowed it, discarding the shell. Instinctively, they lay eggs, and instinctively, it seems, they know that only one young wasp can live in each cell. Whether the wasp's consciousness or recognition of numbers is something more than instinct, or whether the fact that this one passed over the first egg and reached to get the new egg beyond it indicates something more plastic than instinct, I dare not say. Then, again, the fact that she recognized an abnormal condition and thereupon performed an abnormal act in eating her own egg—stretching a point to gain a meal—leads one to see how very plastic is their behavior.

In one orphan nest of *P. variatus*, where I had neglected to feed the larvae for a few days, one half-grown larva spun a cap to its cell. This was not flush with the top or protruding as usual, but down about one-third of the length of the cell below the edge.

Hibernation of the Striped Cucumber Beetle (Coleop.: Chrysomelidae).

W. V. Balduf, University of Illinois.

Where and how the striped cucumber beetle, *Diabrotica vittata* Fabr., spends the winter has long been a puzzling question. Most workers are satisfied that the adult stage carries the species through the cold season, but much mystery surrounds its exact location through that period. It may therefore be of interest to report that the writer discovered 59 living adults of this species in what seems to be its natural habitat for hibernation. Two miles south of Muncie, Illinois (near Urbana), is a small river valley bordered on the north by low, lightly forested hills ranging east to west. On January 20, 1929, 31 of the beetles were found on the south slope of such a hill, quite near its base, and about two rods from the south margin of the woods, which is bordered there by a public road. All these individuals occurred under two inches of foliage of trees within an area of two square feet around the base of an ash seedling about three feet high. Two of them were in actual bodily contact, but the rest were isolated by short distances and there was a slightly greater concentration nearest the ash.

Upon further investigation on January 28, 28 additional specimens were found under similar circumstances about five feet removed from the first lot. Again there was a heavy cover of dead foliage over the beetles, and in addition a few small decaying branches thrown together in a heap, and a few ash seedlings grew in their midst. A rather thorough examination of the acre surrounding these spots failed to reveal more of this species. No dead individuals were found in these places.

It is commonly stated in the literature dealing with *D. vittata* that it spends the winter in the soil, which is an absurd claim in view of the absence of fossorial devices on this insect. Most of the beetles taken on the above dates were on the soil surface with the leaves fairly compacted over them. A few of those found on the last date occurred in small shallow depressions about an inch deep and perhaps made by the feet of a small domestic animal or by the process of freezing and thawing. These pockets were full of leaf mold, and the presence of some

*Contribution No. 135 from the Entomological Laboratories of the University of Illinois.

beetles in them indicates the tendency of the insect to react to lowering temperatures by descending as far as their locomotor facilities make possible. Temperature readings on January 28 showed that the beetles were under conditions of 31 degrees Fahr. shortly before noon, with the sun shining, whereas the air temperature four feet above that spot and in the shade varied from 25 to 28 degrees Fahr., and in the sun and wind it was 36 to 37 degrees Fahr. The soil here was loose, and devoid of solid ice despite one of the most consistently cold winters known here within the last decade. A few ice crystals, probably formed from the melting of a light snow that fell a few days earlier, had formed among the laminae of leaves over the beetles. Upon direct exposure to the sun's rays, the beetles soon moved their appendages slightly.

It seems then that the striped cucumber beetle is gregarious in hibernation, resembling in this habit the common spotted ladybeetle *Ceratomegilla fuscilabris*, which, by the way, was abundant in this environment in its characteristic masses, but obviously sheltered by a comparatively thin blanket of leaves Another difference noted is that the lady beetle is most often found huddled at the base of a tree, whereas the cucumber beetle, while hidden on the woods floor, was removed about ten feet from the nearest tree. The two species did not occur directly together in the same spots.

Where did these cucumber beetles originate, and how did they succeed in meeting in two such narrowly-separated, localized spots? Residents in the valley stated that the nearest cultivated cucurbits were a little patch, constituting a small fraction of an acre, of watermelons one-fourth mile to the southwest of this spot. Others were more than a mile away. Old melons were still present on the ground in January, it was found. An open pasture field and two small fields of corn separated the cucurbit field and the hibernation quarters. It is presumed that the beetles made their way to the woods in the path of the wind individually, not collectively, by either a single, or a series of short flights. By what sense do they find one or two spots, the like of which, estimated by human judgment, were common all over the hillside? Does the forest margin serve as a wall that limits the extent of the flight? And is the direction of the migration determined by either a positive or a negative reaction to the prevailing wind? It would seem that certain larger and broader features of the landscape, such as trees and hills, aided by the wind, serve to concentrate the beetles in a general way. After settling down within a relatively small area of a few square rods, perhaps gathering one now and another then, they come close enough together to enable individuals to detect one another by the sense of smell and what is probably to be designated as a specific body odor. Obviously such a fall migration flight must be made before low temperatures benumb the muscles. It is well known that these beetles concentrate on old cucurbit fruits in autumn, and feed there as long as edible substance remains, which has been found to exist as late as early November at Columbus, Ohio, or weeks after frosts have killed the foliage of the vines. Migration probably does not begin until the cucurbit food is no longer edible. By that time the forest foliage has mostly or entirely fallen, and the beetles coming to the forest margin, which ecologists claim to be the natural environment in which this species originally fed upon wild cucumber species, find the bed of leaves already formed. It is, then, probable that two or more tropisms,—(1) a positive or negative anemotropism, (2) attraction of individuals into a localized spot by sensing the body odor of the species, and (3) possibly an isolated small plant or other object may serve as a place for landing or congregation, from which they may then descend below the leaves when their geotropism is made positive by lowering temperature,—govern this insect in its migration from its adopted feeding ground on cultivated cucurbits to its primitive hibernation site.

If this gregarious habit is typical for the species, it can be readily understood why this common pest of the cucurbitaceous vine has so long eluded those interested in finding its true habit and habitat during the winter season. When the members of a generation from a given patch seem to center in a few square feet of area amid acres of what to man seems to contain hundreds of equally suitable sites for hibernation purposes, it is plain why this insect has not been discovered before in any numbers and in a situation that meets the requirements of the original habitat.

The Fourth Paper on New Species of Plagiognathus (Hemiptera: Miridae).

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

Plagiognathus negundinis n. sp.

Runs to *annulatus* Uhler in my key (Hem. Conn., 1923, p. 431), but differs in the longer second antennal segment which in the male is equal to or slightly exceeds width of pronotum at base; head more vertical and tylus less prominent.

♂. Length 4 mm., width 1.36 mm. Head: width .72 mm., vertex .37 mm. Rostrum, length 1.4 mm., reaching to middle of hind coxae. Antennae: segment I, length .27 mm.; II, 1.2 mm.; III, .75 mm.; IV, .35 mm.; black, tip of first segment pale, last two segments dusky brown. Pronotum: length .62 mm., width at base 1.17 mm.

Black, vertex pale, legs orange yellow, hind femora with a row of four or five black spots on antero-dorsal line, also one spot on median line of anterior face at middle of apical half, sometimes with two or three smaller dots, and two subapical black spots beneath, but rarely forming a black line above or beneath; tibiae yellow, knees, spines and spots at base of spines black; tarsi fuscous, apical segment black. Rostrum yellow, apex and basal half of first segment blackish. Membrane and veins fuscous, a clear spot behind smaller areole by apex of cuneus. Dorsum clothed with simple, recumbent, yellowish to dusky brown pubescence.

♀. Length 3.8 mm., width 1.4 mm. Head: width .71 mm., vertex .40 mm. Antennae: segment I, length .26 mm.; II, 1.02 mm.; III, .66 mm.; IV, .36 mm. Pronotum: length .64 mm., width at base 1.21 mm. Very similar to the male in pubescence and coloration.

Holotype: ♂ June 19, 1927, Ames, Iowa (H. H. Knight); Iowa State College collection. *Allotype*: taken with the type. *Paratypes*: 86 ♂ ♀ taken with the types on box elder (*Acer Negundo* L.). 40 ♂ ♀ June 14, 46 ♂ ♀ June 20, 1927, Ames, Iowa (H. H. Knight), taken on box elder where the species was breeding. ♂ ♀ June 2, ♂ 2 ♀ June 9, 1925, Ames, Iowa (H. H. Knight). ♂ 3 ♀ June 16, 5 ♂ June 25, 1927, Ames, Iowa (H. G. Johnston), taken on box elder. 6 ♂ ♀ June 3, 1912, Ames, Iowa (R. L. Webster), "associated with *Chaitophorus negundinis* Thos."

PLAGIOGNATHUS NEGUNDINIS **fulvotinctus** n. var.

Similar in structure to *negundinis* but runs in my key (Hem. Conn., 1923, p. 431) to *fraternus* Uhler from which it may be separated by having the femora orange yellow, not clouded with fuscous although with distinct black spots. Differs from typical *negundinis* in that the embolium, basal half of corium more or less, outer margin of clavus on basal half, and basal half of cuneus is pale to orange yellow.

Type: ♀ July 10, 1924, Fort Snelling, MINNESOTA (H. H. Knight), author's collection. *Paratypes*: 2♂ 4♀ June 14, 16♂ ♀ June 19, 9♂ ♀ June 20, 1927, Ames, IOWA (H. H. Knight), taken on box elder.

Plagiognathus crataegi n. sp.

Runs to *repetitus* Kngt. in my key (Hem. Conn., 1923, p. 431), while the paler females may run to *punctatipes* Kngt. Differs from *repetitus* in the larger size, relatively longer antennae, larger spots on hind femora, and front coxae uniformly yellow without fuscous at base. Separated from *punctatipes* by the uniformly yellow front coxae and the more broadly blackish antennae; males differ in form of left genital clasper.

♂. Length 3.4 mm., width 1.3 mm. Head: width .65 mm., vertex .31 mm.; black, vertex yellowish. Rostrum, length 1.21 mm., reaching to apices of hind femora, yellowish, basal segment and apex black. Antennae: segment I, length .21 mm.; II, .86 mm.; III, .56 mm.; IV, .32 mm.; black, last two segments more fuscous. Pronotum: length .50 mm.; width at base 1.02 mm.

Clothed with simple, recumbent, yellowish pubescence. Black, vertex yellowish; membrane uniformly dark fuscous, veins slightly paler. Legs yellow, tibial spots and spines black; hind femora with two rows of black spots on anterior face, clouded with fuscous; middle femora with a few small fuscous spots; coxae uniformly yellow, hind pair only with fuscous at base.

♀. Length 3.5 mm., width 1.4 mm. Head: width .68., mm., vertex .355 mm. Antennae: segment I, length .21 mm., black; II, .87 mm., dusky yellow to fuscous, basal one-fourth to one-third black, apex usually infuscated; III, .57 mm., dusky yellow; IV, .37 mm., dusky yellow. Pronotum: length .56 mm., width at base 1.11 mm. Very similar to the male in coloration and pubescence.

Holotype: ♂ July 2, 1928, Ames, IOWA (H. H. Knight); Iowa State College collection. *Allotype*: taken with the type. *Paratypes*: 24♂ ♀, taken with the types on *Crataegus* sp. where the species was breeding. 10 ♂ ♀ June 2, 1925, Ames, Iowa (H. H. Knight), found breeding on Crataegus; some specimens reared from nymphs confined on tender foliage.

Crataegi is allied to *dispar* Kngt., a species found breeding on hickory in New York, but with cuneus pale at base while the second antennal segment is yellow and narrowly black at base.

Plagiognathus geminatus n. sp.

Allied to *ilicis* Kngt., but differs in the longer second antennal segment which exceeds length of rostrum; femora and scutellum infuscated, hemelytra uniformly pale greenish yellow.

♀. Length 3.5 mm., width 1.7 mm. Head: width .80 mm., vertex .37 mm. Rostrum, length 1.02 mm., reaching to middle of intermediate coxae, not equal to length of second antennal segment. Antennae: segment I, length .21 mm.; II, 1.21 mm.; III, .59 mm.; IV, .31 mm.; yellowish, becoming dusky on last two segments. Pronotum: length .71 mm., width at base 1.4 mm.

Pale greenish yellow, embolium and cuneus more greenish, disk of scutellum fuscous, membrane rather uniformly dusky; femora infuscated, hind femora darker, a row of small darker spots along median line of anterior aspect; tibiae pale, spines brownish and without spots at base. Clothed with simple, yellowish pubescence, more prominent on head and pronotum.

Holotype: ♀ April 7, 1928, College Station, TEXAS (H. G. Johnston); author's collection. *Paratypes*: 48 ♀ April 7, 20 ♀ April 11, 1928, taken with the type on *Ilex decidua* and *Ilex vomitaria* by Mr. Johnston. It seems rather remarkable that not a single male can be found in the large series studied. This species is another good example of Jordan's Law of geminate species, in that *geminatus* is the southwestern twin of *ilicis* Kngt. which was described from New York. These two species are indeed very similar except in structure of antennae and rostrum, and in the fuscous coloration. In the large series studied there is no variation in color.

Plagiognathus gleditsiae n. sp.

Allied to *delicatus* Uhler but distinguished by the broader head and shorter rostrum; scutellum black with median line pale, frons with a quadrate black spot each side of median line.

♀. Length 3 mm., width 1.29 mm. Head: width .72 mm., vertex .37 mm. Rostrum, length .77 mm., only attaining hind margin of mesosternum. Antennae: segment I, length .18 mm., black; II, .69 mm., brownish black, darker on base and apex; III, .38 mm., blackish; IV, .21 mm., black. Pronotum: length .55 mm., width at base 1.12 mm.

Coloration yellowish with fuscous and black; quadrate spot each side of frons, tylus, apex of lora, calli, broad rays extending from calli to basal margin of pronotum, triangular area behind coxal cleft, mesoscutum except lateral edge, scutellum except narrow median line, inner half of clavus except base, corium except base, sternum, apex of rostrum, and venter, fuscous to black. Cuneus somewhat dusky on middle. Membrane fuscous brown, darker within areoles, veins dusky, opaque yellow at apex of areoles. Legs yellowish, with three rows of black spots on anterior aspect, also spots above and on apical half of posterior aspect. Tibiae with black spots at base of spines, but becoming obsolete apically; tarsi fuscous, apices black. Clothed with short, recumbent, simple fuscous to black pubescence, yellowish on ventral surface.

Holotype: ♀ April 13, 1928, College Station, TEXAS (H. G. Johnston); author's collection. *Paratypes*: 9 ♀, taken with the type on honey locust (*Gleditsia triacanthos*).

Plagiognathus subovatus n. sp.

Runs to *albocuneatus* Kngt. in my key (Hem. Conn., 1923, p. 431) but distinguished by the shorter antennae, both sexes with segment III shorter than width of head across eyes; male differs in the shorter and more rounded posterior lobe of left genital clasper, while second antennal segment is not equal to basal width of pronotum; female differs in the strongly arcuate embolar margins, veins of membrane pale, size distinctly smaller and more ovate.

♂. Length 3.6 mm., width 1.45 mm. Head: width .77 mm., vertex .38 mm. Rostrum, length 1.39 mm., reaching to middle of hind coxae, largely fuscous. Antennae: segment I, .27 mm., black; II, 1.06 mm., black; III, .64 mm., dusky yellow; IV, .44 mm., pale fuscous. Pronotum: length .59 mm., width at base 1.12 mm. Hemelytra with embolar margins moderately arcuate. Clothed with prominent, simple, pale to yellowish recumbent pubescence.

Black, vertex, spot just behind calli on middle of disk, lower margins of propleura, median line of scutellum but frequently obsolete on middle, outer half of clavus, basal half of corium, embolium, cuneus, and legs largely, pale. Membrane fuscous, slightly paler on middle, veins and spot behind smaller areole, pale. Coxae with basal third fuscous; apical half of femora with two rows of spots on anterior aspect, also group of spots on posterior face black, becoming obscured with fuscous; front and middle femora with a row of four or five small black dots on median line beginning at middle. Tibiae with spots and spines black, tarsi fuscous. Genital claspers distinctive, left clasper with posterior lobe shorter and more rounded than in *albocuneatus*.

♀. Length 3.4 mm., width 1.6 mm. Head: width .77 mm., vertex .40 mm. Antennae: segment I, length .27 mm.; II, .99 mm.; III, .67 mm.; IV, .42 mm. Pronotum: length .59 mm., width at base 1.17 mm. Embolar margins more strongly arcuate than in the male, pubescence and coloration very similar but somewhat more broadly pale.

Holotype: ♂ July 9, 1921, St. Anthony Park, St. Paul, MINNESOTA (H. H. Knight), taken at light; author's collection. *Allotype*: Aug. 11, taken at the same light. *Paratypes*: 3♀ July 6, ♀ July 8, ♀ July 10, ♂ July 9, 1921, topotypic, taken at light.

This species is allied to *albonotatus* Kngt. but differs in the black second antennal segment and in form of the genital claspers, general form also somewhat larger.

Plagiognathus fusciflavus n. sp.

Allied to *alboradialis* Kngt., but differs in that both sexes are rather similar and more broadly pale; scutellum pale with basal angles broadly fuscous; corium pale, a longitudinal fuscous stripe thru the middle; cuneus pale yellowish brown, darker on middle.

♂. Length 4.1 mm., width 1.45 mm. Head: width .75 mm., vertex .37 mm.; yellowish, lora and tylus black, the latter with a spot on each side of a Y-shaped mark at base, pale; gula, spot above base of antennae and obsolete marks on frons, fuscous. Rostrum, length 1.55 mm., reaching upon fourth ventral segment, yellowish, last two segments black. Antennae: segment I, length .26 mm., black; II, 1.15 mm., black; III, (broken). Pronotum: length .56 mm., width at base 1.12 mm.; pale to yellow, calli fuscous, black on inner margins, yellow before, narrow collar margin black; propleura fuscous, lower margin pale. Mesoscutum rather broadly exposed, yellowish; scutellum pale yellowish, basal angles rather broadly infuscated, sutural line at base blackish but obsolete on middle.

Dorsum and venter clothed with simple yellowish pubescence, but blackish on the legs. Hemelytra pale, corium with a longitudinal fuscous stripe thru the middle, only slightly wider apically; commissural edges of clavus blackish; cuneus yellowish brown, darker on middle. Membrane pale to dusky, a fuscous spot each side just behind apex of smaller areole, anal area blackish; veins yellowish, an opaque callous mark bordering apex of larger areole. Ventral surface fuscous but not entirely obscuring the yellowish pigment of the hypodermis; ostiolar peritreme yellowish. Legs yellowish, femora with rows of black spots, larger on hind femora, but those on posterior aspect grouped on distal half. Tibiae with knees, spots and spines, black; tarsi black.

♀. Length 4 mm., width 1.5 mm. Head: width .77 mm., vertex .41 mm. Antennae: segment I, length .26 mm.; II, 1.03 mm.; III, .68 mm.; IV, .38 mm.; black. Pronotum: length .56 mm., width at base 1.15 mm. Very similar to the male in pubescence and coloration, but venter more broadly yellowish, posterior half of each segment only blackish.

Holotype: ♂ June 26, 1926, LaGrande, OREGON (E. W. Davis); author's collection. *Allotype*: same data as the type.

Plagiognathus fuscipes n. sp.

Runs to *laricicola* Kngt. in my key (Hem. Conn., 1923, p. 431) but distinguished by the longer rostrum and more prominent and pointed head.

♂. Length 3.7 mm., width 1.3 mm. Head: width .77 mm., vertex .37 mm., moderately produced, tylus prominent as viewed from above. Rostrum, length 1.96 mm., reaching upon fifth ventral segment, black. Antennae: segment I, length .27 mm.; II, 1.05 mm.; III, .66 mm.; IV, .42 mm.; black, last two segments pale fuscous. Pronotum: length .53 mm., width at base 1.09 mm.

Clothed with moderately prominent, pale to yellowish pubescence. Color black with a tinge of brown, the cuneus uniformly black like the corium. Membrane and veins uniformly dark fuscous, slightly paler by tip of cuneus. Vertex transversely pale. Legs uniformly fuscous over a lighter ground color, tibiae slightly paler, spines with small basal spots black; hind femora with a double row of black spots showing thru the fuscous shade; apical half of coxae and the trochanters pale.

♀. Length 3.6 mm., width 1.48 mm. Head: width .72 mm., vertex .39 mm. Antennae: segment I, length .24 mm.; II, .96 mm.; III, .65 mm.; IV, .35 mm. Very similar to the male in pubescence and coloration.

Holotype: ♂ August 9, 1925, Veta Pass, COLORADO (H. H. Knight); author's collection. *Allotype*: same data as the type. *Paratypes*: 7 ♂ 2 ♀ taken with the types on *Dasiophora fruticosa* L. where the species was evidently breeding.

An Unusual Catocala Colony (Lepid.: Noctuidae).

By Lucien Harris, Jr., Macmillan Company, Publishers, Atlanta, Georgia.

While it is not unusual to find many species of lepidoptera abounding in certain areas, it has been my good fortune to find here in Atlanta, in a very restricted area, twenty-seven species and ten variations of moths belonging to the genus *Catocala*.

Some are common and some are rare, but they were all taken in a little wooded ravine not over two acres in extent. The very limited space in which I have found all of these, and the further fact that none is to be found in other nearby patches of woods, makes this particular place quite unusual.

The woods in this little ravine are rather open and made up of the following trees: pine (quite a number), a few immense poplars, a good many oaks, and the following in decreasing numbers, beech, hickory, dogwood, sweet gum, ironwood, willow and hawthorne.

Several species of the *Catocalae* are very abundant during their particular season of the summer. Of these I would especially mention *C. epione, C. cara,* var. *carissima, C. ilia, C. maestosa, C. lacrymosa and C. innubens.* A few others are common in certain favorable years. I remember two years ago I took a number of *C. consors* in this place where previously it had been very rare. Also during one excellent year for *Catocalae* I counted forty-five *C. maestosa* sitting on one poplar tree. One day last year I found fifteen of the beautiful *C. cara* variety *carissima* all under a favorite log. In this colony, *C. cara* itself is seldom found. In fact I have seen and taken only four or five specimens, but the form *carissima* is abundant.

I would like to make special mention of a few of the moths encountered. My first *C. marmorata* was found sitting on a medium sized pine tree. At rest it resembled a very large *C. maestosa* and it was not until the cyanide jar was quickly thrust over it, that I realized what a prize had been captured. The following year I caught another one within a hundred feet of the same spot. It was sitting on one of the large poplars. Both were fresh specimens and were taken in August.

C. angusi form *lucetta* I find is partial to the pine as a place to rest. *C. lacrymosa* rather prefers the beech and dogwoods, while *C. vidua* and *maestosa* seem to like the poplars as a resting place, or perhaps I should say hiding place for their colors and markings blend remarkably well. *C. nebulosa* I found sitting with several *carissima* underneath a log that had fallen across a small stream that flows through these woods. *C. ilia* is usually plentiful and is to be found each year in several varietal forms.

C. mira appears to be out of its recorded range but the specimen taken is undoubtedly this species.

For those interested I am giving a complete list of the *Catocalae* taken up to date in this little area. The nomenclature is that given in Barnes and McDunnough's work on *Catocala*.

Agrippina (Strecker), *agrippina* form *subviridis* (Harvey), *alabamae* (Grote), *amatrix* (Hübner), *amatrix* form *selecta* (Walker), *amica* (Hübner), *amica* form *nerissa* (Hy. Edwards), *andromeda* (Guenée), *angusi* form *lucetta* (Hy. Edwards), *cara* (Guenée), *cara* form *carissima* (Hulst), *consors* (Abbott and Smith), *crataegi* (Saunders), *clonympha* (Hübner), *epione* (Drury), *flebilis* (Grote), *ilia* (Cramer), *ilia* form *conspicua* (Worthington), *ilia* form *duplicata* (Worthington), *innubens* (Guenée), *innubens* form *scintillans* (Grote), *insolabilis* (Guenée), *lacrymosa* (Guenée), *lacrymosa* form *evelina* (French), *lacrymosa* form *paulina* (Hy. Edwards), *maestosa* (Hulst), *marmorata* (Edwards), *mira* (Grote), *nebulosa* (Edwards), *obscura* (Strecker), *piatrix* (Grote), *robinsoni* (Grote), *ulalume* (Strecker), *ultronia* (Hübner), *ultronia* form *celia* (Hy. Edwards), *vidua* (Abbott and Smith), *Euparthenos nubilis* form *fasciata* (Beutenmüller).

Three New Species of Agrilus (Coleop.: Burprestidae).

By J. N. Knull, Pennsylvania Bureau of Plant Industry.

Agrilus duncani n. sp.

Head bronzy green; pronotum dark blue almost black; elytra cupreous, suture dark blue; ventral surface dark blue, more shining than above.

Head convex, a slight median depression, rugosely punctate, densely clothed with recumbent pubescence; antennae short, serrate beginning with the fifth joints.

Pronotum slightly wider than long, convex, widest at middle, sides arcuately rounded to just behind the middle, then strongly sinuate to posterior angles; marginal and submarginal carinae feebly sinuate, separated anteriorly and joined near base; anterior margin strongly sinuate, median lobe broadly rounded; disk convex, broad oblique depression along each lateral margin; prehumeral carinae distinct, surface finely transversely rugose, sparsely clothed with recumbent pubescence, which is more numerous laterally. Scutellum granulate, without transverse carina.

Elytra at base slightly wider than pronotum at base, sides sinuate, tips rounded, slightly prolonged, strongly serrulate; sides of abdomen visible from above; disk slightly flattened, sutural margins strongly elevated posteriorly, moderate basal depressions; surface densely imbricate-punctate, recumbent pubescence sparse, more prominent along suture.

Abdomen beneath finely punctate, pubescent, first and second segments united, suture between the two segments faintly indicated at sides, median depression smooth, extending to middle of second ventral segment; pygidium without projecting carina. Prosternum densely clothed with long white pubescence, prosternal lobe broadly rounded, feebly emarginate in front. Tarsal claws on anterior and middle feet toothed, inner portions only feebly turned inward, the tips distant, posterior tarsi lacking. Length 6 mm., width 1.5 mm.

Described from one male specimen in the collection of the writer, labeled Sierra Ancha Mountains, ARIZONA, D. K. Duncan collector. The species would run to *Agrilus ferris* Dury in Fisher's key,* but the antennae being serrate from the fourth joint will at once separate it from that species.

Agrilus fisheri n. sp.

Color, form and markings of *Agrilus felix* Horn, brownish cupreous, a vitta on each side of pronotum and elytra formed by white pubescence.

Head with slight median depression on vertex; surface granulate, lower half covered with dense white pubescence which conceals the surface; antennae serrate beginning with the fourth joints.

Pronotum nearly twice as wide as long, slightly wider at apex than at base, widest in middle; sides arcuate from apex to base; marginal and submarginal carinae sinuate, separated in front and joined near base; anterior margin broadly sinuate; disk slightly flattened, with two median depressions, anterior one broad, lateral oblique depressions deep; prehumeral carinae distinct, surface granulose, lightly transversely rugose. Scutellum granulate, transversely carinate.

* W. S. Fisher—U. S. National Museum, Bul. 145.

Elytra at base wider than base of pronotum; sides sinuate, tips rounded, serrulate; sides of abdomen exposed above; disk with a longitudinal costa on each side, sutural margins elevated on apical third, basal depressions deep; surface imbricate. Abdomen beneath finely punctate, a dense patch of white pubescence on each side of each abdominal segment; pygidium carinate, carina projecting.

Prosternum densely clothed with recumbent white pubescence, prosternal lobe broadly rounded, feebly emarginate, prosternal process with sides parallel between and behind front coxal cavities, tip acute. Tarsal claws similar on all feet, cleft, inner tooth slightly shorter but not turned inward.

Length 8 mm., width 2.5 mm.

Described from one female specimen in the collection of the writer labeled Phoenix, ARIZONA, June 2, 1927, A. A. Nichol collector.

According to Fisher's key, the species would run to *Agrilus macer* Lec., however the white vittae on the dorsal surface will at once separate it from that species. Named for Mr. W. S. Fisher, who kindly compared the three species described in this paper with the types in the National Museum collection.

Agrilus parafloridanus n. sp.

Color bronzy green, form of a stout *Agrilus floridanus* Cr.

Head with a broad depression on vertex; surface irregularly rugose; antennae short, serrate beginning with the fifth joints.

Pronotum wider than long, wider at apex than at base, widest in middle; sides arcuately rounded, from apical angles to base; marginal and submarginal carinae sinuate, widely separated anteriorly, connected near base; anterior margin strongly sinuate, median lobe broadly rounded; disk convex, with two slight median depressions, lateral depressions deep; prehumeral carinae not sharp, but well indicated; surface coarsely, transversely rugose, punctate between rugae. Scutellum transversely carinate.

Elytra at base as wide as base of pronotum; sides sinuate to broadly rounded tips, tips serrulate; sides of abdomen exposed from above; disk flattened, sutural margins elevated posteriorly, basal depressions deep; surface densely coarsely imbricate-punctate, sparsely clothed with small hairs, a small patch of indistinct pubescence on each elytron in front of middle and on apical fourth, which give the appearance of spots.

Abdomen beneath imbricate, clothed with recumbent hairs, first and second segments united, suture between the two segments faintly indicated at the sides; pygidium with a feeble longitudinal carina, which does not project.

Prosternum densely clothed with recumbent pubescence; anterior margin truncate; prosternal process wide, sides parallel to apex, which is truncate.

Tarsal claws similar on all feet, cleft, inner tooth shorter than outer, not turned inward.

Length 7.5 mm., width 2 mm.

Described from one female specimen in the collection of the writer, labeled Apopka, FLORIDA, July 11, 1926, E. D. Ball collector.

According to Fisher's key, this species would run to *Agrilus floridanus* Crotch, but it can be separated from that species by the color, the head being more deeply depressed; wider and more coarsely sculptured pronotum.

A Swarm of Dragonflies in Costa Rica (Odonata).

On the morning of January 3d of the current year, at about 8 A. M., I was standing on the front porch of my home when I saw what seemed to me a swarm of locusts flying at a great height from east to the west, more or less. It was impossible to tell what they were, but in the afternoon of the same day while I was in the back yard, I noticed another swarm flying low and I thinking they would land on the nearby fields came out and ran toward the direction in which I had seen them flying, but with little or, better, no success, except that I was able to see that the insects were large dragonflies and not locusts, as I imagined before. The following day I found that a man from Tres Rios had also noticed a swarm of dragonflies flying towards San José on the same day, and also few persons in Turrúcares and Rio Grande. They tell me also that some school children in Rio Grande have captured some and that they are about four inches from one end to the other of the wings. I shall try very hard to obtain a sample of them.
C. MADRIGAL MORA, Liceo, San José, Costa Rica.

In reference to this note by Mr. Mora, Prof. J. F. Tristán wrote: "I tried to get some specimens of this dragonfly, but it was impossible, because they fly very high and very quickly. My colleague, Mr. C. Madrigal Mora, Professor of English at the Liceo, saw this swarm and I asked him to write a description of this, new to me, phenomenon. I am sending you herewith the description. Many persons spoke to me about this swarm of *pipilachas*. A teacher told me that he had seen the same flock of *libélulas* in Turrúcares the same day. I can say that the flock was seen in Escasú, San José and Tres Rios."
—J. FID. TRISTÁN, San José, Costa Rica.

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

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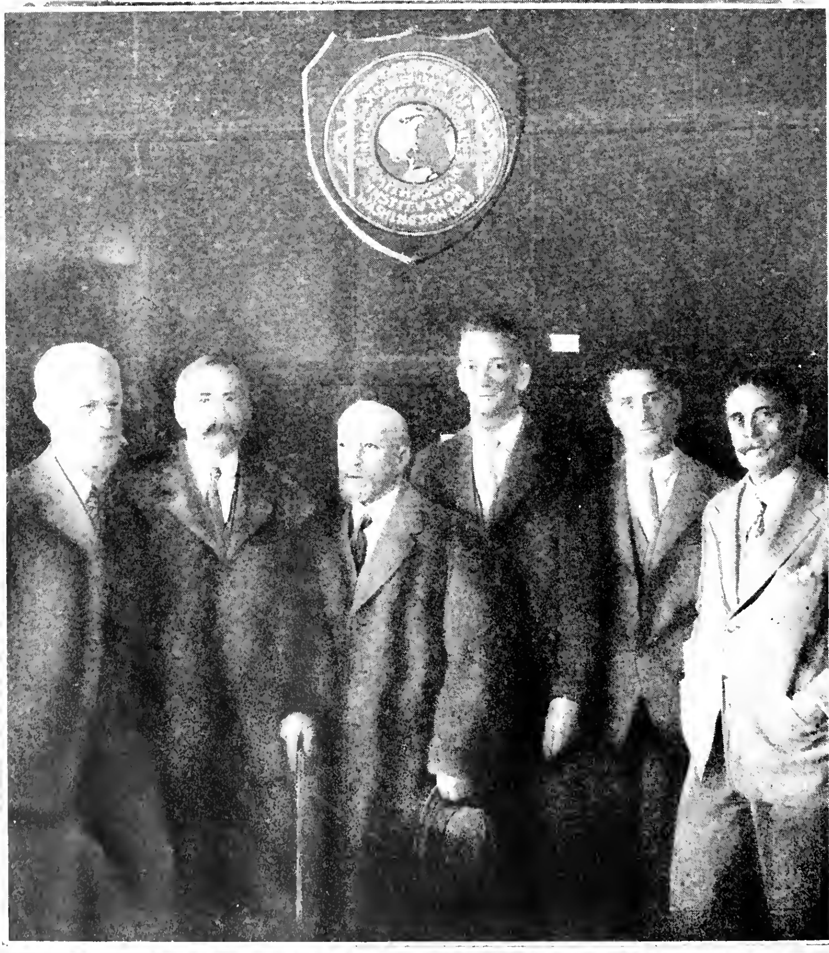
Owing to increased cost of labor and materials, no illustrations will be published in the News for the present, except where authors furnish the necessary blocks, or pay in advance the cost of making blocks and pay for the cost of printing plates. Information as to the cost will be furnished in each case on application to the Editor. Blocks furnished or paid for by authors will, of course, be returned to authors, after publication, if desired.

Stated Meetings of The American Entomological Society will be held at 7.30 o'clock P. M., on the fourth Thursday of each month, excepting June, July, August, November and December, and on the third Thursday of November and December.

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

The printer of the "News" will furnish reprints of articles over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 35 cents; three or four pages, twenty-five copies, 70 cents; five to eight pages, twenty-five copies, $1.40; nine to twelve pages, twenty-five copies, $2.00; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be at the corresponding multiples of these rates.



*DR. HARRISON G. DYAR
DR. WM. G. SCHAUS
DR. L. O. HOWARD
CARL HEINRICH
AUGUST BUSCK
FRANCIS H. NOYES

*Deceased

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North American Institutions Featuring Lepidoptera.
VIII. U. S. National Museum, Washington, D. C.

By J. D. Gunder, Pasadena, California.

(Plate XVI).

Every country has a museum, or group of museums, in its capital city. Among the oldest is the British Museum in London which came into existence in 1753 by act of Parliament and was inspired by the will of Sir Hans Sloane, who left an invaluable collection of books, manuscripts and so-called curiosities. Actually, the first scientific museum on record along modern lines was begun at Oxford, England, in 1667, by Elias Ashmole. Though not under national control, it still survives and is known as the Ashmolean Museum. The beginning of a government collection in America dates from 1826, when James Smithson bequeathed his estate to the United States "to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men." Mr. Smithson's personal effects consisted of several boxes of books and a good mineral collection of about ten thousand small specimens. This formed the nucleus of our nation's first display cabinet. Unfortunately this collection was destroyed in the Smithsonian fire of 1865. The phrase "National Museum", or the idea of a National Museum, was first suggested in 1840 by Hon. Joel R. Poinsett, of South Carolina, who was Secretary of War under President Van Buren. The words "National Museum of the United States" were painted over the door of the exhibition hall of the Smithsonian Building in 1859 and since then there has been an ever-increasing tendency to submerge the word Smithsonian in favor of the broader name. However, there will always be a Smithsonian Instititíon Building in

Washington to perpetuate the original bequest and ideals of the founder.

The new Natural History Building shown in the oval on the accompanying plate was completed in 1912 and is one of several fine structures in Smithsonian Park where all the government museum buildings are located. The Division of Insects, under the Department of Biology, occupies a number of rooms on the third floor and here are assembled all the entomological collections, as well as the offices and laboratories of the many scientists whose work is so well known.

The National collection of insects has from the earliest time been closely associated with the U. S. Bureau of Entomology, which has contributed not only a large part of the specimens during the last forty years, but which, also, has paid the salary of the major part of the working force. The chiefs of the Bureau of Entomology (C. V. Riley and Dr. L. O. Howard) have been the honorary Curators of the insect collections. A portrait of Dr. Howard is among the group[1] shown on plate XVI. The Doctor tells me that for personal study he is partial to parasitic hymenoptera and that next to that he finds great pleasure in adding to his private entomological library, which already consists of six or seven thousand volumes and pamphlets. Since going to Washington in 1878, he has not felt the need of a private insect collection and those which he made as a youth were given to Cornell University. I hope the Doctor will forgive me if I list the degrees which have come to him: B.S., Cornell, 1877; M.S., Cornell, 1883; Ph.D., Georgetown, 1896; M.D., George Washington, 1911; LL.D., Pittsburgh, 1911; Sc.D., Toronto, 1921; LL.D., University of California, 1929. It can be said that L. O. Howard put economic entomology on the map. His books were largely responsible for the anti-house fly campaign all over the world in

[1] Photograph taken Jan. 4, 1929, in the Lepidoptera collection room. This is the last picture in which Dr. Harrison Grey Dyar appeared. He was very shortly to have been made "Expert in Culicidae (mosquitoes), Bureau of Entomology", but death took its toll Jan. 21st. A fine testimonial biography appears in *Science* under date of Feb. 8, 1929, from the pen of Dr. L. O. Howard.

the last twenty years and he will always be remembered as a leader in the international "mosquito campaign". He forced the people and the governments to understand the need of insect control. Dr. Howard was born at Rockford, Illinois, on June 11, 1857, and has three charming daughters.

The small beginnings of the Lepidoptera collections at the National Museum date from Towsend Glover and C. V. Riley. They took more technical form from the early work of John B. Smith and were well on the way when Dr. H. G. Dyar became custodian in 1897 and gave his large collection of North American Lepidoptera to the museum. From then on the collection as a whole acquired importance through the very many types, several thousands, described by Dyar, Schaus, Busck and Heinrich and by the acquisition of numerous large and smaller collections, among the more important of which are:

1897. Harrison G. Dyar collection (gift); North American, arranged according to the Dyar List.

1898. Hoffman collection (purchase); Palearctic Lepidoptera, a very complete, well mounted and well determined European collection.

1903. Wm. Schaus collection (gift); Central and South American Lepidoptera, worked up in subsequent years and constituting the major part of the largest and most important South and Central American collection extant.

1903. U. Nawa collection (gift); Japanese Lepidoptera exhibited at the St. Louis World Fair.

1908. Meyrick collection (gift); Australian Microlepidoptera, authentically named material.

1911-12. Smithsonian Panama Expedition collection; large collection made by Busck and subsequently worked up by Busck and Dyar, yielding many hundreds of new types.

1912. Walsingham collection (gift); Microlepidoptera (c. half types and cotypes) of the *Biologia Centrali-Americana;* also numerous other named micros from Africa and the East.

1920 ?. Idding collection (gift); Lepidoptera, largely exotics in glass mounts and largely used for exhibition purposes.

1924. C. H. Fernald collection (purchase); mainly Microlepidoptera, containing Fish types, Fitch's Pterophorid types and many North American cotypes of Hulst, Packard, Grote and Walsingham, besides Fernald's own Tortricid types.

1925. Dognin collection (purchased by subscription and presented to the Museum); mostly exotics, about 80,000 specimens with over 3000 Dognin types and 300 Thierry-Mieg types.

1925. Schoenborn collection (gift); eastern United States and European material.

1925. Hamfelt collection (purchase); large, well determined and well preserved Palearctic collection.

1928. A. Philpott collection (gift); authentic collection of New Zealand Microlepidoptera, nearly complete.

1929. Brooklyn Museum collection (permanent deposit); a very large series of North American collections, including types of Neumoegen, Hulst and others.

The Lepidoptera collections are all kept in one hundred metal cases of fifty drawers each and two hundred wooden cases of twenty-two drawers each. The drawers average 18 x 18 inches. This makes a total of 9400 drawers containing the butterflies and moths. Perhaps there are well over 500,000 mounted and labeled specimens altogether. The number of types exceed 12,000 according to index record.

When anyone wants to know about foreign moths he asks Dr. William Schaus, for he has worked with and described more exotic Heterocera than any other American. Harry Edwards first interested the Doctor in Lepidoptera. Born in New York City, January 11, 1859, he attended private schools in England and France and won his M.A. at the University of Wisconsin. The degree of D.Sc. was received several years ago from the University of Pittsburgh. Dr. Schaus had a very complete entomological library which was donated to the Smithsonian, but remains under his personal care. He is at present concluding "A Monograph of American Bombycidae" for Seitz's Lepidoptera of the World.

I was very glad to include Mr. Carl Heinrich in the group photograph. Although an associate entomologist with the U. S. Bureau of Entomology, he has been working in conjunction with the Insect Division of the National Museum since 1913 and has numerous papers upon American moths and their larvae to his credit. Beginning in 1916, he made a number of productive collecting trips through the southwestern United States. Unlike most entomologists, Mr. Heinrich is an all-round student, being well versed and interesting himself in history, literature and philosophy especially. He was born April 7, 1880, in Newark, New York, and was brought up in Omaha, Nebraska.

The gentleman on the extreme right in the picture is Mr. Francis H. Noyes, the well-known entomological artist. He has made upwards of one thousand paintings of Lepidoptera for the Museum. His work is in reality miniature painting of insects. Mr. Noyes says, "I first make an academic drawing of each subject to be figured and then paint it as I would any miniature portrait. I started drawing at the age of fifteen and painting at about eighteen or nineteen under the tutelage of Dr. Wm. H. Holmes, the venerable Director of the U. S. National Museum, than whom, in my humble opinion, there is no superior aquarelle artist. After working in Washington until 1886, I went abroad to study and lived in London and on the Continent for twenty-eight years, returning to America in 1914." To view some of Mr. Noyes' portraits of Lepidoptera is to know to what exceptional success he carries his art. Each figure is an exquisite expression in life-like detail and color.

August Busck first came to the Government in 1895 and he is undoubtedly the American expert on Microlepidoptera. These are the very interesting little fellows of which the common cloths moth is a representative. Mr. Busck has described nearly 1200 new species, the types for the most part being in the National Museum, except for a few in the Wm. Barnes collection at Decatur, Illinois. He has accomplished much revisional work, especially in the Families Gelechiidae, Oecophoridae and Phaloniidae. As a lepidopterist he accompanied the Smithsonian Biological Survey to Panama. Mr. Busck was born Feb. 18, 1870, at Mygdal in the district of Randers, Denmark, and was raised in Copenhagen where he was graduated from the Royal University. He married Ville Christensen of Hoboken, New Jersey, in July, 1895, and has four children, two boys and two girls.

In the preparation of this article upon the National Museum, I am much indebted to Mr. Busck for considerable patient help. He is a man whom any entomologist would be glad to personally know or correspond with. If you have a few extra micro moths or should incidentally collect some at light, send them on to August Busck, for they may be new and it is worth while to receive any credit of discovery.

A Correction.

In my article upon the Carnegie Museum and its activities, published in the issue of July, 1929, I gave what purported to be a short biographical account submitted to me by my good friend, Dr. W. J. Holland. In preparing the article I did not always closely follow the language of the sketch of his life, which he gave me at my urgent request a year or more ago, and I now discover to my regret that I would have done better to have used exactly the words which he wrote. He did not say, as I represented him as saying: "In 1874 I had learned enough about religion to hold down the pastorship of the Bellefield Presbyterian Church in Pittsburgh. Fortunately, and as a relief from pure clergical work I was almost immediately thereafter made a Trustee of the Pennsylvania College for Women." The original reads: "In the spring of 1874 I was installed as the pastor of the Bellefield Presbyterian Church in Pittsburgh and almost immediately thereafter was made a Trustee of the Pennsylvania College for Women." In the top paragraph of p. 214 I quote Dr. Holland as saying: "About this time I again renewed my interest in natural history and resumed the collection of insects. I felt I needed diversion from the narrowness of the ministerial profession." The original manuscript reads: "About this time I began to feel I needed diversion from more strictly professional duties, and fell back upon the study of nature. I resumed the collection of insects." Dr. Holland insists that I have unfortunately and with no intention of grieving him, quite misrepresented his attitude as to his calling, which he declares is not "narrow" from his point of view, and which he regards as "high and most honorable."—J. D. Gunder, Pasadena, California.

The Parasites of Wireworms (Coleop.: Elateridae).

By C. A. Thomas, Pennsylvania State College.

The true wireworms seem to be comparatively free from internal parasites. They are heavily chitinized and live entirely underground, which may have much to do with freedom from attack. That these are not the only factors is indicated by the fact that the "False wireworms" or Tenebrinoid larvae, which are likewise heavily chitinized and subterranean, are attacked by several parasites.

Reference to the literature on wireworms in this country and Europe indicates that the parasites are quite local in their distribution, and in only a few instances could be considered as control factors. Their scarcity is indicated by the following: Conradi and Eagerton, (1914), and Gibson, (1916), found none in their studies of *Horistonotus uhleri* Horn in South Carolina; Graf (1914) found none in ten thousand larvae of *Limonius californicus* Mann. in California; Veitch (1916) found the Sugar-Cane Wireworm, *Simodactylus cinnamoneus* Boisd. free from parasites; Williams and Swezey (1922), in their search for the parasites of the wireworms of Hawaii, found none in the Philippines, Australia, or in the countries bordering the Gulf of Mexico; Escherich (1923) mentioned the scarcity of parasites; Strickland (1927) found no trace of parasites in *Ludius acripennis* Kby.; and in handling many thousands of wireworms during investigations in Pennsylvania the writer has found only one instance of wireworm parasitism.

Correspondence with investigators on the biology and control of wireworms has elicited the information that although they have handled many thousands of larvae, they have found no parasites.

The most important insect parasites of wireworms belong to the Hymenoptera, chiefly of the families Proctotrupidae and Bethylidae, and to the Diptera. Records of the hymenopterous parasites are as follows:

In England—Bierkander, (1805), found six wireworms in-

*Publication authorized by the Director of the Pennsylvania Agricultural Experiment Station as Technical Paper No. 476.

fested with "Ichneumons", which he did not rear to maturity, and did not name. John Curtis, (1845), noted the rearing of an internal parasite as far as the pupal stage but it did not become adult. He said it probably was a *Microgaster*, and gave a figure of it in the Royal Agricultural Journal, vol. III, plate E, fig. 10. In the same paper (1845), Curtis gave another reference to an "Ichneumon" larva infesting a dead larva of *Elater* (*Agriotes*) *lineatus*, and said the pupa was accidently forced through the wireworm's skin and the adult never emerged. Curtis was possibly wrong in thinking that the pupa projecting through the skin was accidental, as this is a normal habit of the Proctotrupids affecting wireworms. He thought that this parasite was far from uncommon, though he never found many, never reared it to the adult stage, and did not know its name. These same parasites were again referred to on page 159 of his "Farm Insects," (1860), but were doubtfully called *Proctotrupes viator*.

In 1917, Ford noted that *Agriotes obscurus* L. was very free from internal parasites but had been reported by Fryer as being attacked by an undetermined Hymenopteron. Rymer-Roberts, (1919), said that several specimens of a Proctotrupid, *Phaenoserphus* species, probably *P. fuscipes* Hal., were bred in July from a larva of *Athous haemorrhoidalis*, and that Dr. M. Laurie, of the Rothamsted station, found several parasites, probably Proctotrupids, in a larval *Agriotes obscurus*.

Koblova (1922) recorded an undetermined Proctotrupid reared from a larva of *Agriotes lineatus* L. at Orlov, Russia, while Blunck, (1925), stated that in 1922 he obtained one male and nineteen females of the Proctotrupid *Paracodrus apterogynus* Halid. from an *Agriotes sputator* larva in Germany. In 1924, Zolk recorded *P. apterogynus* as parasitizing *Agriotes obscurus* L. in Esthonia. In most instances the parasite pupae protruded from the dead bodies of wireworm larvae that were ready for pupation. In his Nov. 1924 paper, Zolk described and figured this parasite and discussed its biology. In a letter to the writer, Zolk says, "*P. apterogynus* is spreading very rapidly. First found in 1923, in 1924 I found considerably more, and in 1925 the number of infected wireworms was increased to 25 per cent. Thus this is a very important wireworm parasite, and is the only one found in Esthonia."

Régnier (1928) found the larvae of *Agriotes obscurus* L. to be parasitized by the Proctotrupid, *Phaenoserphus pallipes* Latr. in the neighborhood of Rouen, France, at the end of April. These parasites, a description of which is given, were bred in the laboratory and emerged in series over a period of 15 days, beginning in early May. Régnier stated that Ferrière also found *P. pallipes* as a parasite of undetermined *Agriotes* larvae.

South America—In the "Gaceta Rural", (1914), the Ichneumon, *Bracon dispar*, was said to be an effective parasite of *Agriotes* (*Elater*) *segetis*, which would otherwise be a most injurious pest to cereals in Argentina.

United States—Klippart, in 1860, stated that a small ichneumon fly, *Proctotrupes viator*, was very abundant, laying 20 to 30 eggs in wireworms, producing maggots which destroyed the latter. This note may have been taken by Klippart from Curtis' "Farm Insects".

Hyslop, (1915), found a *Melanotus* larval skin firmly attached to an empty hymenopterous pupal case, which closely resembled a Tiphia cocoon. This was probably a Bethylid cocoon. Hyslop said that J. J. Davis had made an identical observation in Indiana.

Hyslop, (1916) gave a description and account of a larva of the Bethylid, *Pristocera armifera* (Say), which was found in late July, 1915, at Brattleboro, Vermont, attached to the ventral surface of a living *Limonius agonus* (Say) larva. After destroying this wireworm it attacked another and soon killed it, leaving its second host on July 29 and spinning a silken cocoon on the soil surface. The adult parasite emerged on August 30, thirty-three days after the cocoon was spun. Hyslop gave figures of this parasite.

In the late summer of 1924 the writer found an empty light brown silken cocoon in soil at Riverton, N. J. Attached to the outside of this cocoon was the empty skin of a *Melanotus* larva. From the cocoon and from remains of the parasite pupal skin found within the cocoon, A. B. Gahan of the National Museum identified this as *Pristocera armifera.* This cocoon with its attached wireworm skin is shown in figure 1.

Hayes, (1927), recorded finding, in a corn plot at Manhattan, Kansas, August 19, 1920, a dead larva of *Aeolus dorsalis* Say with an external larval parasite attached. This parasite had its head inserted in the ventral side of the wireworm's abdomen. On August 21 it spun a brown silken cocoon, and the adult emerged in late September. Rohwer identified this adult as *Pristocera armifera.* A similar cocoon was found on the same plots in February, 1921, with a *Melanotus* larval skin attached, but the adult parasite had emerged.

Fig. 1.—*Pristocera armifera* (Say) Cocoon: enlarged x 2. The empty skin of a Melanotus larva is attached to it.

In a recent paper, Bryson, (1929), noted the occurrence of several unnamed parasites among wireworms he had reared at Manhattan, Kansas. J. W. McColloch, of Manhattan, states that the parasite mentioned by Bryson is *Pristocera armifera.* In one collection of *Melanotus* larvae from a pasture near Manhattan in 1928, about 25 per cent. of these wireworms were parasitized by *P. armifera.* This is the only instance of a high percentage of parasitism found at Manhattan.

The above data are all that the writer has found in regard to the hymenopterous parasites of wireworms.

The references to dipterous parasites of wireworms are even more scarce, and consist of the following two items:

S. A. Forbes, (18th Report, 1892, p. 41), says "A single parasitic fly has been bred by us from a wireworm, which because of its condition when found, could be only doubtfully referred to *Melanotus fissilis*." This fly was never determined, and according to a recent letter from Dr. Forbes, cannot now be found in their collection.

The other reference is a paper by C. M. Packard which has just appeared in the Journal of Economic Entomology. In this paper Packard stated that in June, 1919, he reared six specimens of the Dexiid fly, *Ateloglossa cinerea* Coq. from *Melanotus* larvae collected by D. J. Caffrey in his garden at Arlington Heights, Massachusetts. This parasitism did not average over 3 per cent. of the larvae collected. In a lot of *Melanotus* larvae collected in the same garden in the spring of 1921, Van Zwaluwenburg found 20 per cent. parasitism, although apparently no adult parasites were reared. In the field the parasitized wireworms came out onto the soil surface about the time the parasite larvae were ready to emerge. The maggot then issued from the side of the wireworm and formed its puparium just below the soil surface.

Internal Parasites other than Insects.

In Gardeners' Chronicle, London, vol. 3, p. 433, 1843, Bierkander stated that he obtained from a correspondent a *Filaria* worm taken from a wireworm. Curtis referred to this specimen in his "Farm Insects", (1860).

Conradi and Eagerton, (1914), said that a few *Horistonotus uhlerii* Horn larvae were killed presumably by an Annelid parasite observed in the bodies. This was identified as belonging to the family Enchytraeidae by P. S. Welch, who stated, however, that none of the species of this family are known to be true internal parasites, and he wondered whether this might not be a case of accidental parasitism.

Van Zwaluwenburg, (1928), stated "The only record of Nematode parasitism that we know of is given by Dr. F. X. Williams. While in Trinidad he bred an undetermined Mermithid from an Elaterid pupa associated in a rotten log with *Monocrepidius* larvae."

Régnier, (1928), gave a photograph of an adult *Agriotes obscurus* parasitized by an undetermined Nematode.

The foregoing records constitute all that a quite thorough review of the entomological literature has revealed in regard to the internal animal parasites of Elaterid larvae. It is possible, however, that there have been omissions, and the writer will appreciate having such omissions brought to his attention.

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Four New Species of Chiggers (Acarina-Trombidiidae).

By H. E. Ewing, Bureau of Entomology, Washington, D. C.

In this paper there are described three new species of *Trombicula* (larval instar) and one new species of *Schöngastia* (larval instar). All four of these species were collected in the Atlantic Coast states. The types are deposited in the United States National Museum.

Key to the Trombicula Larvae Described in this Paper.

1. Palpal claw bifurcate; dorsal plate fully twice as broad as long; 38 dorsal abdominal setae
T. myotis, new species.
Palpal claw trifurcate; dorsal plate about one and a half times as broad as long; not over 32 dorsal abdominal setae ....2.
2. Pseudostigmatic organs pectinate; a transverse line behind each pseudostigmata; dorsal abdominal setae 32
T. bisignata, new species.
Pseudostigmatic organs simple; no transverse line behind each pseudostigmata; dorsal abdominal setae 26-30
T. whartoni, new species.

Trombicula myotis, new species.

Palpi angulate laterally, the outer wall of the second segment being suddenly thickened near the anterior end and produced outwardly into a lateral angle. First palpal seta simple, about as long as the segment on which it is situated; second palpal seta simple and about twice as long as the first; third palpal seta simple and somewhat shorter than the first. Palpal claw divided into two elements, the inner being much the largest and longest. Dorsal plate over twice as broad as long, front margin inwardly curved between each lateral seta and the median seta, posterior margin outwardly angulate behind each pseudostigmata. Pseudostigmata situated almost between the posterior pair of lateral setae of dorsal plate. Pseudostigmatic organs longer than the dorsal plate, flagelliform and pectinate for the distal one-half of their length. Anterior and posterior eyes equal. Dorsal abdominal setae short, thirty-eight in number, and arranged in irregular transverse rows as follows, 2-10-10-6-6-4. Legs moderate, anterior and posterior pairs subequal, second pair considerably shorter.

Length of partly engorged larva, 0.45 mm.; width, 0.25 mm.

Type host.—A bat, *Myotis lucifugus lucifugus*. *Type locality.*—Mt. Katahdin, Maine. *Type slide.*—Cat. No. 991, U. S. N. M.

Described from three specimens which were part of a lot taken from the type host at Basin Ponds, Mt. Katahdin, Maine, September 7, 1928, by Francis Harper and W. J. Hamilton, Jr. The specimens were taken from the tragi and ears. This species is quite distinct from any described *Trombicula* larva in the shape of the dorsal plate, and is the only one to be thus far reported in the Nearctic Zone from a bat host.

Trombicula bisignata, new species.

Palpi with outer margin of large second segment rounded, but not evenly so. First palpal seta pectinate, with many barbs; second palpal seta about as long as first and with only a few barbs; third palpal seta shorter than second and with two or three barbs. Palpal claw trifurcate, the two accessory prongs being small, subequal and situated laterally near the tip. Dorsal plate about one and a half times as broad as long, the front margin being almost straight while the posterior margin forms a broad angle with the apex on the median line. Pseudostigmata medium, situated slightly behind the middle of dorsal plate; immediately behind each in a short transverse line equal in length to the width of the pseudostigma. Each pseudostigmatic organ flagelliform and with about four barbs, its length about equal to the width of the dorsal plate. Front and rear eyes equal. Dorsal abdominal setae thirty-two, not well arranged into transverse rows. First and second pairs of legs subequal and slightly shorter than the third pair.

Length of unengorged larva, 0.31 mm.; width, 0.19 mm.

Type host.—Meadow mouse, *Microtus pennsylvanicus pennsylvanicus*. *Type locality.*—Mt. Katahdin, Maine. *Type slides.*—Cat. no. 992, U. S. N. M.

Described from four specimens as follows: one from *Microtus pennsylvanicus pennsylvanicus* taken at Mt. Katahdin, Maine, August 22, 1928, by W. J. Hamilton, Jr., and three from *Peromyscus maniculatus abietorum* taken at Mt. Desert Island, Maine, August 19, 1928, by W. J. Hamilton, Jr. This species from the extreme northeast part of the United States is nearest the common chigger of Europe, *Trombicula autumnalis* (Shaw) but differs from *autumnalis* in having the transverse lines behind the pseudostigmata and fewer barbs on the pseudostigmatic organs.

Trombicula whartoni, new species.

Palpi rounded laterally. First palpal seta provided with many barbs; second palpal seta provided with several barbs; third palpal seta with two or three barbs. The barbs on all the palpal setae are longer than usual. Palpal claw strongly curved, with two unequal accessory claws below about the middle. Chelicerae stout, curved, but with the tips broken off. Dorsal plate about one and a half times as broad as long; front margin incurved between median line and each lateral corner; hind margin strongly outcurved, more so toward the median line. Pseudostigmata situated about two-thirds the distance from the front margin of dorsal plate to the hind margin, and each a little more than its diameter from the median line. Pseudostigmatic organs longer than the dorsal plate, simple, flagelliform. Anterior and posterior eyes about equal, but the posterior ones without well-developed corneas. Dorsal abdominal setae of the usual size and structure, twenty-six in number not counting four situated on lateral margins. They are arranged in rows as follows, 2-6-6-4-4-2-2. Legs rather short, last pair longest, first pair next, second the shortest. Tarsal spine stout on Tarsus I and II, but almost setiform on tarsus III.

Length of partly engorged larva, 0.60 mm.; width, 0.45 mm.

Type host.—A bird. *Type locality.*—Summerville, South Carolina. *Type slide.*—Cat. No. 999, U. S. N. M.

Described from a single specimen taken from inside of ear of a bird, at type locality, by W. P. Wharton during bird-banding operations. This species is closely related to *T. autumnalis* (Shaw) of Europe, but has simple pseudostigmatic organs and fewer dorsal abdominal setae.

Schöngastia peromysci, new species.

Palpi angulate laterally near the end of large second segment. First papal seta with many barbs arranged along its entire length; second seta similar to first but slightly smaller. Palpal claw long, curved and trifurcate, the two accessory prongs being small, equal and situated on the outside near the tip of claw. Chelicerae stout, strongly curved and sharply pointed. Dorsal plate rather small. Pseudostigmata situated about twice their diameters apart; pseudostigmatic organs subcapitate, with very short pedicels; each being well studded with minute prickles. Dorsal abdominal setae numerous, over forty being present. Legs rather short; first pair equal to third and second pair shorter. Tarsus I enlarged above and distally so as to form sort of a tubercle, which is tipped with a seta.

Length of slightly engorged larva, 0.37 mm.; width, 0.20 mm.

Type host.—White-footed mouse, *Peromyscus leucopus noveboracensis*. *Type locality.*—Sturbridge, MASSACHUSETTS. *Type slide.*—Cat. No. 993, U. S. N. M.

Described from a single larva which was taken from the type host at Sturbridge, Massachusetts, May 27, 1928, by Francis Harper. This species is most nearly related to *S. sciuricola* Ewing, but in *sciuricola* the first papal seta is only slightly pectinate while the second is simple. In *peromysci* both the first and second palpal setae are heavily pectinate.

Eastern Branch American Association of Economic Entomologists.

A meeting of the Eastern Branch of the American Association of Economic Entomologists will be held on November 21 and 22 at the American Museum of Natural History, 77th Street and Central Park West, New York City. The Hotel McAlpin, Broadway and 34th Street, has been selected as headquarters. Results of research work in the form of papers requiring not more than fifteen minutes for delivery are desired and should be presented in a form suitable for publication, because it is hoped that arrangements will be made for their appearance in the *Journal of Economic Entomology*. The titles of papers, together with a brief statement as to the scope of each (for program purposes) should be submitted to the Secretary by November 8.

The revised Articles of Agreement will be presented for adoption.

As this is the first paper-reading session of the Branch, it is hoped that full advantage will be taken of the opportunities for presenting research work and for discussions.—HARRY B. WEISS, *Secretary*, Room 903, Trenton Trust Bldg., Trenton, New Jersey.

The Brackenridge Clemens Memorial.

The Academy of Natural Sciences of Philadelphia announces that through the generosity of Dr. James B. Clemens there has been established at the Academy a fund to be known as the Brackenridge Clemens Memorial Fund. Dr. Brackenridge Clemens, father of Dr. James B. Clemens, was America's pioneer student of the Microlepidoptera, and his collections and types formed the nucleus of the very important series of that suborder of insects now in the Entomological Department of the Academy.

Born in Wheeling, West Virginia, January 31, 1825, Brackenridge Clemens received his early education at the Virginia Military Institute, and after his graduation there he matriculated at the University of Pennsylvania, Medical Department, graduating with the class of 1848. Much of his life was spent at Easton, Penna., and his first contribution to entomology was published in the year 1859, in the *Proceedings of the Academy of Natural Sciences of Philadelphia.* Between that year and his premature and untimely death in 1867, the elder Dr. Clemens published eighteen papers, eight in the pages of the *Proceedings* and *Journal* of the Academy, and ten in the *Proceedings of the Entomological Society of Philadelphia*, all but one bearing upon the Microlepidoptera. In these contributions he described some hundreds of new species and thirty-one new genera, thus creating the first authoritative literature on the Microlepidoptera to appear in America. In 1903, Dr. August Busck, an outstanding student of the tineid section of the Microlepidoptera, appraised Dr. Clemens' contributions as "a series of systematic and biological articles which yet remain the most important contribution to our knowledge of American Tineina". During the troubled period of civil war days few were able to carry on in the atmosphere of placid thought which scientific work requires. When it is realized that while Dr. Brackenridge Clemens bore his share in the struggle of the day as an officer in the Union Army, and that his foundation of an important field of scientific endeavor was laid on the threshold of and during that great struggle, his example and devotion to his work cannot be other than an inspiration. H. T. Stainton, the eminent British Microlepidopterist, regarded Clemens' work so highly that in 1872 he reprinted in London the papers on Tineina under the title, *The Tineina of North America*, together with his correspondence with Dr. Clemens, which latter gives a delightful picture of the breadth and lucidity of mind of the American worker.

The Brackenridge Clemens Memorial Fund will provide for the care, elaboration and housing of the collections of Microlepidoptera at the Academy, along lines already made possible by Dr. James B. Clemens' assistance; will permit the increase of a recently established special memorial library on the suborder, and will assist in the publication of monographs and similar studies based on the collections covered by the Memorial.

The original collection of Dr. Brackenridge Clemens has been splendidly preserved and is regularly consulted by students of the Microlepidoptera. The entire series of the suborder is now housed in standard glass-top boxes contained in steel cabinets, while the Memorial Library contains copies of all of Dr. Brackenridge Clemens' publications and the more important works of other authors on the subject covered by the Memorial. The collections of Microlepidoptera now in the custody of the Academy also include the types and paratypic series of a number of authors other than Clemens, and excellent representative collections received from Mr. Frank Haimbach of the Academy's entomological staff, Dr. Annette Braun of Cincinnati, Ohio, and other students of these beautiful and diminutive moths.

A portrait of Dr. Brackenridge Clemens now hangs in the Hall of the Academy, which organization and its kindred entomological society were so closely and intimately associated with his scientific activities. His brilliant and invaluable studies hold an enviable place in entomological science in America, and the Memorial will concretely bring the inspiration of his work to those who follow his path.

Foreign Honorary Members of Two Entomological Societies.

It is interesting to glance at the selections of honorary members that have been made by the two oldest of the national entomological societies, both as to their distribution as to nationality and as to the character of the work that brought these individuals the distinction implied in the election to either of these great old societies.

The Entomological Society of France has, since its foundation in 1832, elected thirty-one foreign honorary members. It has also had the custom of electing French honorary members, and fifty-four of those have been chosen during the nearly one hundred years' existence of the Society.

The Entomological Society of London, on the other hand, does not elect British entomologists as honorary fellows (only foreigners). For many years its rules restricted this list to ten. Later it was increased to twelve. During its entire history it has elected fifty-seven such honorary fellows. As a rule the number permitted by the constitution has been kept complete, and new names have been selected only on the death of a previous occupant of an honorary fellowship.

In the following statement of distribution as to nationalities of such honorary members and fellows, it must be remembered, there are no Frenchmen in the French list and no Englishmen in the English list.

Foreign Honorary Members of the Entomological Society of France.

Austria:
- Brauer, 1904.

Belgium:
- Lacordaire, 1859.
- Selys-Longchamps, 1885.
- Lameere, 1915.

Denmark:
- Schiodte, 1874.
- Meinert, 1899.

England:
- Kirby, 1832.
- Curtis, 1856.
- Westwood, 1860.
- Darwin, 1874.
- Lubbock, 1894.
- Sharp, 1907.

Germany:
- Humboldt, 1832.
- Klug, 1832.

Hungary:
- Horvath, 1913.

Italy:
- Spinola, 1849.
- Berlese, 1905.
- Silvestri, 1928.

Russia:
- Romanoff, 1899.
- Osten-Sacken, 1900.

Spain:
- Bolivar, 1913.

Sweden:
- Gyllenhal, 1832.
- Schönherr, 1843.
- Boheman, 1856.
- Zetterstedt, 1858.
- Thomson, 1882.

Switzerland:
- Standfuss, 1905.
- Reverdin, 1923.

United States of America:
- Leconte, 1879.
- Horn, 1885.
- Packard, 1894.
- Howard, 1905.

Foreign Honorary Fellows of the Entomological Society of London.

Austria:
- Hammerschmid, 1843 (?)
- Kollar, 1843 (?)
- Wattenwyl, 1893.
- Brauer, 1900.

Belgium:
- Lacordaire, 1864.
- Lameere, 1914.

Denmark:
- Schiodte, 1870.

France:
- Milne-Edwards, 1843 (?)
- Lefebvre, 1843 (?)
- Dufour, 1861.
- Guerin-Meneville, 1866.
- Guenée, 1874.
- Signoret, 1881.
- Fabre, 1901.
- Oberthur (C.), 1908.
- Marchal, 1918.

Germany:
- Gravenhorst, 1843 (?)
- Weidemann, 1843 (?)
- Klug, 1843 (?)
- Zeller, 1850 (?)
- Schaum, 1861.
- Hagen, 1864.
- Siebold, 1870.
- Burmeister, 1875.
- Mueller (F.), 1884.
- Dohrn (C. A.), 1885.
- Weissman, 1898.
- Ganglbauer, 1906.

Holland:
Haan, 1843 (?)
Snellen (P. T. C.), 1885.
Wasmann, 1911.
Hungary:
Horvath, 1926.
Italy:
Passerini, 1850.
Grassi, 1898.
Berlese, 1915.
Gestro, 1925.
Russia:
Osten-Sacken, 1884.
Reuter (O. M.), 1906.
Tian-Shanski, 1913.
Spain:
Bolivar, 1905.
Sweden:
Schönherr, 1843 (?)
Zetterstedt, 1854.
Boheman, 1866.
Wallengren, 1893.
Thomson, 1895.
Aurivillius, 1900.
Switzerland:
Pictet, 1856.
Saussure, 1872.
Forel, 1894.
Frey-Gessner, 1912.
United States of America:
Leconte, 1864.
Packard, 1884.
Riley, 1889.
Scudder, 1895.
Comstock, 1911.
Howard, 1915.

International Commission on Zoological Nomenclature Opinions 105 to 114.

The undersigned has the honor to invite the attention of the zoological profession to the fact that Opinions 105 to 114 have been published by the Smithsonian Institution.[1] The summaries, in so far as they refer to Entomology, read as follows:

Opinion 106. The Type of *Oestrus* Linn., 1758, is *O. ovis*. The type of *Oestrus* Linn., 1758, is *O. ovis* (Art. 30*g*). Latreille's designation of *Oestrus equi* Fabr. as type of *Oestrus* is not valid (Art. 30*g*). The following five names of dipterous genera are hereby placed in the Official List of Generic Names: *Cephenemyia* (type *trompe*), *Gasterophilus* (type *equi* of Clark, synonym of *intestinalis* de Geer), *Hypoderma* (type *bovis*), *Oedemagena* (type *tarandi*), and *Oestrus* (type *ovis*).

Opinion 113. *Sarcoptes* Latreille, 1802, Type *scabiei*, Placed in Official List.—*Sarcoptes* Latreille dates from 1802 instead of 1804 or 1806 as frequently quoted. It was originally monotypic, containing only *Acarus scabiei*. The 1810 type designation of *Acarus passerinus* is invalid under Article 30*c* and 30*cx*. The acceptance of *Acarus scabiei* as type species of *Acarus* is invalidated by Article 30*g*, according to which *Acarus siro* (syn. *farinae*) is the type of *Acarus*. *Sarcoptes* Latr., 1802, mt. *scabiei* is hereby placed in the Official List of Generic Names.—C. W. STILES (Secretary to the International Commission on Zoological Nomenclature), Washington, D. C.

[1] *Smithsonian Miscellaneous Collections,* v. 73, no. 6, pp. 1-26.

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

GENERAL.—Bezzi, M.—Obituary by B. Parisi. [Mem. Soc. Ent. Italiana] 6: 165-182, ill. **Dallas, E. D.**—Anotaciones referentes a los "tipos" en entomologia y su terminologia. [44] 31: 206-216. **Davis, J. J.**—Insects of Indiana for 1928. [Indiana Acad. Sci.] 38: 299-314, ill. **Fluke, C. L.**—The known predacious and parasitic enemies of the pea aphid in North America. [Agric. Exp. Sta. Univ. Wisconsin] 1929: 47 pp., ill. **Friedrich, A.**—Meine sammelerfahrungen in Brasilien. [14] 43: 138-142. **Handbuch der Zoologie.**—Progoneata: Chilopoda: Insecta by Attems, Handlirsch & Meixner. 4: 673-800, ill. **Heikertinger, F.**—Vom ziele der nomenklatur und seiner erreichung. [Col. Cent.] 3: 161-178. **Hoffman, F.**—Acht monate in den urwäldern von Espirito Santo (Brasilien). [Ent. Jahrbuch] 1929: 53-73. **Hume, H. H.**—The mediterranean fruit fly situation. [Florida State Plant Board] 14: 29-42. **Porter, C. E.**—Algunos insectos de Mancera. [44] 31: 121-122. **Schwarz, E. A.**—Letters of E. A. Schwarz, by J. D. Sherman, Jr. [6] 37: 181-392, ill. **Wileman, A. E.**—Obituary. [9] 62: 215-216. **Wood, A. A.**—A method of preparing wax entomological exhibits. [29] 59: 52-55, ill.

ANATOMY, PHYSIOLOGY, ETC.—Cappe de Baillon, P.—Diplogenéses et formations multiples chez les insectes. [Bull. Biol. France & Belgique] 63: 456-484, ill. **Gadeau de Kerville, H.**—Sur la couleur interférentielle vert d'émeraude brillant du Physonota gigantea (Chrysomelidae).

(S). [25] 1929: 231-232. **Gadeau de Kerville, H.**—Production, chez des insectes desséchés (Coléoptères, Lépidoptères, Hémiptères et Orthoptères), de variations de couleurs par l'action de substances chimiques et de températures élevées. [25] 1929: 214-216. **Jacquet & Bonnamour.**—Note sur les mœurs et l'alimentation de Carpophilus hemipterus [Nitidulidae] et de sa larve. [25] 1929: 223-224. **Macgregor, M. E.**—The significance of the pH in the development of mosquito larvae. [Parasitology] 21: 132-157. **Merker, E.**—Die fluoreszenz im insektenauge, die fluoreszenz des chitins der insekten und seine durchlässigkeit für ultraviolettes licht. [89] 46: 483-574, ill. **Nabours, R. K.** — The genetics of the Tettigidae (grouse locusts). [Bibl. Gen.] 5: 27-104, ill. **Nakahara & Nakahara.**—An observation on the etiology of a certain malformation in the earwig, Anisolabis maritima (Dermaptera). [19] 24: 161-163, ill. **Nolan, W. J.**—Success in the artificial insemination of queen bees at the bee culture laboratory. [12] 22: 544-551. **Piza Junior, S. T.**—Sobre as glandulas salivares dos Blattideos. [Bol. Biol. Brazil] 1928: 6-9, ill. **Pruthi, H. S.**—Homologies of the genitalia of insects. [8] 65: 198-201. **Rosen, H. R.**—The discovery of insect transmission of pathogenic micro-organisms. [68] 70: 355. **Szalay, L.**—Ueber die widerstandsfähigkeit der hydracarinen. [An. Hist. Nat. Mus. Nat. Hungarici] 25: 427-438. **Yung-tai, T.**—Recherches expérimentales sur la métamorphose de "Galleria mellonella". [Bull. Biol. France & Belgique] 63: 350-376.

ARACHNIDA AND MYRIOPODA.—***Banks, N.**—Spiders from Panama. [Bull. Mus. Comp. Zool. Harvard Coll.] 69: 53-96, ill. **Chamberlin & Gertsch.**—New spiders from Utah and California. [13] 21: 101-112, ill. **Mello-Leitão.**—Aranhas de Pernambuco, colhidas por D. Bento Pickel. [An. Acad. Brasileira Sci.] 1: 91-112, ill. **Petrunkevitch, A.**—The spider fauna of Panama and its Central American affiliation. [90] 63: 455-469. **Schmitt, C.**—Spinner u. weber bei den tieren. [Kosmos] 26: 306-309, ill.

THE SMALLER ORDER OF INSECTS.—***Banks, N.**—Revision of the nearctic Myrmeleonidae. [Bull. Mus. Comp. Zool. Harvard Coll.] 68: 84 pp., ill. **Claude-Joseph.**—Observaciones sobre el Peripatus blainvillei. (S). [44] 31: 223-236, ill. **Jones, D. T.**—A snail-collecting aphis-lion larva. [Marieta Coll. Res. Pub.] 1: 9 pp., ill. **Knoch, V.**—Die wunder des termitenstaates. [Ent. Jahrbuch] 1929: 160-175. ***McDunnough, J.**—Notes on North American Ephemeroptera with descriptions of new species, II. [4]

61: 169-180, ill. **Navas, R. P. L.**—Insectos Neotropicos. Neuropteros. [44] 31: 316-328, ill. **Paton, C. I.**—Migration of dragonflies and uraniid moth in British Guiana. [9] 62: 212-213. **Tulloch, J. B. G.**—Dragonfly migration. [9] 62: 213.

ORTHOPTERA.—Allard, H. A.—Physiological differentiation in overwintering individuals of certain musical Orthoptera. [4] 61: 195-198. ***Karny, H. H.**—Revision der Gryllacriden des Ungarischen National-Museums. (S). [An. Hist. Nat. Mus. Nat. Hungarici] 25: 215-260, ill. **Piza Junior, S. T.**—Contribuição para o conhecimento do apparelho reproductor e da reproducção dos Blattideos. (S). [Bol. Biol. Brazil] 1928: 76-78, ill. **Zeuner, F.**—Beiträge zur systematik und phylogenie der gattung Platycleis und verwandter Decticinen (Tettig.). [Mitt. Zool. Mus. Berlin] 15: 201-235, ill. **Zeuner, F.**—Der einfluss der postglazialen klimaschwankungen auf die verbreitung von Ephippigera vitium (Tettig.). [Mitt. Zool. Mus. Berlin] 15: 87-106.

HEMIPTERA.—Annand, P. N.—A contribution toward a monograph of the Adelginae (Phylloxeridae) of North America. [Stanford Univ. Pub. Biol. Sci.] 6: 146 pp., ill. ***Goding, F. W.**—The Membracidae of South America and the Antilles. IV Subfamilies Hoplophorioninae, Darninae, Smiliinae, Tragopinae (Homoptera). [1] 55: 197-330, ill. **Jaczewski, T.**—Notes on Corixidae. [An. Hist. Nat. Mus. Nat. Hungarici] 25: 204-214, ill. ***Knight, H. H.**—Labops verae, n. sp., with Labopella, Nicholia, and Pronotocrepis, n. g. of North American Miridae. [4] 61: 214-218. **Knowlton, G. F.**—Studies on the morphology of the beet leafhopper. [Utah State Agric. Coll. Agric. Exp. Sta.] Bull. 212: 3-24, ill. **Marelli, C. A.**—Una intersante anomalia por sacralización coxigea del Batracio, Calyptocephalus gayi. [44] 31: 237-240, ill. ***Myers, J. G.**—Notes on Cuban fulgoroid Homoptera. [Harvard. Biol. Lab. & Bot. Garden Cuba] 1928: 13-28, ill. ***Pack & Knowlton.**—A few match brush aphids from Utah. [4] 61: 199-204, ill. **Parshley, H. M.**—Observations on Metrobates hesperius (Gerridae). [19] 24: 157-160, ill. **Pinto, C.**—Sobre a presença do Cimex poedus (Stal, 1854) no Brasil. [Bol. Biol. Brazil] 1928: 85-91, ill. ***Pinto, C.**—Cimex limai n. sp. parasite of bats of Brasil. [Bol. Biol. Brazil] 1927: 188-189. ***Pinto, C.**—Sphaeridopidae, nova familia de Hemiptero Reduvioideae, com a descripção de um genero e 'especie nova. (S). [Bol. Biol. Brazil], 1927: 43-47, ill. ***Pinto, C.**—Sobre um novo genero de Coccidea da sub-familia Klossinae (Cariniella carinii). (S). [Bol. Biol. Brazil] 1926: 82-83, ill.

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THE PROBLEMS OF APPLIED ENTOMOLOGY by ROBERT A. WARDLE. XI and 587 pp., 31 figs. McGraw-Hill Book Company, New York. $6.00.—This work, the first part of which largely represents an expansion of the earlier *Principles of Insect Control* by Wardle and Buckle, is one which should be in the hands of every person who wishes to be reliably informed on the present state of knowledge in the now highly diversified field of applied entomology. Not only is the work before us a mine of information as regards fact and theory, but it also possesses the merit of being both fair and critical in its estimate of the achievements of the science and of the problems remaining to be solved. In the opinion of the reviewer, there is much in this book which is reminiscent of Bateson's *Problems of Genetics*, despite the fact that the two works deal with radically different subjects. Both exhibit a refreshing originality of treatment which is most stimulating and suggestive. In both we find that same lack of satisfaction in the finality of the results attained and of the theories promulgated which, however provoking it may be to those who are content with nothing short of certainty, is the very breath of life to the investigator who realizes how tentative our present knowledge is likely to be and who appreciates the fact that innumerable problems remain to be solved. It is well to have pointed out to us how insecure are many of the conclusions which we are disposed to consider settled on the basis of existing knowledge. In the work at hand, the author, while in no way belittling the noteworthy achievements in applied entomology, shows throughout a most commendable attitude of caution in refraining from expressing in too dogmatic a tone the conclusions which, however much they may be in line with certain classes of facts, may perhaps not be entirely justified when the whole body of evidence is critically reviewed.

Although the work under review is ostensibly intended for those who are engaged in the practical work of insect control, it is by no means lacking in value to others whose main interest lies in fundamental biological phenomena, especially as these are illustrated in insect material. It is obvious that the ultimate basis of insect control is the knowledge which we possess of insect reactions, and, in line with the general recognition of this relation, we find that a very considerable portion of the present book is devoted to a consideration of such purely physiological or ecological problems as would fall under subjects like host adaptability and resistence, biological races, the phase theory, disease, population estimates, climatic adaptability, faunal succession, tropic behavior, parasites and predators, environmental relationships. It is clear, therefore, that the scope of the present work is not narrow, in the sense of being confined to the strictly applied phases of entomology, but that, instead, it contains much which would appeal to the worker in biological science pure and simple.

There can be little doubt that Wardle's work will take high rank as a standard work of reference in the field which it covers. In these days of extreme specialization and often narrowed professional outlook, when the worker in some phase of applied science finds it almost hopeless to keep himself informed of progress in even closely allied branches of his general subject, the need for such a comprehensive summary, as is contained in the present work, of the knowledge accumulated in the diverse subdivisions of applied entomology is clear. In bringing together, within the limits of a single volume, the information compiled from many widely different sources, the author richly deserves the gratitude of his co-workers, not only of those engaged in applied entomology in a strict sense, but also of others who may be more especially interested in the basic biological phenomena underlying insect control. As it is, Wardle's work is one which no entomologist, except perhaps the strictest sort of systematist, can afford to ignore, and it is at least conceivable that a perusal of it might be of benefit to even a systematist in suggesting, like Bateson's work already mentioned, the broad biological implications of his specialty.

From the point of view of the investigator, one of the most valuable features of the present work is the very extensive bibliography, occupying forty closely printed pages of matter, which forms Part III of the book. The titles are arranged under headings corresponding to the chapters of the text. Naturally, it results from this arrangement that many references are cited more than once, but this in no way detracts from the value of the list which, in the reviewer's judgment, is a model of what a bibliography covering such a wide range of subjects should be.

The text of the book is divided into two parts, Part I, entitled General Problems, treats of the broad principles—physical, chemical, biological,—which underlie the problem of insect control, while Part II, entitled Area Problems, deals more specifically with the particular insect control problems confronting entomologists in the different countries of the globe.

As previously mentioned, Part I represents, to a very considerable extent, an expansion of an earlier work by the same author in joint authorship with Buckle. In the present work, about half of the space devoted to Part I is taken up with subjects which collectively might be classified under the head of natural control, while the remainder could be grouped under that of artificial control. As regards natural agencies of control, we find chapters in this first part on subjects such as host resistence, clmatic resistence, tropic behavior, disease, and parasites and predators. In the second half of Part I, pertaining to artificial methods of control, we have chapters on the theory of insecticides, stomach poisons, contact insecticides, fumigants and combination insecticides, and cultural influences.

Part II represents a new departure. It is quite different in general plan from Part I, and, as the author intimates in the preface, might well have formed the basis for a separate book. In the words of the author, this part "attempts to present to the entomologists of any one country some conception of the problems which face his confrères in other countries." In accordance with this plan, the treatment in Part II is geographic throughout, with the notable exception of the last two chapers, treating respectively the subjects of locality disinfection and locality protection. In the opinion of the reviewer, these latter chapters seem out of place in a section otherwise strictly geographic in arrangement, and would more appropriately have come at the end of Part I, in connection with the general consideration of artificial agencies of control.

Owing to the limited amount of space available, scarcely more than a summary is given in Part II of the more important problems in insect control which are met with in the different countries of the globe. This is explicitly recognized by the author, who states that anything like an adequate treatment of this phase of his subject would require a separate book, and he frankly expresses the hope that his outline will serve to stimulate the production of such a text. So far as chapter subdivision in this part is concerned, it is based, with the exception of the two chapters previously mentioned, upon what may appropriately be termed the insect control provinces of the earth. By this is meant that the author groups together those countries or regions in which closely similar insect control problems claim major attention. In some instances these provinces coincide with definitely delimited geographic areas, as, for example, North America, Southeastern Asia, the Euro-Asiatic Plain, the Mediterranean Area, but in other instances he associates regions often widely separated geographically. Thus, we find one chapter with the title, West Africa and Central America, while another treats of South America, South Africa, Central and East Africa.

In selecting matters for special comment or criticism in a work covering as much ground as this, one is as much embarrassed by the wealth and variety of material from which to choose as he is from the realization that anything approaching a satisfactory attempt in that direction would require the cooperation of a number of specialists, each an authority in one of the special fields of investigation covered by the book. On this account the present reviewer will limit his further remarks to those portions of the work which treat of basic biological problems and will leave to others the task of pointing out errors, defects, or omissions in the sections devoted to the more strictly applied phases of the subject.

In a discussion of Uvarov's Phase Theory on pp. 14-16, the examples chosen to illustrate this theory are all drawn from exotic Orthoptera. An illustration much more familiar to readers on this side of the Atlantic could have been found in the case of the old Rocky Mountain locust, *Melanoplus spretus*, which is almost certainly nothing more than the migratory phase of the common and widely distributed grasshopper, *Melanoplus atlanis*.

In his discussion of the Phase Theory, the author, in this, as in other sections of his book, shows his fairness toward and tolerance of views which may impress one as mutually antagonistic. While apparently strongly disposed to favor the phase theory as promulgated by Uvarov, he also presents the views of Plotnikov, who maintains the specific distinctness of swarming and non-swarming forms of grasshoppers, but argues that, in periods of abundance, variations in the one form approach and overlap those taking place simultaneously in the other, thereby giving what Plotnikov evidently claims to be a deceptive apearance of blending of the two forms. A view of this sort may seem rather far-fetched, but it is well to have it stated clearly in a work of this kind, as it may serve to impress the reader with the futility of trying to solve questions of this nature on the basis of observation alone. The whole problem of specific distinctness or of intergradation, in the case of forms whose taxonomic status is unsettled, needs to be attacked from the side of experimental breeding.

In enumerating, on pp. 33-34, four general principles upon which estimates of infestation should be based, it seems that none of these quite covers a rule which has impressed itself upon the reviewer in an attempt to estimate the abundance of the Japanese beetle, *Popillia japonica*, in successive years. For instance, a survey of any suitable area within the territory infested by this insect shows that, in each year, a rapid reduction in the number of larvae takes place as spring advances. For this reason, in order to obtain comparable results, it is necessary, in any given area, to make the larval surveys at about the same time each year. Thus, if in one year, a larval survey is conducted in April, it would be necessary to make a similar survey in the same month of the following year, as a survey made later in the season would not yield comparable results. Of course, a rule of this kind would apply only in case estimates of insect infestation are intended to cover a series of years.

In view of the many excellent features and the general critical tone of the book, it may seem rather gratuitous to call attention to a passage in which the author would appear to have inadvertently allowed himself to fall into error, or, at least, to have expressed his meaning in so obscure a form as to render it far from obvious. On page 50, in commenting upon the fact that a given month in one part of an insect's range may not be the ecological equivalent of the same month in another part of its range, the author adds, by way of illustration that "the degree of temperature and the amount of rainfall required to produce a particular value of atmospheric humidity or of soil moisture content would not have the same values in the north as in the south." Evidently the meaning which he intended to convey in this passage, (as is also indicated by his insertion of Koppen's table of rainfall necessary to produce stream flow at different temperatures) is that the amount of rainfall required to produce a particular value of atmospheric humidity or of soil moisture content would be different in the two sections, the obvious reason being that normally the temperature in the one is different from that in the other.

The absence of dogmatic finality, which the author so consistently maintains throughout, is shown in his comments upon the generally accepted mathematical formulations of the rate of development of insects as influenced more especially by temperature. Thus, on page 63, we read that "the more precise work of later observers . . . has cast some doubt upon the absolute correctness of these assumptions, and the question arises as to whether the thermal constant really is constant for all temperatures within the effective range; whether the velocity curve really is a straight line; whether the point at which it cuts the temperature axis is really the true Threshold of Development, whether, in fact, the curve expressing the effective range is an equilateral hyperbola at all." It is well for physiological entomologists to have their attention called thus to the fact that many an assumption, which they are likely to take as an established fact, may not be wholly free from doubt in the present state of knowledge.

Because of the present claim on popular interest which the institution of drastic quarantine measures against the spread of insect pests has called forth in various sections of this country, it is interesting to note that in the present work the author takes a very pessimistic tone as regards the efficiency of such measures. He seems to think that the chances are strongly against the probability of any form of quarantine inspection preventing, or even materially delaying, the introduction or spread of any of the major insect pests. As an example, he mentions the Mediterranean Fruit-fly (of interest in connection with its recent startling discovery in epidemic form in Florida), which, despite the admittedly high efficiency of the California quarantine system, he is apparently disposed to think, may be already established in that State, and that its appearance there in epidemic form is only a question of time and climate. Truly a gloomy outlook from the point of view of legislative control of insect pests! However, our experience in such attempts at insect control is still limited, and it may well be that in the near future, with a richer measure of experience to serve as a guide, public control measures may yet be evolved to a point where they will yield more satisfactory results. The difficulties are great, and may seem insurmountable, but that does not seem adequate ground for advocating the adoption of a *laissez faire* policy in the face of a threatened insect pest invasion.—HENRY FOX.

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1838-1926

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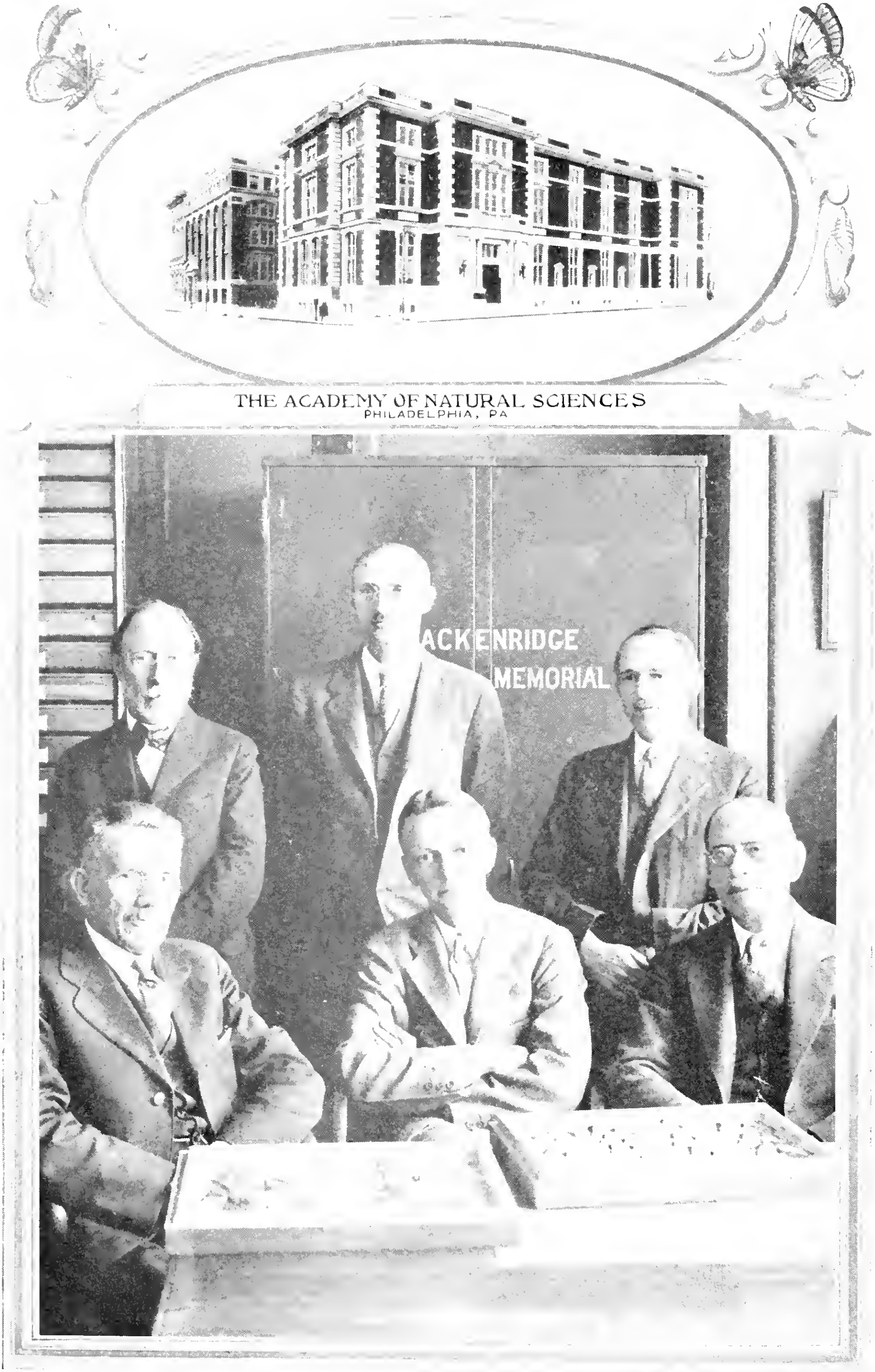

Standing—DR. P. P. CALVERT, JAMES A. G. REHN, E. T. CRESSON, Jr.
Seated—FRANK HAIMBACH, MORGAN HEBARD, R. C. WILLIAMS Jr.

ENTOMOLOGICAL NEWS

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North American Institutions Featuring Lepidoptera.

IX. The Academy of Natural Sciences, Philadelphia, Pa.

By J. D. Gunder, Pasadena, California.

(Plates XVII-XX).

Philadelphia is the birthplace not only of our national independence and constitutional law and liberty, but of a number of other good things. Among these, and not the least valuable, is an institution which has through its history, particularly before 1860, exerted a greater influence in the development of our knowledge of the natural sciences than any similar scientific body in America. I refer to the Academy of Natural Sciences of Philadelphia. It was founded in the fore part of 1812 by John Speakman, Jacob Gilliams and several others, including Thomas Say, the well-known naturalist and entomologist. The presence of Mr. Say and the high character of his early scientific work, coupled with the dignity he was able to lend the first proceedings, undoubtedly accounted for the continued existence of the Academy. Say was a born naturalist and scarcely troubled himself with "commercial business". At one time, as a result, it is said that he was so poor that he had to make his bed under a stuffed horse in the hall of the Academy. In his scientific investigations it is interesting to note he paid little attention to relationships and classification, but confined his work almost entirely to specific distinctions of which he had an unusually acute perception. His oral reports of original researches were the first to replace the time-honored reading of extracts from encyclopaedias and journals, which formed the usual attraction at those early-day meetings. The founders of the Academy in that distant period, nearly 118 years ago, did not have big buildings, tolerant audiences or fine halls for their meetings. Little did they think when renting a small room on Second Street, and each gave a "small collection of scientific objects", that they were forming the nucleus of the museum and superb library which today gives the Academy its distinction among learned societies. The energy of those founders was persistent and the spirit of their industrious research has continued on down till now, as exemplified by the high character of the present scientific staff.

Philadelphia is also the birthplace of the first purely entomological society in America. On February 14, 1859, James Riding, George Newman and Ezra T. Cresson[1] met together at the Cresson residence with the view of forming an association "whose object shall be the advancement of entomological science, by ascertaining the name, locality and habits of insects found within the United States". This well-known organization thrived from the beginning and until 1867 was known as the Entomological Society of Philadelphia, when the name was changed to the American Entomological Society. The new name gave the body a national significance which it was eventually to merit. For a while, beginning in 1865, the Society edited a paper called *The Practical Entomologist*. It was in reality an economic journal intended for farmers, gardeners, foresters and agricultural people, but the venture was not appreciated by those for whom it was intended, as the times were not ripe and economic entomology was hardly understood, so the Society had to suspend this publication. However, to those Philadelphia entomologists and founders of the American Entomological Society goes the credit of being the pioneers of that immensely distributed work now being done by the Bureau of Entomology under the U. S. Department of Agriculture.

By 1876 the collection of insects, including types and library, of the Society had so increased that it was thought necessary to have them associated with the Academy of Natural Sciences, so admission was granted and an Entomological Section thereof was formed[2]. The Entomological Society has always retained

[1] His portrait appears on the front cover page of this volume of the News.

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, 1826-1840

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, 1840-1876

its corporate existence, however. This move gave the collections fire-proof housing and the facilities which only a museum can afford. In looking over the records of the Society during the last 50 years, it is interesting to note the names of so many fine men and well-known scientists. As long as mankind shall be interested in the insect world, the memory of Cresson, Horn, LeConte, McCook, Skinner and others will remain bright.

In 1917 the Sections of the Academy were abolished and the Entomological Department of the Academy advanced, so that today it holds equal rank with the other divisions or sciences and occupies six large rooms on two floors, one above the other. All the collections, work tables and library are in close proximity. This is a very advantageous arrangement because in some museums, most museums in fact, the library is "down stairs" or far away and much "red tape" is necessary to get a book and return same within a specified time.

The collections of butterflies and moths are kept in 120 metal and wooden cabinets which contain altogether about 1400 drawers of Lepidoptera. These cases are not double-decked as there is plenty of floor space. Mr. Williams estimates there are 500 types and some 150,000 mounted specimens in all, but I think these figures must be rather low. The Museum of the Academy displays a fine localized collection of Insects for the average individual, which saves wear and tear on the main collections. It provides a cohesive visualization of the butterfly and moth fauna around Philadelphia. Dr. J. B. Clemens has recently given the Academy a memorial cabinet to hold the microlepidoptera collections and writings of his father and others. It is known as the "Brackenridge Clemens Memorial" and is shown in the background of plate

[2] See illustrations of Academy Building up to 1840 and up to 1876 on Plate XVIII. The present Academy Building, shown in circle at top of Plate XVII, consists of six large three-stôry buildings of brick and terra-cotta, connected into an E-shaped group. They cover approximately one acre of ground area. Unfortunately the Academy receives no support from the City of Philadelphia, but in the past the State of Pennsylvania has financed the erection of some of its buildings. Although no definite expansion plan is contemplated at present, it will undoubtedly be necessary within the next few years.

XVII. Among the larger individual collections of lepidoptera which have come to the Institution in the past are those of Felipe Poey, 1865; B. Clemens, 1867; T. R. Peale, 1890; I. C. Martindale, 1894; C. A. Blake, 1903, and Henry Skinner, 1908.

Mr. R. C. Williams, Jr., has recently donated his excellent collection of about 25,000 butterflies, which include his American Hesperioidea and Palaearctic Rhopalocera. Mr. Williams was born in Brooklyn, New York, August 21, 1869, attended the Adelphi Academy, of Brooklyn, N. Y., in 1889 and was graduated from Cornell with B.S. and M.E. in 1892. He has been Research Associate on the staff for years and since the demise of Dr. Henry Skinner, has been considered their expert on American butterflies, especially the skippers. Numerous contributions on Hesperiids have appeared from his pen in recent years and before that, several upon the larger Hesperiidae of North America in joint authorship with Dr. Skinner. His investigations have had as a background the genitalic morphology of the species and having about worked-out the North American fauna, he is now engaged on the neotropical groups. Mr. Williams has made many trips abroad and also to the western and southern United States. While these trips have not always been basically entomological field expeditions, he has secured valuable and important material and is continually increasing the collections of his specialty at the Academy. He at present holds the office of President of the American Entomological Society.

To. Mr. J. W. Coxey is evidently left the task of building up the Academy's collection of exotic lepidoptera. He has already made two very successful trips to Ecuador (1926-27 and 1928-29), bringing home valuable and extensive collections, including many rarities which only a personal trip can secure. He was unfortunately absent in South America when the Academy group photograph was taken, but Plate XIX of this article shows him busy at the time in camp at Dos Puentes, Ecuador, mounting what is evidently a large specimen of a

PREPARING TROPICAL BUTTERFLIES FOR SHIPMENT

[*Photograph of Mr. W. Judson Coxey at camp in Dos Puentes, Ecuador; February, 1929*]

1—ALASKA: Expedition to Kodiak Island. HARRY WHITNEY secured four specimens Alaskan Brown Bear. Motion picture films obtained.

2—BRITISH COLUMBIA: CLEMENT B. NEWBOLD collected specimens Rocky Mountain Goats and Mountain Sheep. These are now being prepared for exhibition in Museum.

3—UTAH, IDAHO, OREGON, NEVADA: Field work—Entomology.

4—UTAH: Waterfowl and other birds collected. Motion picture films obtained.

5—LOUISIANA: Waterfowl collected. Motion picture films obtained.

6—WEST VIRGINIA, NORTH CAROLINA, KENTUCKY. Field work—Botany.

7—NORTH CAROLINA (EASTERN): Field work—Birds.

8—COSTA RICA: Field work—Entomology and Birds.

9—CUBA: Field work—Conchology.

10—DOMINICAN REPUBLIC: Valuable collection birds secured by JOHN T. EMLEN, JR.

11—WEST INDIES: Birds collected by JAMES BOND.

12—ECUADOR, PERU, BOLIVIA: Field work—Entomology. By W. JUDSON COXEY.

13—SIAM: Bird collection secured by RODOLPHE MEYER DESCHAUENSEE.

14—CHINA, YANGTSE DELTA: Birds collected under direction of LACEY I. MOFFETT.

15—CHINA, SHANTUNG PROVINCE: Collection of birds obtained by RUFUS H. LEFEVRE.

Morpho butterfly. Mr. Coxey was born in Camden, New Jersey, November 29, 1887, and is a valued Research Associate on the staff. Would that he could be induced to give us several vivid articles in the News upon his collecting experiences in the wilds of Ecuador!

The Frank Haimbach collection of Heterocera (moths), which he donated to the Academy not long ago, is especially noteworthy. For forty years Mr. Haimbach has been an assiduous collector of these insects in the middle Atlantic States and in this way and by exchange, he has built up a most extensive and beautifully prepared series of many thousands of specimens. He occasionally publishes records and new descriptions of moths in the News and *Transactions*. Mr. Haimbach was born July 2, 1859, and is a native son of Philadelphia. He is Secretary and Treasurer of the American Entomological Society and former corresponding Secretary of the same society.

Aside from Lepidoptera there are several men working on other insect orders who have helped make the Entomological Department of the Institution internationally well known. Mr. E. T. Cresson, Jr., for example, whose interest is the Diptera, is clearly the foremost American authority on the Acalyptrate family Ephydridae. Over a period of nearly twenty years he has published a considerable number of articles and a fair portion of these papers are parts of a revision of this family, on which he has been engaged for nearly his entire productive period.

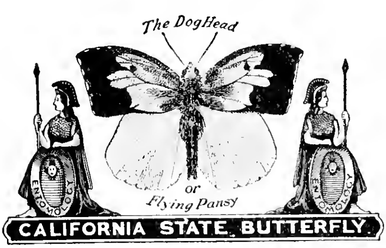
Mr. Morgan Hebard, Curator, and Mr. James A. G. Rehn, Secretary of the Academy and Associate Curator of the Department of Entomology, are both specialists in the Orthoptera and have made numerous field trips together to western and southern United States. Special trips were often made to the desert portions of Nevada, Utah, Arizona and New Mexico. Their Orthoptera collections are unsurpassed and both are continually offering new papers upon every phase of this interesting order.

The American Entomological Society issues three publications, namely: the *Transactions*, a quarterly started in 1867, following the *Proceedings of the Entomological Society of Philadelphia;* the *Memoirs,* which are complete papers of monographic character appearing at irregular intervals since 1916, and this publication, ENTOMOLOGICAL NEWS, which was begun in 1890. An outstanding feature of the NEWS, which has always been distinctive, is its section devoted to "Entomological Literature". Mr. E. T. Cresson, Jr., deserves a great deal of credit for his invaluable work of continually abstracting those many tedious references.

Dr. P. P. Calvert is sufficiently well known to our readers as the Editor of the NEWS and writer on Odonata. His collection of these insects is at the Academy.

Mr. James A. G. Rehn has materially assisted me in the preparation of this article and I heartily thank him for much of the data contained herein.

A State Butterfly for California (Lepid.: Pieridae).



The entomologists of the State of California, numbering about 200 as a whole, recently voted upon the question of a State Insect and choose the native butterfly, *Zerene eurydice Bdv.*, (the Dog Head or Flying Pansy), to serve as their emblem.

The State Flower for California is the "Poppy". This is the first state in the Union to record a symbol of the Insect Kingdom for acceptance by the general public. It will undoubtedly stimulate interest in entomology. Will not other states, Pennsylvania, for example, follow suit? The accompanying insignia illustrate the male of the species. See the October, 1929, *Pan-Pacific Entomologist* for further information.

J. D. GUNDER, Pasadena, California.

The North American Species of Sarcophaga belonging to the "A" Group[1] (Dip.: Sarcophagidae).

By DAVID G. HALL, JR.,
Kansas State Agricultural College.

Four species of Sarcophaga were included by Doctor Aldrich (1916, Sarcophaga and Allies. p. 67) in his provisional "A" Group. These were *S. sinuata* Mg., *S. cockerellae* Ald., *S. hineii* Ald., and *S. pulla* Ald. To these may be added *S. morosa* Ald. (1925. Proc. U. S. Nat. Mus. Vol. 66:26), and the two species herein described.

These species have the following characters in common: Three postsutural dorso-central bristles, genital segments black, and the hind tibiae of the male more or less villous.

Acknowledgment for the comparison of specimens with type material, and for the generous exchange of notes is due Dr. J. M. Aldrich, of the United States National Museum.

Key to Species.

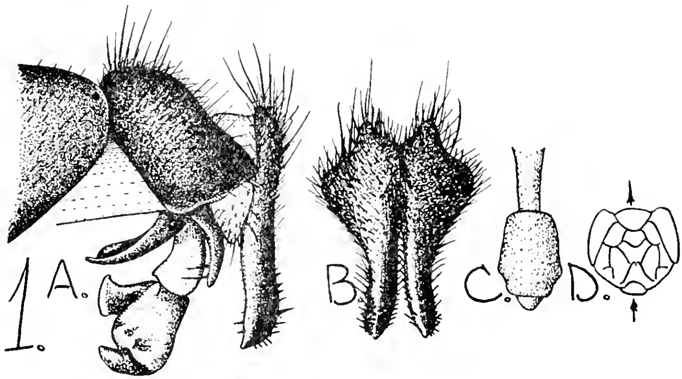
1. Outer verticals well developed, first posterior cell closed or but slightly open in margin. (D. C., Va., Penna.) *minutissima* n. sp. Fig. 1
   Outer verticals absent 2
2. Two sternopleural bristles present (Alta. Can.) *canadensis* n. sp. Fig. 2
   Three sternopleural bristles present 3
3. Middle femora with whitish, yellowish, or golden patch of hair on outer front side (widespread—Northern U. S.) *sinuata* *Mg.*
   Middle femora plain, without such spot 4
4. Second abdominal segment with pair of median marginal bristles which may be somewhat small or depressed 5
   Second abdominal segment without median marginal bristles 6
5. Middle tibae with three antero-dorsal bristles, forceps thick with a long, slender tooth on tip (Colo., N. Mex., and British Col., Can.) . . . . *cockerellae* Ald.
   Middle tibae with one large and one small antero-dorsal bristles, forceps slender with a small tooth on middle of the blunt tip (Lake Erie area) . . . . *hineii* Ald.
6. Accessory plate long and finger-like (Ohio, Penna.) *pulla*. Ald.
   Accessory plate triangular (Ontario, Ohio) . . *morosa* Ald.

[1] Contribution No. 374 from the Entomological Laboratory, Kansas State Agricultural College.

Sarcophaga minutissima n. sp. (Fig. 1).

Small; black; outer verticals developed.

♂. Front narrow, .161 of head (average of three .190, .160, and .133); parafrontals and parafacials silvery, the latter with the usual row of minute hairs below near eye, the lower two long and bristle-like; frontal bristles about eight, the lower few diverging to the middle of the second antennal joint; antennae black, third joint hardly twice second, reaching four-fifths



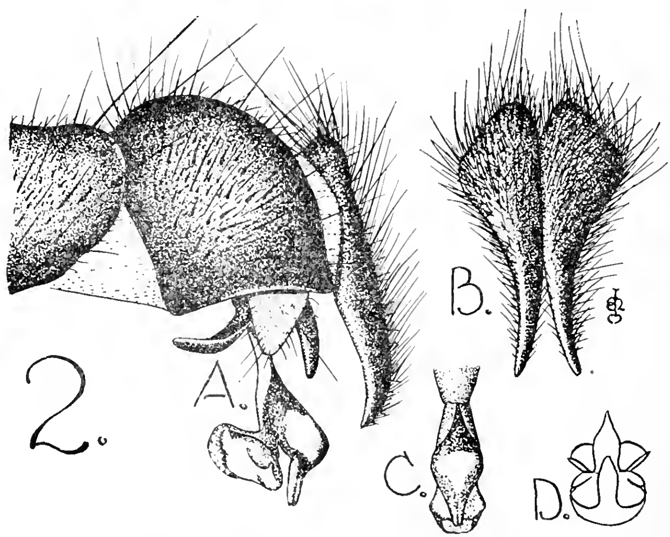


Fig. 1.—*Sarcophaga minutissima* Hall. Fig. 2.—*Sarcophaga canadensis* Hall. A. Left lateral view of hypopygial composite. B. Rear view of forceps. C. Rear view of penis. D. Tip of penis.

distance to the vibrissae which are normal and are at the oral margin; arista plumose for half its length; palpi and proboscis black, normal; bucca two-thirds eyeheight; back of head with two rows of post-ocular bristles, below with some pale hairs, none before the metacephalic suture; outer verticals distinct.

Thorax with the usual 3-5 black stripes; anterior acrostichals 2; prescutellars present, small and slender; postsuturals 3; sterno-pleurals 3, the intermediate rather small and hairlike; scutellum with two marginals, one subapical and one apical.

Abdomen thinly pollinose, the usual tessellation indistinct; second and third segments with median marginals; fourth with marginal row of about twelve; fifth sternite obscured.

Hypopygium shining black; first segment small, a few hairs in a posterior marginal row; second segment globose, shining black, clothed with numerous black hairs; forceps black, in rear view, behind diverging gently to tips, clothed with long curly hair, anterior edge straight with slight tip, posteriorly curved strongly forward at tip, behind at tip with a patch of minute spines; accessory plate triangular, more brown than black; posterior clasper black, curved slightly forward with several hairs on the anterior edge; anterior clasper black, curved strongly forward, the inner edge rolled toward outside; penis composed of two segments, first segment transparent white and curved somewhat forward, second segment with rounded anteriorly thick tip, forward, on each side two partially transparent plates or processes extending anteriorly, centrally one each side with a semi-transparent pad.

Wings anteriorly smoked brown; costal spine present; third costal segment shorter than fifth; first posterior cell closed or slightly open in the wing margin; first vein bare; third with several setulae.

Legs, black; middle tibae with two antero-dorsal bristles; hind tibae with sparse villosity.

♀. Front narrow, .254 of head (average of three .250, .231, .291); generally less pollinose than male; lacks the scutellar apicals; otherwise like male except for sexual characteristics. Length 3½-5 mm.

Three males and three females from the U. S. National Museum collection: two females, Rock Creek Park, District of Columbia, August 19, 1927, C. H. T. Townsend; one male and one female, Falls Church, Virginia, Aug. 27, 1912, C. T. Greene; one male, Rock Creek Park, D. C., May 1, 1919, G. E. Quinter; one female, Montebello, Pennsylvania, Oct. 5, 1920, Champlain and Knull. *Holotype,* the Rock Creek Park male in the U. S. N. M., No. 41910. *Allotype*—Female from the same locality in the U. S. N. M., No. 41911.

To the knowledge of the author, this is the smallest species of Sarcophaga to be described from North America. Notwithstanding the closing of the first posterior cell in the margin of the wing, chaetotaxy and genital similarities adhere it to the present grouping.

Sarcophaga canadensis n. sp. (Fig. 2).

Small; tessellated; two sternopleurals.

♂. Front .333 of head in single specimen; frontal stripe narrow; frontal bristles about eight, the lower few diverging to the middle of the second antennal joint; parafacials and parafrontals silvery, the latter with the usual row of minute hair below near eye; antennae black, third joint two-thirds length of second, reaching three-fourths the distance to the vibrissae which are normal and are at the oral margin; arista plumose for half its length; bucca reddish and but slightly pollinose, one-third the eyeheight; palpi and proboscis black, ordinary; back of head with one complete and seveeral scattered rows of black hair; outer vertical not differentiated; a few pale hairs around neck and below, none before the metacephalic suture.

Thorax with usual 3-5 black stripes, quite shining; anterior acrostichals O; postsutural dorsocentrals 3; sternopleurals 2; scutellum with two marginals, no preapicals nor apicals.

Abdomen thinly pollinose, mostly shining black; first and second segments with lateral bristles only; third with median marginal pair, fourth with marginal row of about twelve; fifth sternite obscured.

Hypopygium black; first segment with a row of hair-like bristles on posterior margin; second segment quite hairy, shining black; forceps in rear gradually diverging to tips, with long curly hair at base; in profile gradually curving forward to sharp point; accessory plate triangular, more brown than black; posterior clasper black, slightly curved anteriorly; anterior clasper black, curved strongly anteriorly, its outside edge rolled inward; penis narrow at base, globose toward tip where two tube-like processes project downward, anteriorly with shoe-shaped protuberance which is white and semi-transparent.

Legs black; middle femora with anterior and posterior combs; middle tibae with one antero-dorsal bristle; hind tibae with villosity.

Wings sub-hyaline; no costal spine; third costal segment longer than fifth; first vein bare; third with several setulae.

Female unknown.

One male, Banff, ALBERTA, Canada, June 15, 1922, collected by C. B. D. Garrett and sent to the author by Mr. C. H. Curran from the Canadian Entomological Collections at Ottawa, Ont. *Holotype.*—In the Canadian Entomological Collections.

Three sternopleural bristles are found quite constantly in all the species of Sarcophaga. The presence of but two in *S. canadensis* should render the species easily recognizable in both the male and the female.

Although the genitalia of the male are quite unlike the other species within this group, and the species has but two sternopleural bristles, it should not be of generic or of sub-generic importance. *S. bisetosa* Parker has only two sternopleural bristles, but the genitalia of the species are almost identical to that of *S. cimbicis* Townsend, showing that the absence of one sternopleural bristle is not of generic significance.

SARCOPHAGA SINUATA Meig.

Meigen, 1828, Syst. Bescher., V: 22—Europe.
Townsend, 1892, Trans. Am. Ent. Soc., XIX: 110-111.
Sarcotachinella intermedia.—Ill.

This is the most easily determined Sarcophagid occurring in North America. Both the male and the female have the outer front side of the middle femora with a brilliant whitish, yellowish, or golden spot.

S. sinuata is evidently a common species in this country. Specimens have been determined from New England to Oregon, and southward to northwestern Arkansas, apparently most common in the St. Lawrence River area. Bottcher stated that the species was widely distributed in Europe, but that it was apparently nowhere common.

SARCOPHAGA COCKERELLAE Ald.

Aldrich. 1916, Sarc. and Allies, p. 70, fig. 22.

The species is evidently not common. Beside the type specimens, one male has been seen from White Lake, BRITISH COLUMBIA, Canada, July 27, 1929, collected by Norman Criddle. *Holotype.*—Male No. 20495, U. S. N. M.

SARCOPHAGA HINEII Ald.

Aldrich, 1916, Sarc. and Allies, p. 71, fig. 23.

Auten, 1925, Ann. Ent. Soc. Am. XVIII: 244. (Reared from nests of spiders, *Philodromus canadensis*, *Epeira sclopetaria* and *Aranea frondosa*).

The characters given in the key, separate this species from its closest ally, *S. cockerellae* Ald.

The species was first collected by Prof. J. S. Hine, at Cedar Point, OHIO, where it is commonly found during the summer. Dr. C. H. Kennedy of Ohio State University has collected for a number of years at Put-in-Bay, Ohio, and has found the species common on the islands. The author appreciates the donation of over one hundred males and females of this species which he collected there.

It is commonly reared from the nests of certain house-inhabiting spiders in the Lake Erie area, Miss Agnes Auten being the first to rear material extensively. Her report is noted above.

Holotype.—Male No. 20496, U. S. N. M.

SARCOPHAGA PULLA Ald.

Aldrich, 1916, Sarc. and Allied, p. 72, fig. 24.

Aside from genital peculiarities of the male, this species may be separated from all the species very closely related, with the exception of S. morosa, Ald., by the lack of median marginals on the second abdominal segment. From S. morosa, the species is most clearly separated by the shape of the accessory plate which is triangular in *S. morosa*, elongate and finger-like in *S. pulla*.

The type specimen of this species was collected in Westmoreland County, PENNSYLVANIA. Specimens have been collected at Cantwell Cliffs, OHIO, May 15, 1926, by the author.

Type. Male, Acc. 321, Carnegie Museum, Pittsburgh, Pa.

SARCOPHAGA MOROSA Ald.

Aldrich, 1925, Proc. U. S. Nat. Mus., Vol. LXVI, 26, fig. 1, d.

The type specimen of S. morosa was reared from a larva by F. Johansen, near OTTAWA, Canada, the fly emerging July 11, 1918. Specimens have been taken by the author at Miami County, OHIO, June 14, 1928, and Lucas County, Ohio, June 19, 1928. *Holotype*.—Male No. 27098, U. S. N. M.

Notes on the Relationship between Formica ulkei Emery and Solenopsis molesta Say (Hymen.: Formicidae).*

By Thomas Park, University of Chicago.

The general economy and life-history of *Solenopsis molesta* has been well studied by a number of investigators, among whom McColloch and Hayes (1916) have presented complete and significant data on this subject. This ant which often inhabits the nests of larger species is known as a "thief-ant" or as Wheeler classifies it, a "Lestiobiosis" type, (1910; p. 427) and is found living typically in such a relationship with many forms. In an examination of the *Formica ulkei* mound-nests at Palos Park, Illinois, a number of colonies of *Solenopsis molesta* were found existing in greater numbers in the outer layers of the nest similar to the other cases described by McColloch and Hayes. The nests of *Solenopsis* consisted of a net-work of minute tunnels which branched off from a well used passageway of the *Formica* nest and radiated from a comparatively large cavern located between the Formica runways. These small tunnels were too tenuous to allow a *Formica ulkei* worker to enter them, and they seemed, furthermore, to be continually guarded. When both species were introduced into the laboratory, the *Solenopsis* colony seemed to thrive and to have no real need of the larger ant.

In the laboratory, *Solenopsis molesta* defends itself and its nest from *F. ulkei* with great vigor, displaying the same reaction each time attacked. *Molesta* workers would mount upon the femora and antennae of the larger ant so that in all the invader had about six or eight individuals upon its appendages. There they would cling biting and perhaps stinging until the death of the *Formica ulkei*. The latter seemed powerless to remove these pests and after varying length of time died, whereupon all of the *Solenopsis* workers dismounted from the dead ant and returned to their nest. The details of this process seemed to be essentially the same in all of the six or seven cases observed. In one instance, after a *Formica* had been so

*Supervised by Dr. W. C. Allee.

attacked, it was immediately killed and soon after the reflexes of death had ceased the *Solenopsis molesta* workers left the body and paid it no more attention.

The main object of this note, however, is to record the occurrence of *Solenopsis molesta* in *Formica ulkei* nests in a "Lestiobiotic" relationship; a fact hitherto overlooked.

LITERATURE CITED.

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McCOLLOCH, J. W. & HAYES, W. P. 1916. A Preliminary Report on the Life Economy of *Solenopsis molesta* Say. Journal of Economic Entomology, Vol. IX.

WHEELER, W. M. 1910. Ants. Their Structure, Behavior, and Development. New York: The Columbia University Press.

Hesperia ruricola Boisd. and Pamphila californica Mabille Synonyms of Atrytone vestris (Boisduval) (Lepid.: Hesperiidae).

By W. J. HOLLAND, Carnegie Museum, Pittsburgh, Pennsylvania.

In the *Annales* of the Entomological Society of France (2) X, 1852, p. 315, Boisduval briefly described *Hesperia ruricola.* In the "Lépidoptères de la Californie," (Ann. Soc. Ent. de Belgique, XII, 1863, p. 25) he republished his description of the species. He gives California as the habitat of the insect. Both descriptions are quite brief and amount to the statement that the butterfly is in form and size like *lineola,* fulvous in color above, with a narrow brown border, the sexual brand of the primaries as strongly developed as in *sylvanus,* bordered longitudinally by a fine light line. The underside yellowish, with the entire surface of the inferiors and the apex of the superiors greenish (verdâtre).

Speaking of this insect in the *Études Comparées,* Fasc. IX, 1re Partie, 1913, p. 43, Mons. Charles Oberthür remarks: "Manque dans la collection; le type parait perdu."

The identity of the insect has been a puzzle to American (and particularly Californian) lepidopterists.

Last March I wrote to Mons. Réné Oberthür at Rennes, in whose hands are now all the *Hesperiidæ*, which were a part of the collection of his brother Charles, requesting him to kindly make a renewed search for the type of *H. ruricola*, and to give me all the information possible. I have just received from him a long and most interesting letter, which is well worthy of being translated and published at length; but I content myself in this connection with a condensed statement. With the most obliging generosity he has risked sending me across the ocean one of the three males possessed by him, and mentioned by me in what follows. I have carefully studied this specimen in company with Prof. A. W. Lindsey, who agrees with me in my conclusions.

Mons. Réné Oberthür after careful search found a specimen bearing the printed locality-label "Californie, Lorquin", and labelled in Boisduval's handwriting "*Hesperia rubicola*. Type." As Boisduval never published a species under the name "*rubicola*," from California, but did publish the name "*ruricola*" as that of a Californian species, Mons. Oberthür naturally has reached the conclusion that Boisduval, who published the species under the name "*ruricola*," had intentionally, or inadvertently, changed the name from what is written on the label. The change, which involves but one letter (the substitution of "r" for "b"), may represent a *lapsus calami*, when Boisduval was penning his description, which went to the printer; or he may have thought "*ruricola*" more appropriate, and have failed to make the corresponding change on his label. Mons. Oberthür informs me that he has two other specimens of the same provenance, each bearing the same printed label "Californie. Lorquin." All three, including the type of *ruricola* (*rubicola*), came into the hands of their original possessors through Depuiset, a well known dealer in insects, to whom Lorquin sent his collections made in California to be sold. The second specimen, a male, identical with the type of *ruricola*, is the type of *Pamphila californica* Mabille, obtained by Réné Oberthür from Mabille himself, who described the insect under the foregoing name in the *Comptes-Rendus* of the Soc. Ent. de Belgique, T. XXVII, 1883, p. lxvii. Mons. Oberthür informs me that this insect exactly matches in every particular the type of *H. ruricola* (*rubicola*). The third specimen in the hands of Mons. Oberthür was originally in the possession of Guenée, whose insects became the property of Mons. Charles Oberthür. It too bears the printed label "Californie. Lorquin." Mons. Oberthür tells me that is an exact match of the other two specimens of which I have spoken above. This specimen Mons. Oberthür has kindly sent me for study and examination.

Careful and protracted examination shows that this third specimen is positively and beyond doubt an old (it lacks the antennæ) example of *Atrytone vestris* (Boisd.) matching specimens from Shasta and other parts of California in the Edwards, Holland, and Lindsey Collections, which are somewhat paler as a rule than specimens from the eastern part of the continent. As Dr. Lindsey put the matter to me when we were examining the insect: "Put a male of *A. vestris* in the sun, bleaching it for a week, and the type of *Hesperia ruricola* or of *Pamphila californica* will be before you."

This discovery eliminates from future Check-lists of the Hesperiidæ of North America, two specific names, which have long been used as those of species "*incertæ sedis*," and puts them into the already formidable list of synonyms of *A. vestris*.

An Unexpected Food Plant of the Striped Cucumber Beetle (Coleop.: Chrysomelidae).

W. V. Balduf's paper on the striped cucumber beetle in the October number of the NEWS, reminds me of an observation on this insect which seems worthy of record. On June 1st, 1928, having need of living adults of *Diabrotica vittata* for exhibition purposes on Long Island, N. Y., I searched carefully for specimens in the vicinity of old cucumber fields but without success. The new plantings were not yet above ground and I was forced to give up the search. On the way back to the hotel in Riverhead, however, I stopped to examine a beautiful stand of the pink lady-slipper (*Cypripedium acaule*) growing in a patch of woods by the roadside. I noticed that many of the blossoms showed brown areas and were beginning to wilt. On opening these injured flowers I was surprised to find that most of them contained three or four of the beetles and that they were apparently responsible for the injury — C. R. CROSBY, Ithaca, New York.

Proposed Amendments: International Rules of Zoological Nomenclature.

Notice to the Zoological Profession that Certain Propositions for Changes in the International Rules of Zoological Nomenclature have been submitted to the International Commission for Consideration.

The undersigned has the honor to invite attention of the zoological profession to the fact that a considerable number of propositions for changes in the International Rules have been submitted to the Commission. Some of these involve major questions, others deal with minor points. The present notice deals chiefly with certain major questions.

Zoological societies, special and national committees on nomenclature, and individual zoologists are cordially invited to communicate to any member of the Commission their views on these propositions, not later than June 30, 1930, if feasible. The Commission will hold its next session probably in August or September, 1930.

1930A [number of proposition in Secretary's file].—Instructs the Commission to report to the Congress all propositions which obtain a *majority* [instead of a *unanimous* vote, as heretofore] and these controversial cases are then to be decided in open meeting by the general session of the triennial congresses. This proposal was presented with a list of about 550 names in 1913 and of about 650 names in 1927 of persons who supported it, but a referendum conducted in the United States showed a vote of 549 against it and only 4 for it.

1930B [substitute for *1930A*].—At least all those proposals for amendments of or additions to the International Rules of Zoological Nomenclature which have obtained—

first, a majority of 5/6ths of the total membership of the Commission of Nomenclature for the time being, *and*

subsequently, 5/6ths of the votes of those present at the meeting of the Commission,

shall be the recommendations of the Commission to the Congress.

1930C [substitute for *1930A, B, D, F*].—The stability of the Rules is a prime and fundamental principle.

1930D.—Provides that type designation by "Elimination" be raised from the status of a *recommendation* (Art. 30*k*) to the status of a *rule*. This proposal has three times (1907; 1913; 1927) failed of acceptance in Commission, and it is resubmitted for reconsideration in 1930. In its support were about 550 signatures in 1913 and about 650 signatures in 1927, chiefly Europeans. The 1927 referendum conducted in the United States resulted in 4 signatures in favor, and 548 signatures against this proposition.

1930E [substitute for *1930D*].—That under Article 30, III of the Rules, the Recommendations *h, i, j,* and *k,* in this order, be raised from the status of *recommendations* to the status of *rules,* effective (but not retroactive) after December 31, 1930, or at a date later by not more than three years.

1930F.—Proposition to reject from nomenclature papers which are *binary* (recognizing genera and species) but *not binomial* (do not use generic and specific names as a binomial). This is a century-old controversial question which failed of acceptance by the Commission in 1901, 1913, and 1927.

1930G [substitute for *1930F*].—To accept the 12th edition (1766-67) of Linnaeus' *Systema naturae* as a starting point for the application of the Rules of Nomenclature, thus eliminating many of the papers printed in the transitional stage of 1758 to 1766.

1930H.—A purely tentative draft (for purpose of study) defining the term "Publication".

Rule effective January 1, 1931 (and in some parts retroactive).—From the standpoint of the Rules of Nomenclature, Zoological Publication shall consist (or consists) in the *distribution* of zoological documents containing *data intended as record* [i. e., not asking for information]. The distribution must be, at least in part, by sale, thus making the documents potentially and reasonably available to the entire zoological profession, and the documents must be manifolded by some method (such as printing) and with materials (permanent ink and fairly stable paper) which promise reasonable permanency.

Preliminary notices are to be considered publication, since it is customary to admit their names to action of the Law of Priority.

The following are not to be considered publication:

a. Anonymous documents of every kind including unsigned reviews and editorials;

b. Deposit of document in public library without simultaneous offering for sale to make it potentially and reasonably available to the entire zoological profession [not retroactive, because of the old university custom of exchange of theses];

c. Documents of any sort not bearing at least the year date;

d. Manuscript (including hard, carbon, and letter press copies);

e. Presentation of paper before meeting of any kind;

f. Printer's proof sheets (galley or page);

g. Separata (including preprints; reprints; etc.), unless these are definitely placed on sale as separate publications;

h. Specimen tags or museum labels, but these take date and published status when quoted in published documents;

i. Reports (no matter how detailed) in the nontechnical press (for instance, political or lay newspapers, lay journals, lay magazines, etc.).

RECOMMENDATIONS.—It is urgently recommended that all zoölogical documents of record printed in any of the less universally read languages (Chinese, Hungarian, Japanese, Polish, Russian, etc.) be provided with a summary in English, French, German, Italian, Latin, or Spanish.

The date borne by a publication is to be assumed to be correct unless and until proved to be incorrect.

In case of publications bearing more than one year date (example, "Proceedings for the years 1883 to 1885") without a definite year date of issue, the last year (example 1885) may be assumed to be the date of publication for all pages of the volume unless and until an earlier date of issue is proved.

In case of publications bearing only the year date, the actual date of publication for all pages may be assumed to be December 31, unless and until an earlier date of issue is proved.

In case of publications bearing year and month date, the actual date of all pages may be assumed to be the last day of that month, Greenwich time, unless and until an earlier date of issue is proved.

In case of serials, it is recommended that the actual date of publication of each part or number be stated in the next succeeding part or number.

All zoological documents should bear the name and address of the editor or publisher, or publishing organization, and it is well for publishers to report titles promptly to dealers in scientific publications, to zoological bibliographic agencies, and to journals which habitually publish reviews or abstracts.

1930I.—It is recommended that superfamily names, based on generic names, be given the ending *oidea.* [As originally proposed by Gill (1872) when he proposed the superfamily as a group. Four endings are now used for superfamily names: *oidea, oidae, oideae*, and *ides.*]

It is recommended that new ordinal names, when based upon generic names, be given the ending *ida* (or *idea?*) and new subordinal names *ina* (or *inea?*).

1930J.—The following amendments to Articles 4 and 5 have been submitted to the Commission. (See Science, 1928, vol. 68, August 3, pp. 102-104.)

(a) The type genus of a family or subfamily shall be the contained genus of which the stem of the name was first employed in combination with a termination in Latin plural form to designate a group higher than genus. If any termination was originally used other than provided for in Article 4 of the code, said termination shall be changed to bring it into conformation with that article. (Older authors rarely used the terminology today required.)

(b) The name of a family or subfamily shall date from the time it was first proposed as a group higher than genus, provided it was based on a contained generic name. (The older authors used many terms to indicate groups equivalent from a nomenclatorial standpoint to what we now call family and subfamily.)

(c) *Recommendation.* When erecting a subfamily or family, an author should choose the oldest valid contained genus as type, whenever feasible; but no family or subfamily name is to be changed because its type is not the oldest contained genus.

Article 5. When the name of the type genus of a family or subfamily is found to be a homonym, it must be changed to correspond to the change of the name of its type genus.

In addition to the foregoing specific propositions, the Commission has before it three general propositions which call for extensive changes in wording, arrangement, and details of the present Rules. These are:

1930K.—Report of the British National Committee on Entomological Nomenclature: See Proc. Ent. Soc. London, 1928, containing early edition which has now been somewhat emended.

1930L.—Numerous propositions by Dr. Franz Poche. See *Entomologischer Anzeiger,* Jahrgang VII, 1927, Nr. 1-15, about 75 pages.

1930M.—Schenk's proposal to reedit present Rules, with various modifications. Not published, but manuscript copy can be consulted at office of any of the Commissioners.

1930N.—Various proposals by Dr. Baron de Féjerváry (of Budapest). See Bul. Soc. Vaudoise Sci. nat., 1919, v. 52 (195), pp. 317-324.

The Commission sits, usually for one week, immediately prior to the meeting of the Congress. According to procedure, no proposition is considered unless it is submitted to the Commission at least one year prior to the meeting of the Congress. A preliminary informal vote on propositions precedes the meeting of the Commission, and no proposition is subject to discussion unless it receives a majority vote in this preliminary consideration. No proposition is reported to the Congress unless it receives the unanimous vote of the entire Commission present at the meeting.

Hearings are granted to persons especially interested, *pro* or *con*, in any proposition.

C. W. STILES, *Secretary to Commission.*

Entomological Literature

COMPILED BY FRANK HAIMBACH AND LAURA S. MACKEY
UNDER THE SUPERVISION OF E. T. CRESSON, JR.

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

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

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

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 change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

GENERAL.—Aaron, S. F.—Six-legged warriors. A view of some battlers of the world of insects. [31] 14: 281-284, ill. **Barnett, R. J.**—Entomology in Kansas. A historical note. [103] 2: 90-93. **Belfrage, G. W.**—Naturalists of the frontier by S. W. Geiser. [Southwest Review] 14: 381-398. **Blackmore, E. H.**—Obituary. [4] 61: 218. **Breakey, E. P.** — Notes on the natural enemies of the Iris borer, Macronoctua onusta. [7] 22: 459-464. **du Monceau, H. L. D.**— A pioneer economic entomologist. By P. Simmons. [12] 22: 820-821, ill. **Engelhardt, G. P.**—The Brooklyn and New

York Entomological Societies, past and present. [7] 22: 392-400. **Gifford, W. M.**—An appreciation. By E. P. Van Duzee. [55] 6: 46-47. **Hall, M. C.**—Arthropods as intermediate hosts of helminths. [Smiths. Misc. Coll.] 81, no. 15: 77 pp., ill. **Hayes, W. P.**—A preliminary list of insects of the Sorghum Field. [Trans. Kansas Acad. Sci.] 30: 235-240. **McAtee, W. L.**—The place of authority in taxonomy. [10] 31: 138. **Scheidter, F.**—Insektenlarven: Larvenformen und larvenleben. [Der Naturf., Berlin] 6: 241-247. **Scott, H.**—On some cases of maternal care displayed by cockroaches and their significance. [8] 65: 218-222. **Stewart, M. A.**—The teaching of entomology. [12] 22: 777-781. **Tucker, E. S.**—Studies of insects associated with the American mistletoe. [Trans. Kansas Acad. Sci.] 30: 143-170, ill.

ANATOMY, PHYSIOLOGY, ETC.—Campbell, F. L.—The detection and estimation of insect chitin; and the irrelation of "Chitinization" to hardness and pigmentation of the cuticula of the American cockroach, Periplaneta americana. [7] 22: 401-426, ill. **Grossman, E. F.**—Biology of the Mexican cotton boll weevil IV. Duration of fertility after copulation. [39] 13: 41-43. **Mergenthaler, W.**—Ueber die putzorgane der hautflügler. [Aus der Heimat, Stuttgart] 42: 289-292, ill. **Muttkowski, R. A.**—Insect nutrition and metabolism. [7] 22: 552-554. **Steinweden, J. B.**—Notes on the origin of the wax secretion of certain Coccinellid larvae. [55] 6: 26-32, ill.

ARACHNIDA AND MYRIOPODA.—*Petrunkevitch, A.—Descriptions of new or inadequately known American spiders. [7] 22: 511-525, ill.

THE SMALLER ORDERS OF INSECTS.—Allison, V. C.—Some dragon flies of southeastern Kansas. [Trans. Kansas Acad. Sci.] 30: 45-58, ill. **Clark, A. H.**—Peripatus from the island of Montserrat. [10] 31: 139. ***Jordan, K.**—On a small collection of Siphonaptera from the Adirondacks, with a list of the species known from the state of New York. [71] 168-177, ill. ***Moulton, D.**—Contribution to our knowledge of American Thysanoptera. [19] 24: 224-244, ill. **Park, O.**—Reticulitermes tibialis in the Chicago area. [10] 31: 121-126. **Táborsky', K.**—Études systematiques et morphologiques sur l'appareil buccal des Odonata. [74] 5: 143-180, ill. **Wagner, J.**—Ueber die nordamerikanische Ceratophylli welche auf Zieseln und Murmeltieren leben. [56] 8: 311-315.

ORTHOPTERA.—Uvarov, B. P.—Locusts and grasshoppers. A handbook for their study and control. 352 pp., ill. **Uvarov & Zolotarevsky.**—Phases of locusts and their interrelations. [22] 20: 261-265.

HEMIPTERA.—de la Torre-Bueno, J. R.—A few late spring bugs. [19] 24: 221. ***Gillette & Palmer.**—Five new Aphididae from Colorado. [7] 22: 468-476, ill. **Griswold, G. H.**—On the bionomics of a primary parasite and of two hyperparasites of the geranium aphid. [7] 22: 438-452, ill. **Johnston, H. G.**—A partial list of Miridae from Texas. [19] 24: 217-219. ***Knowlton, G. F.**—Aphid notes from Utah. [55] 6: 33-42, ill. **Knowlton, G. F.**—Notes on a few Homoptera from Utah. [39] 13: 45-51. **Lawson, P. B.**—A list of the Cicadellidae of Kansas. [Trans. Kansas Acad. Sci.] 30: 331-336. ***Moulton, D.**—New Mexican Thysanoptera. [55] 6: 11-20. ***Osborn, H.**—A new genus and three new species of South American Cicadellidae. [7] 22: 465-467. ***Van Duzee, E. P.**—A new Corimelaena. [55] 6: 10.

LEPIDOPTERA.—Bennett, N.—The dissection and preparation of the genitalia of lepidoptera. [9] 62: 220-223, cont. **Bratley, H. E.**—Notes on Lymire edwardsi, the rubber tree caterpillar. [39] 13: 44. ***Busck, A.**—A new aegeriid on cowpea from Brazil (Aegeriidae). [10] 31: 134-136, ill. **Cockerell, T. D. A.**—Paonias excaecatus in Colorado. [19] 24: 244. **Crevecoeur, F. F.**—Additions to the list of Kansas Lepidoptera. [Trans. Kansas Acad. Sci.] 30: 377-385. ***Gunder, J. D.**—The genus Euphydryas of Boreal America (Nymphalidae). [55] 6: 1-8, ill. ***Gunder, J. D.**—An addition to Cynthia carye (Nymphalidae). [55] 6: 9, ill. ***Hampson, G. F.**—Five new species of Phycitinae (Pyralidae). (S). [75] 4: 351-353. ***Holland, W. J.**—Notes upon some North American species and varieties of the genus Brenthis. [3] 19: 35-45, ill. **Holland, W. J.**—The Argynnids of the Nokomis-group. [3] 19: 15-34, ill. [In December, 1928, the above articles of Dr. Holland's were cited without the journal reference number, [3], which is "Ann. Carnegie Mus."] **Klots, A. B.**—Further notes on Eurema (Pieridae). [19] 24: 214-216. **Klots, A. B.**—The generic status of Catopsilia and Phoebis, with a discussion of the relationships of the species and the homologies of the male genitalia (Pieridae). [19] 24: 203-214, ill. **Kosminsky & Golowinskaja.**—Zur morphologie des geschlechtsapparats der Lepidopteren. [46] 15: 459-473, ill. **Latham, R.**—Isturgia truncataria in Long Island. [19] 24: 246. **Przegendza.**—Zur biologie von Morpho hercules. (S). [14] 43: 154-155. **Randolph, V.**—A list of the butterflies of Crawford County, Kansas. [Trans. Kansas Acad. Sci.] 30: 59-61. A preliminary study of the life history and habits of Dione vanillae. [Trans. Kansas Acad. Sci.] 30: 351-362. ***Röber, J.**—Ueber einige exotische falter. [18] 23: 323-327, ill. **Salman, K. A.**—Notes on the immature stages and biology of a birch case-bearer. [7] 22: 480-488. **Seitz, A.**—Ueber das sammeln von Mikrolepidopteren. Pyralidae. [17] 46: 37-39, ill., cont. **Van Mellaerts, L.**—La curiosité chez les papillons? [Lambillionea] 29: 99-100.

DIPTERA.—Bigelow, N. K.—Some common Diptera and their habits. [19] 24: 245-246. ***Curran, C. H.**—New Syrphidae and Tachinidae. (S). [7] 22: 489-510. **Fall, H. C.**—Phyllophaga austricola—A correction. [19] 24: 216. **Frost, C. A.**—Winter homes for mosquitoes. [19] 24: 223. **Hall, D. G.**—An annotated list of the Sarcophaginae which have been collected in Kansas. [103] 2: 83-90. ***Malloch, J. R.**—Exotic Muscaridae. (S). [75] 4: 322-341.

COLEOPTERA.—*Blaisdell, F. E.—A revision of the beetles of the Tenebrionid tribe Usechini, with descriptions of a new genus and new species. [50] 75, Art. 19: 14 pp., ill. ***Blaisdell, F. E.**—Miscellaneous studies in the Coleoptera, III. [55] 6: 21-25, ill. **Blaisdell, F. E.**—Note on Notoxus. [55] 6: 42. **Brooks & Cotton.**—The chestnut curculios. [U. S. Dept. Agric.] Tech. Bull. 130: 24 pp., ill. ***Chamberlain, K. F.**—A new species of Gyrinus from northern New Hampshire. [19] 24: 247-249, ill. **Dawson, R. W.**—Biology of the tiger beetles with a key to the species of Cicindela found in Minnesota. [Univ. Minn. Agric. Exp. Sta.] Tech. Bull. 56: 3-8, ill. **Frost C. A.**—Cicindela tranquebarica horiconensis. [19] 24: 219. A synonym. [19] 24: 249. **Frost & Dietrich.**—Coleoptera taken from bait-traps. [7] 22: 427-437, ill. **Hayes, W. P.**—Kansas Rhynchophora in the collection of the Kansas State Agricultural College. [Trans. Kansas Acad. Sci.] 30: 205-212. **Horn, W.**—Notes and records on the tiger beetles of Minnesota. [Minn. Agric. Exp. Sta.] Tech. Bull. 56: 9-13. ***Horn, W.**—Sur deux espèces nouvelles d'Odontochila néotropiques et quelques autres espèces rapprochées. (S). [Rev. Chilena Hist. Nat] 33: 154-158, ill. ***Hustache, A.**—Un nouveau genre remarquable de Baridiinae (Curculionidae). (S). [75] 4: 349-351, ill. **Kleine, R.**—Ueber die biologie und die systematische stellung der Taphroderini. [2] 25: 149-150. **Maran, J.**—The study of the rudiments of the wings in the genera Pterostichus, Poecilus, Abax and Molops. (Carabidae.) [74] 5: 121-139, ill. **Notman, H.**—

Coleoptera from northern California. [19] 24: 222-223. **Pic, M.**—Addenda et corrigenda du Coleopterorum Catalogus. [33] 69: 205-208. ***Reichensperger, A.**—Neue ameisengäste und ein neuer termitengast (Pauss. Hist. Staph.). (S). [2] 25: 132-137.

HYMENOPTERA.—Andrews, E. A.—The mound-building ant, Formica exsectoides, associated with tree-hoppers. [7] 22: 369-391, ill. **Bequaert, J.**—Podalonia violaceipennis (Lepeletier). A dimorphic fossorial wasp. [19] 24: 220-221. ***Borgmeier, T.**—Zur kenntnis der brasilianischen ameisen. [EOS] 5: 195-214, ill. **Crevecoeur, F. F.**—Additions to the list of Kansas Hymenoptera. [Trans. Kansas Acad. Sci.] 30: 385-388. ***Flanders, S. E.**—A new codling moth parasite. (Calliephialtes sp.) [55] 6: 32. **Howard, L. O.**—Aphelinus mali and its travels. [7] 22: 341-368. **Kostoff & Kendall.**—Studies on the structure and development of certain cynipid galls. [92] 56: 402-458, ill. **Lubbock, J.**—Ants, bees and wasps. A record of observations on the habits of the social Hymenoptera. 377 pp., ill. ***Smith, M. R.**—Descriptions of five new North American ants, with biological notes. [7] 22: 543-551, ill. ***Timberlake, P. H.**—A new species of the Encyrtid genus Metaphycus from Washington. [55] 6: 43-45. **Van Duzee, E. P.**—A rare wasp from Oregon. (Odynerus margaretellus). [55] 6: 47.

A MANUAL OF EXTERNAL PARASITES, by HENRY ELLSWORTH EWING, 225 pages, 96 text figures, Charles C. Thomas, Springfield, Ill., 1929.

Here is a book for which a word of sincere praise is due to the publisher and printer. It is a most attractive little volume, beautifully bound, and beautifully printed. It would form a creditable addition even to a library the function of which is to please the esthetic sense rather than to fulfill the severely utilitarian needs of reference.

But with the contents the case is somewhat otherwise. Were the reviewer to attempt a single word summary—after the fashion of the "wise-cracking" journals—he might be tempted to light upon the word "feeble" as his choice. The book simply falls short of being what it should be. It is an attempt to fill a very obvious gap in our entomological literature. From the reviewer's point of view it rattles about somewhat in the gap, but still it performs its intended function with a certain measure of efficiency. To the entomologist who knows nothing of the ectoparasitic Arthropoda it will be extremely useful, for it brings within the compass of a single volume information that otherwise is scattered so widely as to be almost unavailable to the general student. And as there are in all the world scarcely more than a dozen entomologists who are especially informed concerning the fields that the book covers, it is evident that there is a definite advance with its publication. Nevertheless, from the point of view of one of that dozen, it cannot be regarded as constituting an especially impressive contribution to the literature of the ectoparasites.

In the first place, the title is misleading. It is presented without qualifications or reservations as "A Manual of External Parasites." The selection of a title is almost always a difficult matter and it is perhaps to that difficulty that the discrepancy between promise and performance is to be charged. But the discrepancy is large. The ectoparasitic Arthropoda come from a surprisingly large number of widely separated groups. There are the Acarina of the Arachnida; the two families Cimicidae and Polyctenidae of the Hemiptera; the so-called sub-order Pupipara of the Diptera with its three families Hippoboscidae, Streblidae and Nycteribiidae, and the curious Braulidae of uncertain position; there are the truly parasitic beetles of the families Leptinidae and Platypsyllidae and a number of presumably parasitic Staphylinidae; there is *Hemimerus* of the Dermaptera; there are the three completely parasitic orders Mallophaga, Anoplura and Siphonaptera; there are even one or two putatively parasitic moths. But of this assemblage only the Acarina, Anoplura, Mallophaga, and Siphonaptera are treated in this volume, in spite of the inclusive title.

It is true that the groups dealt with include in numbers of species probably more than ninety-five percent of the ectoparasites, but the remaining groups are biologically just as important and the knowledge of them among entomologists is even more limited. They should at least have been accorded some measure of attention.

In its illustrations the volume clings all too closely to the standard from which the writers of our various text books of parasitology seem utterly unable to escape. True it does not go back quite as far for any of its illustrations as some other recent texts have done. It at least does not utilize Denny's picture of the crab louse which was *first* published in 1842! But the crudeness and inaccuracy of the figure purporting to illustrate *Menopon gallinae* (Fig. 60)—in which the palpi are represented as arising from the dorsal side of the head and the legs appear as unsegmented horns—represent but a slight improvement. It is equalled only by the morphologically amazing drawings of fleas (Figs. 93, 94) in which the abdominal segments are represented as uninterrupted rings. Still, for these last two drawings the author has available the precedent set by one of the world's most eminent entomologists in one of the most recent comprehensive text books. Figure 59 is almost as bad, Figure 70 is little more than a blot, and numerous other figures, such as those from Lugger, are out of place in a modern book. On the other hand, Figures 86 and 89, representing details of fleas, are really excellent, while others are merely technically mediocre. Most important of all, however, is the fact that the number of figures which actually show much of what can really be considered as the morphology of the various groups is exceedingly few. There is practically no reason to suppose from the figures that any insect possesses structures on the ventral side of the body.

Something over one-third of the volume is devoted to the Acarina, and this portion of the volume is far more adequately developed and illustrated than is the remainder. This is but natural, since it covers the field in which the author is best qualified, his knowledge of the other groups being but a comparatively recent development. It may be assumed that the information contained is reliable and reasonably extensive. Certain omissions may be noted, however. Under the genus *Halarachne* (p. 18) it is said that but two North American species are known. Four have been recorded. Also the genus *Myialges,* regarded by Trouessart as constituting a subfamily of the Sarcoptidae, first described many years ago and redescribed more than a year ago by the present writer is not mentioned.

Under the Mallophaga the writer has done about as well as can be hoped for at the present time in compiling keys and arranging the groups. The order is at present in systematic confusion, due to the recognition of the inadequacy of the older classification but lacking any broad general studies that can serve as the basis for a better rearrangement. Ewing has seen fit to name several new genera, especially in the Trichodectidae. Until a careful general review of the Trichodectidae has been made it is doubtful that such a procedure really does anything more than complicate matters for some of these genera are of most dubious value. There is no evidence in the present work that such careful preliminary studies have been made.

Under the Anoplura, a group with which the reviewer is especially familiar, Ewing has essayed not only to name a number of new genera but to extend the general classification as well, again without convincing results. The general classification of the group waits upon the completion of comprehensive studies and until such have been accomplished nothing is to be gained by the naming of new subfamilies when even the present so-called families are of doubtful significance. There is no evidence in the present paper or in any of Ewing's few other short papers on the group that he has made such studies and there is no reason to suppose that his rearrangement is any special improvement over the present and evidently inadequate system. His inclusion of the genera *Phthirpediculus* and *Lemurphthirus* in the family Pediculidae is a case in point. He has evidently been influenced more by considerations of host relationship than by a knowledge of the structure of the insects.

The composition of genera is of course a matter of opinion and in our opinions the author and the reviewer diverge most sharply. Ewing indicates (preface) an expectation of criticism for publishing new genera in a volume such as this. The criticism is due rather for naming some of these genera in *any* publication. The genus *Enderleinellus*, which with its approximately twenty species all from Sciuridae, all of a common facies, all agreeing in essential characters and thus forming a compact, homogeneous and biologically significant group, appears to the reviewer to constitute a real genus—if there be such a thing at all—is split by Ewing into five genera that actually are based upon nothing more than minor departures from the general type.

For the genus *Ahaematopinus*, here named as new, there appears to be no valid reason and to place with its type species, *Neohaematopinus inornatus* Kellogg and Ferris, such species as *Polyplax insulsa* Ferris and *P. oxyrrhynchus* Cummings argues a lack of knowledge of the group.

The genus *Ctenura*, with the single species *Hoplopleura pectinata* Cummings, is an example of the forcible wrenching of a species from the midst of its friends and relatives to imprison it in solitary confinement because it departs slightly from the conventions. The case of *Hoplopleura trispinosa* Kellogg and Ferris, which is made the type of *Euhoplopleura*, is an even more marked example of the same thing.

Hoplopleura cryptica Ferris is made the type of the genus *Ctenoplura* but its very evident relatives, *H. neumanni* Fahrenholz, *H. biseriata* Ferris and *H. veprecula* Ferris are left behind. The earlier separation by Ewing of the genus *Pterophthirus* for the two species *Hoplopleura audax* Ferris and *H. alata* Ferris, and which was the picking up of a crumb dropped by the reviewer, has some justification but there is less for the naming of the genus *Ferrisella* with *H. ochotonae* Ferris as type and *H. disgrega* Ferris, *H. malaysiana* Ferris and *H. emarginata* Ferris for its companions. Once more the reviewer is impelled tearfully to reject the honor implied by the incorporation of his cognomen in a generic name.

Why, in view of the naming of these genera, other species were left undisturbed is difficult to understand. At least a half dozen more genera of equal value could have been brought down by the "shot gun" methods employed and added to the bag. Why were *Neohaematopinus heliosciuri* Cummings, *Polyplax auricularis* Kellogg and Ferris, *P. praecisa* Neumann and *Hoplopleura bidentata* (Neumann) at least not seized upon as types of new genera? They are offered to the attention of the writer of the "Manual of External Parasites" together with the classical advice "*Non es bonum micas alterii legere.*"

The section on the very important order Siphonaptera consists chiefly of a compilation of keys to the genera and a brief discussion of a few of the important genera. This should be especially useful as the generic keys to this order are at present much scattered. But three new genera are here named. G. F. FERRIS.

Doings of Societies.

The Rocky Mountain Conference of Entomologists.

The sixth annual Rocky Mountain Conference of Entomologists was held in Pingree Park, August 19 to 24, 1929, inclusive. A total of 64, including members of the families, registered at camp. Those directly interested in Entomology were present as follows: R. L. Shotwell, K. C. Sullivan, G. A. Dean, L. Johnson, F. B. Paddock, H. G. Butler, Donald A. Wilbur, Miriam A. Palmer, J. G. Sanders, Frank T. Cowan, C. P. Gillette, Sam C. McCampbell, Geo. M. List, Louis G. Davis, C. C. Hamilton, E. R. Bliss, Carl A. Bjurman, R. G. Richmond, Horace G. Smith, Leo J. Doering, L. M. Gates, L. B. Daniels, Geo. I. Reeves and C. R. Jones.

A total of ten sessions were held during the week for the presentation of papers. The following is a list of the subjects presented:

Orthoptera—Grasshopper Investigations, R. L. Shotwell; The Mormon Cricket Control Campaign in Colorado, F. T. Cowan.

Coleoptera—The Alfalfa Weevil in Colorado, J. H. Newton; The Clover Root Curculio on Alfalfa in Kansas, Donald A. Wilbur.

Hymenoptera—Breeding *Trichogramma minutum,* Geo. M. List.

Lepidoptera—The Bee Moth, F. B. Paddock; Codling Moth Traps, J. H. Newton; Codling Moth Work at the Wichita, Kansas, Station, H. G. Butler.

Homoptera—The Spruce Gall Aphid, C. P. Gillette; Aphids on Conifers of Colorado, Miss M. A. Palmer.

Diptera—The Mediterranean Fruit Fly, G. A. Dean.

Apiculture—Some Ideas on the Control of the American Foul Brood, R. G. Richmond.

Insecticides—Fumigating Gases, George A. Dean; Some Relations between Leaf and Fruit Growth of Two Varieties of Apples and the Quantity of Lead Arsenate Maintained, C. C. Hamilton; Oils, J. G. Sanders.

General—The Effect of Insects upon Civilization, G. A. Dean; Plant Inspection in Nebraska, L. M. Gates; Aquatic Insects of the Ozarks, K. C. Sullivan; Insect Egg Penetration, L. B. Daniels.

Symposium—Teaching Entomology: General Discussion and Summary, C. P. Gillette; General Courses, K. C. Sullivan; Graduate Teaching, D. A. Wilbur; Laboratory Teaching, C. R. Jones; The View Point of a Commercial Entomologist, J. G. Sanders; The View Point of a Producer, E. R. Bliss; The View Point of a Field Entomologist, J. H. Newton.

The symposium on the teaching of entomology led to the following recommendations to the various institutions represented and others interested:

1. That every student in agriculture be given a course in entomology and that this be given not later than the sophomore year.
2. That a course in entomology be required for all those taking up county extension agent work and vocational agriculture teaching.
3. That where an entomology department exists in an institution it be given charge of all entomological work of the institution.
4. That more attention be given to entomology in boys' and girls' club work.
5. That each candidate for a master's degree in entomology be required to have at least one-half year in insect morphology and one-half year in insect taxonomy.

The old officers consisting of C. P. Gillette, Chairman, J. W. McCulloch, Vice-chairman, Geo. M. List, Secretary and C. R. Jones, Treasurer, were retained in office for another year. —George M. List, *Secretary.*

OBITUARY.

THOMAS UTTING SPALDING 1866-1929[1].

Thomas Utting Spalding, noted entomological collector, passed away in a Salt Lake City hospital July 9, 1929, after an illness of four days due to paralysis. He was born in Woodbridge, Suffolk, England, September 21, 1866, son of Frederick Spalding, an educated man and student of natural history. Tom Spalding, as he chose to be called, was early led by his father to take an interest in collecting insects and birds. His early education was thorough, as he was taught at home by his nurse and in private schools.

At the age of nineteen he left England in quest of adventure. He came to America and then to the west to participate in the search for gold. While in Utah he met Miss Minnie Swensen of Salt Lake City and they were married in 1892. To this couple were born five sons and one daughter, all of whom survive him.

About 1900, his collecting of Utah insects began in earnest. He had discovered that students of the Lepidoptera in the east were willing to pay for western specimens, and that there was a market for all the specimens, of many groups, he could collect. He was at this time employed by one of the mining companies at Stockston, working on the night shift at the entrance to the mines. This gave him an opportunity to capture many of the night-fliers. At this period of his life, his entomological friends were John Sugden and G. W. Browning, who have long been interested in collecting Utah insects.

In 1905, he moved to Provo and established his "collecting cabin" at Vineyard, on the sand dunes between Provo Bench and Utah Lake, about five miles northwest of Provo. From here, as his permanent quarters, he made collecting trips to various parts of the state, such as Provo Canyon, Callao and Deep Creek Mts. (Ibapah Mts.), Southern Utah, Parawan, Zion Park, and St. George, and Las Vegas, Nevada. In 1919,

[1] Contribution No. 20 from the Department of Zoology and Entomology, Brigham Young University, Provo, Utah.

he accompanied Mr. Warren Knaus on his collecting trip through the southwestern part of Utah. His last five years were spent in Dividend where he was employed at the mines.

The years 1917 and 1918 were his most productive from the standpoint of sales. His books show that in 1918 his receipts were $1150 from the sale of Lepidoptera alone. Specimens were purchased by such men as: Dr. Wm. Barnes, August Busk, Wm. Reiff, S. E. Cassino, J. A. Comstock, Wm. Beutenmuller, F. H. Benjamin, W. J. Coxey, C. A. Hill and others. In 1919, Mr. Spalding began to sell Coleoptera to Col. T. L. Casey. In all he sold him about 820 specimens from which lot the Colonel named dozens and dozens of new species. Mr. Spalding told me that he soon found Col. Casey to be a good customer as he paid well for all his "variable and freakish specimens". Mr. Spalding left a small collection of moths and beetles which are being cared for by members of his family.

Mr. Spalding could not be prevailed upon to publish upon his findings, this he left for others to do. Eighteen species were named in his honor. They are as follows:

Lepidoptera:

Philotes spaldingi B. & McD.
Grotella spaldingi B. & McD.
Lathosea spaldingi Barnes
Trachea spaldingi Sm.
Hyppa spaldingi Sm.
Xanthorhoe spaldingaria Grossb.
Eupithecia spaldingi Tayl.
Scoparia spaldingalis B. & McD.
Tetralopha spaldingella B. & B.
Eurythmia spaldingella Dyar.
Eucosma spaldingana Kearf.

Coleoptera:

Cicindela spaldingi Csy.
Bradytus spaldingi Csy.
Harpalus spaldingi Csy.
Coelocnemis spaldingi Csy.
Conipinus spaldingi Csy.
Prionus spaldingi Csy.

Diptera: *Tipula spaldingi* Dietz.

Tom Spalding will be remembered in many parts of the world as a great collector of Utah insects and in his passing Utah lost her most noted student of the Lepidoptera.

VASCO M. TANNER.

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