# ENTOMOLOGICAL NEWS

## VOLUME XLIV, 1933

CHARLES WILLISON JOHNSON
1863-1932.

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PUBLISHED BY
THE AMERICAN ENTOMOLOGICAL SOCIETY,
PHILADELPHIA, PA.:
THE ACADEMY OF NATURAL SCIENCES
LOGAN SQUARE
1933

The several numbers of the NEWS for 1933 were mailed at the Post Office at Philadelphia, Pa., as follows:

| | |
|---|---|
| No. 1—January | January 12, 1933 |
| " 2—February | February 6 |
| " 3—March | March 21 |
| " 4—April | April 13 |
| " 5—May | May 2 |
| " 6—June | June 6 |
| " 7—July | July 12 |
| " 8—October | October 6 |
| " 9—November | November 7 |

The date of mailing the December, 1933, number will be announced on the last page of the issue for January, 1934.

Subscriptions for 1933 now Payable.

# ENTOMOLOGICAL NEWS

JANUARY, 1933

Vol. XLIV No. 1

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows:

| | |
|---|---|
| United States and possessions, Central and South America . . | $3.00 |
| Canada . . . . . | 3.15 |
| Foreign . . . . . | 3.25 |

Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance.

| | | | | |
|---|---|---|---|---|
| One issue, 1 in., $ 1.20, | 2 in., $ 2.40, | half page, $ 4.00, | full page, $ 7.00 |
| Ten issues " 11.00, | " 20.00, | " 35.00, | " 60.00 |

SUBSCRIPTIONS. All remittances and communications regarding subscriptions, non-receipt of the NEWS or of reprints, and requests for sample copies, should be addressed to

ENTOMOLOGICAL NEWS, 1900 Race Street, PHILADELPHIA, PA.

All complaints regarding non-receipt of issues of the NEWS should be presented within three months from date of mailing of the issue. After that time such numbers, if available, will be supplied only by purchase. Not more than two issues will be replaced gratis, through loss in transit or in change of address, unless such have been registered, at the subscriber's expense. No subscriptions accepted which involve giving a receipt acknowledged before a notary, except at the subscriber's expense.

MANUSCRIPTS AND ADVERTISEMENTS. Address all other communications to the editor, Dr. P. P. Calvert, Zoological Laboratory, University of Pennsylvania, Philadelphia, Pa.

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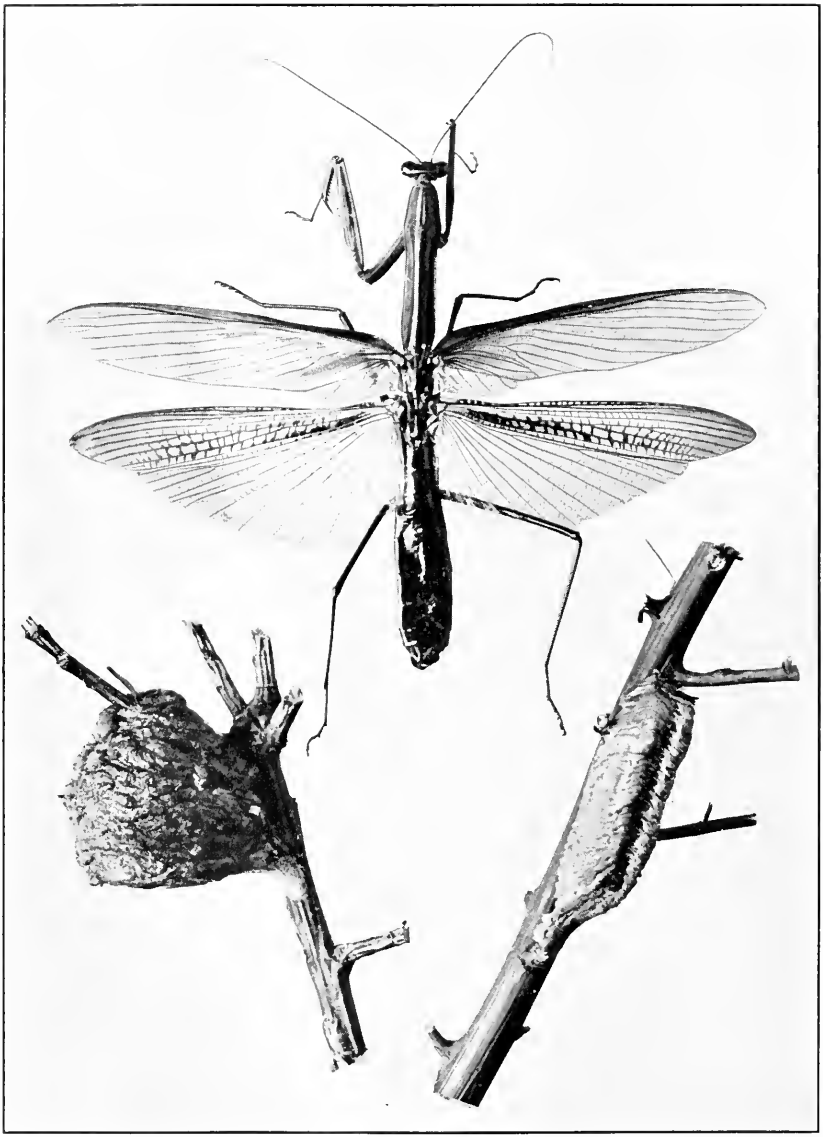

TENODERA ANGUSTIPENNIS SAUSS.—JONES.

ADULT MALE.

EGG-MASS
T. SINENSIS.

EGG-MASS
T. ANGUSTIPENNIS.

ALL NATURAL SIZE.

# ENTOMOLOGICAL NEWS

VOL. XLIV. JANUARY, 1933 No. 1

## Another Oriental Mantis well established in the United States (Tenodera angustipennis Saussure, Orthoptera: Mantidae).

By FRANK MORTON JONES, Wilmington, Delaware.

(Plate I.)

Since the publication (ENT. NEWS, IX, 144-145, Pl. IX, 1898) by Philip Laurent of a figure and brief account of the discovery in the United States of the oriental mantis, *Tenodera sinensis* Sauss., the large size of this insect, its grotesque shape and its postures often interpreted as threatening, its presence in cities and in suburban gardens, have attracted interested attention wherever it has appeared. In 1918 (Bull. Bkln. Ent. Soc., XIII, 73-76) William T. Davis gave a summary of its spread in the years between 1896 and 1918; and in the present year Stanley W. Bromley (Bull. Bkln. Ent. Soc., XXVII, 196-201, 1932) has extended that record, showing a present distribution in Connecticut, New York, New Jersey, Pennsylvania, and Ohio. Northern Delaware may be added to that record, for the insect has been abundant here for a number of years.

This literature includes reference to the presence of another introduced mantis (*religiosa* Linn.) in New York State, and to the occasional adventive occurrence in northern States of a native species from the south; but nowhere do I find reference to a second large exotic species occurring and permanently established in our eastern States.

In September, 1930, near Vandyke, southwest New Castle County, Delaware, I found the egg-mass of a mantis which could not be attributed to *sinensis*, to *religiosa*, or to our native species, *carolina*, which nears its northern limit here. In 1931



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and in the same general region I found more of these puzzling structures, but made no progress toward their identification. Further search in the spring of 1932 showed them to be present over a line extending at least two miles, eastward from the Maryland boundary through Vandyke, and I then brought several egg-masses from that locality and tied them out in my own garden at Wilmington, where they received no further attention until mid-September of this year (1932), when I captured an adult upon a garden shrub. Search was then commenced for further specimens, and an effort made to determine more accurately the distribution of the species, with these results:

Of this species, 26 adult mantids were captured and innumerable egg-masses were found, and the presence of the insect was traced across the width of the Delaware-Maryland peninsula from the western extremity of Middle Neck, Cecil County, Maryland, to Port Penn, New Castle County, Delaware, a distance of 16 miles. Eliminating Wilmington (where its presence may be attributable to my introduction of egg-masses from Vandyke), the northern limits of its observed distribution roughly follow the line of the Chesapeake and Delaware Canal. Search was not made south of Vandyke, so its distribution southward remains to be determined. At both the extreme western and extreme eastern stations for the insect, egg-masses were numerous, and they obviously represented the deposits of at least three successive years. Throughout this observed distribution no extensive plantings of exotic shrubs or trees suggest probable explanation of its presence.

I am indebted to Mr. J. A. G. Rehn for the identification of this insect as *Tenodera angustipennis* Sauss., a native of China, Japan, and Korea, and not hitherto recorded from the United States. Congeneric with *sinensis,* the adult insect (plate I) is indeed closely similar to that species in structure and appearance, and on casual examination might easily be confused with that species. As related, the present recognition of *angustipennis* as distinct is due to the finding of its

characteristic egg-mass. This (plate I), when attached to a twig, is roughly cylindrical, 40 to 60 mm. in length, about 14 mm. in diameter. At the end first deposited, it slopes to a mere coating of the twig, and at the other extremity is rather abruptly truncate. Above, it bears two deep and parallel longitudinal grooves about 5 mm. apart, and emergence of the young takes place from the raised area between the grooves. The surface of the egg-mass is marked throughout by narrow and obscure corrugations, laterally oblique, which probably indicate the location of successive deposits of eggs within the mass. When deposited upon a flat surface, the length of the mass is not modified, but the structure assumes a lower and more flattened form, sometimes attaining a width of 20 mm. with a height above the surface of attachment of 10 mm. Under no observed condition is the egg-mass of *angustipennis* mistakable for the familiar and almost globular deposit of *sinensis* (plate I).

The egg-masses of *angustipennis* are frequently attached to the twigs of shrubs or to the stems of tall herbs; but at field-margins, fence-posts and tree-trunks seem to be preferred sites. Illustrative of their abundance, twelve such deposits were counted upon a single post near St. Augustine Creek, south of Port Penn, Delaware.

The adult mantids exist in three color phases,—green, brown, and (more rarely) gray-brown. Mounts of the ♂ genitalia show close resemblance, and the arrangement and relative size of the spines of the fore legs seem identical in the two species. The more slender form of *angustipennis*, its proportionately shorter and narrower tegmina and wings, and their differences in color-pattern, are obvious from the accompanying figure; and no example of *angustipennis* was seen which presented any difficulty in recognition, when placed side by side with *sinensis*. Mr. Rehn has added to my obligation by making a careful comparative study of the two species as now abundantly represented in the collections of the Academy of Natural Sciences, and his notes will follow the present paper.

## Chief Morphological and Color Features separating Tenodera angustipennis and T. sinensis (Orthoptera: Mantidae).

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

In size *Tenodera angustipennis* averages distinctly smaller and more delicate in both sexes than does *T. sinensis*, the latter being a heavier and more robust insect. The pronotum is more elongate proportionately in *angustipennis* with the collar having its margins less strongly converging cephalad, the cephalic extremity of the pronotum in consequence more broadly and bluntly rounded; the supra-coxal lobes are less expanded, in fact but little widened; the shaft has its margins more subparallel. These differences in pronotal structure are more decided in the female than in the male, the proportionately shorter, stouter pronotum of that sex of *sinensis* being distinctly different from the relatively slender one of *angustipennis*.

The tegmina of *angustipennis* are distinctly narrower and more attenuate than in *sinensis*, the ratio of width to length in males of *angustipennis* being 4.5 to 4.8, of the same sex of *sinensis* 4.2 to 3.8; apex of tegmina more sharply and evenly acute in *angustipennis* than in *sinensis;* marginal field of tegmina in distal half proportionately narrower in *angustipennis* than in *sinensis*. In *angustipennis* the wings are narrower, more attenuate, with the apex of the anterior field much more sharply and evenly acute; in the male greatest width of the wing is contained in the length of the same nearly 2.5 in *angustipennis*, as against 2.25 in *sinensis;* posterior field of the wing much less extensive in *angustipennis* than in *sinensis*.

Certain other less evident structural differences are to be found, such as the proportions of the facial scutellum and the degree of emphasis of the surface sculpture of the internal and ventral (i.e. extensor) surfaces of the cephalic coxae. These, however, cannot be appreciated as readily as those given above, and need not be emphasized in this connection.

In color it is at once evident that regardless of which color phase is represented the posterior or radiate field of the wings

in *angustipennis* is but slightly, if at all, infumate, while in *sinensis* the same area is markedly and completely suffused, except for hyaline areolation near the dividing vein. The striking wing color feature is, however, the longitudinal concentration of the infuscation of the anterior field of the same near the dividing vein, leaving a distinct, nearly clear longitudinal area in the region of the discoidal and median vein for a considerable portion of the wing length, the quadrate areolation caused by the fuscous pencilling of the veins and cross-veins in the marginal field being sharply emphasized, while in *sinensis* virtually all of the proximal two-thirds of the anterior field, aside from the proximal dark blotch, is regularly areolate with fuscous. The apex of the wings ranges in tone from lightly infuscate in an intensive color type to subhyaline with the veins narrowly brushed with pale fuscous to dull greenish in the respective color phases in more recessive individuals. The tegmina have the marginal field green as is usual in the other species of the genus, the discoidal field in the brown phase almost lacking any trace of the pale marmoration often seen in the brown phase of *sinensis*, the veins, however, more distinctly lined in green or brown than in the same phases of *sinensis*. The humeral trunk of the tegmina is more distinctly, definitely and completely lined with fuscous brown in both phases than in the same conditions of *sinensis*.

MEASUREMENT (IN MILLIMETERS) OF REPRESENTATIVE SPECIMENS OF BOTH SPECIES*

| | Length of body. | Length of pronotum. | Greatest width of pronotum. | Length of tegmen. | Greatest width of tegmen. | Greatest length of cephalic femur. |
|---|---|---|---|---|---|---|
| ♂, angustipennis | 66.5 | 23.2 | 5.1 | 47.8 | 10.6 | 15.2 |
| ♂, " | 61.6 | 24.5 | 5.1 | 50.2 | 10 | 15 |
| ♂, sinensis | 67.5 | 22.4 | 5.3 | 52.2 | 11.2 | 16 |
| ♂, " | 82.3 | 26.6 | 7.2 | 65.5 | 14 | 19.6 |
| ♀, angustipennis | 74 | 25.6 | 6.2 | 50.3 | 11 | 17.5 |
| ♀, " | 75 | 26.5 | 7 | 55 | 11.6 | 19 |
| ♀, sinensis | 88.2 | 27 | 7.9 | 54 | 13 | 20.7 |
| ♀, " | 91.5 | 29.4 | 8.9 | 68.5 | 15.2 | 23 |

* Measurements of *sinensis* are from specimens taken at various times in the vicinity of Philadelphia, those of *angustipennis* from material kindly presented to the Academy by Mr. Jones.

## The Use of a Modified McIndoo Olfactometer for the European Earwig, Forficula auricularia, (Dermap.).

By Geoffrey Beall, Dominion Entomological Laboratory, Chatham, Ontario.

### Introduction.

An attempt was made at the University of British Columbia to test the chemotropic responses of the European earwig, *Forficula auricularia,* L., during the winter of 1930-31.* This work was planned to be the basis of an attempt to solve the difficult problem of comparing the attractive properties, positive or negative, of various poisoned baits and their constituents. The more simple problem of the response of the earwig to common foods and chemicals was first studied with the object of discovering to what extent the anticipated methods were practicable, and is the subject of this paper. The results from these preliminary tests were unsatisfactory in that they apparently did not agree with the known behavior of the earwig. Therefore, the work was not extended to include tests on baits.

### Apparatus.

A slightly modified form of the olfactometer* used by McIndoo in his investigations upon the responses of the potato beetle, *Leptinotarsa decemlineata,* Say., was employed. It was essentially a Y of glass tubing, like the original. However, the stem was longer and larger in diameter. Also the passage, at the junction of the stem with the arms, was not constricted as in the model olfactometer. The stem of the olfactometer had an inside diameter of one and a half inches, and the arms had a diameter of half an inch. Three short pieces of glass tubing were attached vertically to the Y near the crotch. The two on the arms served as intake and that on the stem as an outlet, for the air currents.

* Published by permission of Prof. C. M. Fraser, Department of Zoology, University of British Columbia. The work was conducted under the direction of Prof. G. J. Spencer, to whom I am greatly indebted for advice and assistance. To Prof. F. Dickson and Prof. M. J. Marshall, I am also obliged for assistance.

* McIndoo, N. E. 1926 U. S. Bureau Entomology. "An Insect Olfactometer", Jour. Econ. Ent. XIX, No. 3: 545-71, 8 Fig. Geneva, N. Y.

## Operation.

### *Air Movement.*

A bunsen suction pump was used to draw the air through the olfactometer. It was connected with the small vertical outlet on the stem. The air for one of the intake tubes on the arms of the Y was bubbled through a flask of water, then led through the odoriferous substance to be tested. The air for the other intake tube was only bubbled through the water. The intake tubes of the olfactometer were plugged with cotton, which served both as a filter against droplets or dust of the substance being tested and as a barrier against the occasional earwig which might attempt to ascend the tube. The outlet tube was similarly plugged. Stoppers were put in the ends of the Y when the apparatus was being used.

In a preliminary experiment, when no odoriferous substances were being tested, earwigs had shown a tendency to go into the arm of the olfactometer in which air was moving the more rapidly. Therefore, in the experiment proper, every effort was made to equalize the currents of air in the two intake arms.

All resistances to the air currents, such as the bends in the tubing and the depth of water in the flasks, on the two sides were balanced as closely as possible, in setting up the apparatus. Then pinch-cocks were used to help in the equalization. To further approach equality between the two currents, and to ensure a nearly constant rate of flow, the currents were each run through five feet of glass tubing, one millimeter inside diameter. The rate at which air was passing through each side of the intake systems was judged by the number of bubbles per minute in the flask of water on each side. A liter of air was drawn through the system in two minutes.

In order to eliminate the influence of bias between the arms on comparative readings between the two intake systems, the latter were changed over from one arm to the other after every two readings.

### *Earwig Stock Used.*

The earwigs used during December, 1930, and January, 1931, for this work had been taken as adults in September, 1930. They had been kept in the green-house or zoological laboratory in the meantime.

*Procedure in Experiment.*

Since earwigs avoid light, an effort was made to disturb them as little as possible before they were used in an experiment. Accordingly, before any readings were taken they were all counted out; after this they were kept in the dark until it was time to use them. In doing this, about eighty earwigs to be used in the course of the day were divided into lots of six of like sex. Each of these groups was placed in a two-inch vial. Individuals were used that had not been fed for from thirty to forty-eight hours. Each lot was, as a rule, employed only once in the course of a day, although sometimes groups were used a second time after an interval of several hours. Only adults were tested.

Substances to be tested were put in Erlenmeyer flasks or test-tubes. Air was bubbled through two inches of liquids or passed through three inches of fine, freshly mashed, solids.

After each reading, the arms of the olfactometer were cleaned with soft towel paper on the end of a flexible wire. Sometimes the stem was also cleaned. In order to keep the current as free as possible from odors, other than that being tested, rubber connections were reduced to a minimum by using glass and cork wherever possible.

In actually taking a reading, the apparatus was completely assembled, except that the stem of the olfactometer was open. One of the vials of earwigs was taken from the dark, uncorked and placed in the mouth of the stem as quickly as possible, and then the light was switched out. After an average period of fifteen minutes, the light was turned on and the position of the earwigs immediately determined.

It will be seen that in this work no attractive force, such as the light used by McIndoo, was present to draw the insects into the arms of the olfactometer. However, the natural restlessness of the earwigs was relied upon to bring some of them along the stem into the region of the odor.

*Results of Experiment.*

The actual results from a series of readings with various substance is shown below. Since all factors were practically the same in the two arms, it is assumed that an equal number of earwigs should have been obtained in each, that is a 1/1 distribution would be expected. By formula * the probable deviation from this ratio, for the numbers used, is calculated and shown against the observed deviation.

| Odoriferous substance | No. of readings | Period in minutes | Earwigs found at end of period in arm with odor | Earwigs found at end of period in arm without odor | Observed deviation from 1:1 distribution between arms | Probable deviation from 1:1 distribution between arms | Probability of experimental deviation from 1:1 ratio being due to chance |
|---|---|---|---|---|---|---|---|
| 95% ethyl alcohol | 32 | 15 | 31 | 48 | ±8.5 | ±3.0 | .06 |
| 7% ethyl alcohol | 9 | 10–20 | 9 | 24 | ±7.5 | ±1.9 | .009 |
| Concentrated solution of sodium arsenite in water | 32 | 15 | 36 | 43 | ±3.5 | ±3.0 | .4 |
| Pulverized fresh apple | 23 | 15–60 | 16 | 52 | ±18.0 | ±2.8 | 0 |
| Pulverized fresh liver | 44 | 15–60 | 30 | 90 | ±30.0 | ±3.7 | 0 |
| Crushed naphthalene† | 9 | 15 | 2 | 13 | ±5.5 | ±1.3 | .004 |

CONCLUSIONS.

To summarize the results from this experiment, it may be said that, on the whole, the response of the earwigs, when considered in the light of general observations, seemed abnormal for the substances tested. In the case of naphthalene the strong aversion shown toward its odor would have been anticipated. Also since sodium arsenite is not a volatile substance, the

* Formula used is $PE = \mp .6745 \left(\frac{p \cdot q}{N}\right)^{\frac{1}{2}}$

Where p = number in one arm
q = number in other arm
N = p + q

† In the case of the naphthalene the current of air was not passed through the substance but only through the upper part of a 500 cc. Erlenmayer flask which had one common moth-ball crushed in the bottom.

neutral response of the earwigs was apparently normal. The very strongly marked reaction against 7% alcohol, apple and liver is inexplicable. Particularly is this so in the case of the latter two foods which were eaten readily under free and caged conditions.

Since the results obtained with the common foods were so unsatisfactory, and since time was not available to analyze the apparent discrepancies, further tests with earwig baits, which had originally been projected, were not carried out.

While the results obtained were apparently unsatisfactory, it should be noticed that only in the case of one substance, sodium arsenite, was the experimental deviation from a 1/1 ratio between the two arms, within the limits of standard deviation. In this case there were four chances in ten that the deviation obtained was a matter of chance. For all other substances, the probability that the observed deviation was due to chance was nowhere higher than six out of one hundred. In short, the earwigs did orient within the olfactometer to smell.

## Ordinal Status of the Oribatoidea (Acarina).

By Arthur Paul Jacot.

According to some of the most recent systems of classification,[1] the moss mites are placed in the suborder Sarcoptiformes with the Acaridiae, on the ground that (1) some of the larvae of the Oribatoidea resemble some of the Tyroglyphids and that (2) they have *in common* the following structures:

1. Reduction of mandible segments (to 2)
2. Reduction of maxillary palp segments (to 3-5)
3. Reduction of leg segments (to 5)
4. Absence of heart
5. Absence of "malpighian tubes"
6. Presence of pseudostigmatic organs
7. Presence of midgut caeca
8. Presence of complete alimentary canal.

Concerning these structures the following factors should be considered:

Reduction of number of segments is due to orthogenic trends and is therefore of phylogenic import.

[1] Vitzthum, H., 1931, Ordnung der Arachnida: Acari = Milben, *in*: Kükenthal and Krumbach, Handbuch der Zoologie, vol. 3, 160 pp., 161 figs.

Absence of heart is a character which is largely governed by size of body and has no true phylogenic value within an order. The absence may occur in any group of Arthropods in which the body is small enough. Moss mites rarely attain a body length of 2 mm.

Absence of "malpighian tubes" is also correlated with size and possibly diet. As moss mites have a well developed alimentary system and tracheal (aereating) system, an additional excretory system in so small a body would be unnecessary. This absence may therefore have no phyletic significance.

Pseudostigmatic organs are also developed in the Trombidiidae and absent in some of the primitive Oribatoidea.

Midgut caeca are found in varying degrees of development. For instance in the Oribatinae (old Damaeus) they are not developed or are merely angles of the ventriculus. One must therefore consider them an independent development.

Presence of a complete alimentary canal is a character which is largely influenced by feeding habits. Parasitic forms feeding on highly organized fluids have a tendency to reduction of posterior end of alimentary canal. This is true in other phyla of animals. The presence of the complete alimentary canal in the Oribatoidea is directly correlated with their vegetarian diet. The same high development of the alimentary tract, especially the intestine, is found in the vegetarian mammals, birds, fishes and others. It has no phylogenic significance.

Thus these structural characters, are due to size, diet and orthogenic trends.

Another viewpoint is to consider the points of *difference*. These are:

| | *Oribatoidea* | *Acaridiae* |
|---|---|---|
| Mouth parts | enclosed by rostrum | mostly extending beyond |
| Maxillary palp | 3-5 segmented | 3 segmented |
| Tracheae | 0-8 | 0-2 |
| Coxae | variously modified | I & II, III & IV united |
| Tarsi | without pennant, with 1-3 claws | with pennant and/or 1 claw |
| Body | usually highly chitinized | soft |
| Sexual dimorphism | absent | present |

The enclosing of the mouth parts under the rostrum is correlated with feeding habits, i.e. these organs have never become highly developed for prehension or attack as in the Parasitiformes (and the saber-toothed tiger), but remain protected by the chitinous hood.

The presence of the tracheae is a secondary development as they are absent in the Phthiracaridae, in the primitive Oribatids, larvae and nymphs, while they are poorly developed in intermediate groups like the Nothrinae, and long and convoluted in the highly specialized Pterogasterines. Thus again, there is no phylogenic connection. The development of the tracheae in these minute forms is necessitated by and correlated with the degree of chitinization of the skin.

Fusion of coxae and reduction of palp segments designate orthogenic trends.

Conditions of tarsal armature are correlated with life habits, and are strongly divergent tendencies. For instance, in the Acaridiae special structures are developed to enable host relations. In the Oribatoidea the single hook becomes three in the more advanced species, either by reduplication or by splitting on either or both sides, first as thin blades, also as equally stout. The presence of these subsidiary hooks has all the appearance of a mutation. For instance, in the species *Pseudotritia ardua* small races have one nail, while the robust northern form is triheterohamate. In the genus Ameronothrus one hook appears in some species, three in others without correlation, just as they happen to mutate, but breeding true to type once the type is established. In the most highly specialized genera one finds three hooks unexceptionally—though one might expect a single hook in the smallest species. The hooked unguis is the normal ambulatory armature found in the larvae and the primitive groups of most terrestrial Arthropods and is therefore the most primitive condition. The clinging structures developed in the parasitic forms are specializations. Thus the ungual armature is correlated with substratum, secondarily with feeding habits (as in parasitic forms).

Chitinization of body is again an independent development correlated with inoffensive, passive feeding habits, i.e. it is developed as a protection. This is clear from the fact that it is poorly developed in the larvae, better developed in the nymphs

and primitive groups, and highly developed in the winged and long-legged species (i.e. in the climax groups).

Sexual dimorphism is often found in parasitic groups. That it is not developed in the Oribatoidea is not surprising.

Thus it is evident that most of the differential characters are due to the dense chitinization and that this in turn is a protective device necessitated by the passive, feeding habits.

Size is probably a result of the mechanics of structure.

In brief then, the majority of differences between the Oribatoidea and the Acaridiae are that the moss mites are primitive in feeding habits and the Acaroids are specialized.

These characters may be regrouped as follows:

I. Orthogenic characters:
  Reduction in number of mandible segments (to 2)
  Reduction in number of maxillary palp segments (to 3-5)
  Reduction in number of leg segments (to 5-6)
II. Feeding habits: free, vegetarian, resulting in:
  Inoffensive mouth parts—covered by rostrum
  Chitinization of body wall—for protection, necessitating:
    Development of tracheae
    Small size, resulting in:
      Lack of heart
      Lack of "malpighian tubes"
  Development of midgut caeca
  Primitive unguis (ambulatory)
III. Primitive larvae.

Thus the Oribatoidea may be subordinally related to the Acaridiae in that (1) the larvae of some of the Oribatoidea resemble the most primitive of the Acaridiae, (2) the number (a) of mandible segments (b) maxillary segments (c) leg segments are similarly reduced. They *differ* in several striking structural characters necessitated by their markedly different *feeding* habits.

The primitive feeding habits correlated with presence of segmentation should place the Oribatoidea anterior to the Parasitiformes, while the reduced appendages would place them posterior to the Parasitiformes. As the development of the predaceous and parasitic habits with their accompanying structural modifications is a more rapid acquisition than reduction of appendicular segments, the Oribatoidea may be regarded as more highly specialized, more deeply modified than

the Parasitiformes and placed posteriorly—along with the Acaridiae.

To be more specific, the Oribatoidea are far more primitive than the highly diversified and modified parasitic Monacotricha and Anacotricha (of the Acaridiae). Likewise they are distinctly more primitive than the parasitic families of the Diacotricha but more specialized than the saprophytic families. At present these Diacotricha are so poorly understood that it would be a waste of time to endeavor to determine the immediate relationships of the Oribatoidea with these saprophytic Diacotricha, suffice it to say that it is *near* the Tyroglyphoids. Thus the true position of the moss mites would be among the Diacotricha of the Acaridiae. In this connection it should be remembered that some of the Oribatoidea have (1) abdominal segmentation, (2) *six* leg segments, the coxae being invaginated,[2] (3) no praetarsus,[3] (4) a five segmented maxillary palp.[4] Thus it is incorrect to say that the Oribatoidea are chitinized Acaridiae, but one might say they are chitinized Tyroglyphoids.

## Some Notes on California Thrips (Thysanoptera).

By Stanley F. Bailey, University of California.

Some notes have recently been gathered on several species of California Thysanoptera which add somewhat to the knowledge of their distribution and host plants.

Hercothrips femoralis (Reuter.) Mr. L. M. Smith reported this species as causing considerable damage to a cactus garden at San Jose, California, during April, 1931. The majority of the plants attacked belong to the family Crassulaceae and are *Kalanchoe marmorata, Cotyledon maximum, Sempervivum maraianatum, Pleiospilus bolusii, Fancaria tigrina,* and *Crassula monticola.* Only one true cactus (*Cereus ocamponis*) was attacked.

At Davis, California, during May and June, 1931, sugar beets grown in a greenhouse for experimental purposes were found to be heavily infested. There is a distinct preponderance of females in this species and the males were only occasionally taken.

Heliothrips haemorrhoidalis (Bch.). Two records of the greenhouse thrips living out-of-doors in California have recently come to hand. Prof. E. O. Essig reports this thrips

[2] Id., p. 81. [3] Id., p. 82. [4] Id., p. 84.

as damaging the foliage of persimmons at Santa Barbara, October 13, 1930, and Mr. R. L. Usinger collected it on ornamentals (plants not determined) at Oakland during April, 1931.

ODONTOTHRIPS LOTI Haliday. Both sexes were taken by Mr. L. M. Smith and the author on wild vetch (*Vicia sativa* L.) at Monticello, California on March 3, 1931, and by the author on *Lactuca scariola* L. at Davis, California, on June 27, 1931.

SERICOTHRIPS VARIABILIS (Beach). This species has been taken on *Ceanothus* at Davis, California, during June in both 1930 and 1931. The plant is in blossom at this time and the thrips may be found in large numbers in the flowers but decreases as the summer progresses, and has not been taken during the remainder of the year on this host. The male of the species is not very common.

AEOLOTHRIPS KUWANI Moulton. This apparently predacious thrips has been observed at Davis, California, on pear, prune, apple, and *Lactuca scariola* L. during May and June, 1930 and 1931. Pupation occurs on the host in curled leaves, abandoned spiders' webs, etc.

ANAPHOTHRIPS STANFORDI (Moulton). Apterous females were taken on *Lactuca* at Berkeley, California, on Dec. 6, 1930.

LIOTHRIPS VARICORNIS Hood. A large number of adults and larvae were taken in hollyhock (*Althaea rosea*) flowers at Davis, California, on October 19, 1929.

I am indebted to Mr. John B. Steinweden, assistant to Mr. Dudley Moulton, for making determinations of several of the above species.

## Corrections in Nomenclature (Diptera, Asilidae).

In my paper on the genus *Microstylum* in Madagascar, published in the Transactions of the American Entomological Society, LII, pp. 201-207, 1927, I described a new species under the name of *griseum*. Due to a printer's error, this appeared at the head of the description as *giseum*, the second letter being omitted. In the key preceding the description the spelling is correct, *griseum*.

In American Museum Novitates, No. 334 (1928), p. 2, I described *Erax willistoni*. As this name is preoccupied (*E. willistoni* Hine, Annals Ent. Soc. America, XII, 110, 1919), I therefore propose the name *neowillistoni*.

In my paper, A Review of the Genus *Proagonistes* (Annals and Magazine of Natural History, ser. 10, vol. VI, 1930), in the key to species on p. 214, the alternate couplet under No. 4 was omitted in printing. The couplet under No. 4 should read:

"4. Hind tarsi with fine black hairs, causing them to appear black above .....5
Hind tarsi with reddish hairs .....6."

STANLEY W. BROMLEY.
Ohio State University, Columbus, Ohio.

## Ant Communities of a Section of the Sagebrush Semi-Desert in Idaho, with Special Reference to the Vegetation (Hymenop.: Formicidae).

By A. C. Cole, Jr., Ohio State University.

An area one-tenth of a mile square was selected in the sagebrush semi-desert near Twin Falls, Idaho, in which to conduct a survey of the principal ant communities. This area consisted of three distinct parts; firstly, a ledge of overhanging rocks along the north side of the square; secondly, a small stream along the south side; and thirdly, an intervening, somewhat level, sandy area. The principal vegetation of each of these three units is listed in table 1. *Agropyron repens* (L.) Beauv.

TABLE 1.

Vegetation of Three Semi-Desert Biotic Communities.

*The Solenopsis molesta-Agropyron repens Community.*

| Frequent. | Scarce. |
|---|---|
| Agropyron repens (L.) Beauv. | Bromus tectorum L. |
| Cirsium arvense (L.) Scop. | Chrysothamnus graveolens (Nutt.) Greene |

*The Lasius niger americanus-Salsola pestifer Community.*

| Frequent. | Scarce. |
|---|---|
| Salsola pestifer A. Nels. | Atriplex rosea L. |
| Aster sp. | |

*The Formica subpolita-Artemisia tridentata Community.*

| Frequent. | Scarce. |
|---|---|
| Artemisia tridentata Nutt. | Agropyron repens (L.) Beauv. |
| Chrysothamnus graveolens (Nutt.) Greene | |
| Bromus tectorum L. | |

(Bunchgrass) dominated along the rocky ledge, *Salsola pestifer* A. Nels. (Russian Thistle) on the stream margin, and *Artemisia tridentata* Nutt. (Sagebrush) in the central area. The overhanging ledge of rocks provided a shaded habitat in the afternoon and prevented the rapid evaporation of soil moisture. The soil of this portion was a sandy loam. Along the stream the soil was very moist and consisted of a rich loam, while in the unshaded central area it was dry and sandy.

THE BIOTIC COMMUNITIES *

1. *The Solenopsis molesta-Agropyron repens Community*

The ant *Solenopsis molesta* Say dominated in this community in which there were a few colonies each of *Crematogaster lineolata* Say, *Monomorium minimum* Buckley, *Pheidole vinelandica longula* Emery, *Pheidole sp.*, and *Camponotus hyatti* Emery. (Table 2.) One colony of a species of Myrmica was

TABLE 2.

ANTS OF THREE SEMI-DESERT BIOTIC COMMUNITIES.

*The Solenopsis molesta-Agropyron repens Community.*

| | |
|---|---|
| Solenopsis molesta Say | 13† |
| Crematogaster lineolata Say | 6 |
| Monomorium minimum Buckley | 5 |
| Pheidole vinelandica longula Emery | 4 |
| Camponotus hyatti Emery | 2 |
| Pheidole sp. | 2 |
| Myrmica sp. | 1 |

*The Lasius niger americanus-Salsola pestifer Community.*

| | |
|---|---|
| Lasius niger americanus Emery | 22† |
| Solenopsis molesta validiuscula Emery | 17 |
| Tapinoma sessile Say | 12 |
| Camponotus maculatus vicinus nitidiventris Emery | 8 |
| Formica neogagates neogagates Emery | 6 |
| Leptothorax curvispinosus rugatulus Emery | 4 |
| Pheidole sp. | 4 |
| Lasius umbratus mixtus aphidicola Walsh | 3 |
| Formica fusca var. | 1 |
| Lasius niger sitkaënsis Pergande | 1 |

*The Formica subpolita-Artemisia tridentata Community.*

| | |
|---|---|
| Formica subpolita Mayr | 46† |
| Pogonomyrmex occidentalis Cress | 18 |
| Formica rufa obscuripes Forel | 14 |
| Formica fusca neorufibarbis Emery | 12 |
| Formica fusca var. | 4 |
| Formica sanguinea subnuda Emery | 2 |
| Formica pallide-fulva var. | 1 |

also represented. All of the above ants were beneath flat rocks.

2. *The Lasius niger americanus-Salsola pestifer Community*

*Lasius niger americanus* Emery was the dominant ant, while

* Expressed in terms of the dominant ant and the dominant plant.
† The figures indicate the number of colonies.

*Solenopsis molesta validiuscula* Emery, *Tapinoma sessile* Say, and *Camponotus maculatus vicinus nitidiventris* Emery were frequent. Less commonly represented were *Formica neogagates neogagates* Emery, *Leptothorax curvispinosus rugatulus* Emery, *Pheidole sp.*, and *Lasius umbratus mixtus aphidicola* Walsh. *Formica fusca* var. and *Lasius niger sitkaënsis* were rare. (Table 2.) All of the colonies were found beneath flat rocks.

3. *The Formica subpolita-Artemisia tridentata Community*

The most abundant ant in this community was *Formica subpolita* Mayr. *Pogonomyrmex occidentalis* Cresson and *Formica rufa obscuripes* Forel were common, while *Formica fusca neorufibarbis* Emery and *Formica fusca* var. were less frequent, and *Formica sanguinea subnuda* Emery and *Formica pallide-fulva* var., rare. (Table 2.)

*Formica obscuripes* was represented by mounds of detritus formed around clumps of sagebrush, and pebble mounds of *Pogomomyrmex occidentails* were abundant in the bromegrass area between the shrubs. The remaining species were all beneath scattered stones.

## Discussion.

From a study of this nature we see that the habitat of a species of ant is greatly determined by the physical factors of the environment, or the vegetational equivalent. A culmination of factors acting upon the existing vegetation determines whether or not it shall continue to remain in the habitat; likewise, this same group of factors directly, through contact with the ant colonies, or indirectly, through the vegetation types, affects the entire ant fauna of a given community. It determines the quantitative as well as the qualitative composition of the area, and, unless the establishment of the ants is of a contingent nature, it also determines whether or not there shall be this establishment.

The food relations of these associated ants are of prime importance. The members of the genus *Pheidole,* of which three species are represented in our community, are nutritionally dependent upon seeds from adjoining vegetation. This is also true of *Pogomomyrmex occidentalis* and to a lesser extent of *Formica subpolita.* An abundance of annual and perennial

grasses with readily available seeds is an enticement to the establishment, and a factor influencing the continued existence, of the granivorous species of ants. The presence of sagebrush lends itself to the rapid establishment of *Formica obscuripes*. In such a habitat food is rather easily accessible.

It is of consequence that the physical and biotic nature of the semi-desert region is continually, and often rapidly, changing. Vegetation increases and decreases in size, abundance, and composition, annual and seasonal temperatures and precipitation suffer great fluctuations, the nature of the soils is variable, both physically and chemically, the water courses, both surface and subterranean, deviate from their paths, and, with all this, the ant fauna changes to a remarkable extent. New forms invade the area and become established, some permanently, if they are able to cope with rapidly changing conditions, and others only temporarily. Incipient nests are founded by old colonies, some of them fortuitously extending their range into new and previously unoccupied regions, over precarious barriers of climate and topography. The investigator cannot help but observe, from year to year and from decade to decade, the physical and biotic instability of the habitat. Upon a complex of interrelated factors must an individual live, so upon another must it die. The changeability of even a single factor may "push over the dominos" and affect the last link in the chain. The ant, as an organism, is, therefore, directly or indirectly dependent upon all phases of its diversified environment. It is itself a factor producing this environment and a product of it.

## An Opportunity.

It will be of interest to all workers in Biology to learn that the Council of the Biological Society of Washington, at its last meeting, has voted the granting of a special price reduction on the following of its publications: "Natural History of the District of Columbia," by W. L. McAtee, 142 pages, inset map, octavo, paper, 1918. "The International Rules of Zoological Nomenclature," 28 pp. octavo, paper, 1926. "Birds of the Washington, D. C. Region," by May Thatcher Cooke, 79 pp. octavo, paper, 1929. These can be obtained from the Society's corresponding secretary, J. S. Wade, U. S. Bureau of Entomology, Washington, D. C. Requests should be sent promptly as only a very limited number of copies remain.

## Color Changes in Preserved Specimens of Dynastes tityus (Coleop.: Scarabaeidae).

By P. W. Fattig, Emory University, Georgia.

For several years I have been observing the *Dynastes tityus* Linn. (Coleoptera) in my collection, trying to find out why some of the specimens change color.

Blatchley in his Coleoptera of Indiana says that these beetles are "greenish-gray with brownish or piceous spots scattered irregularly over the elytra." He also comments upon the eight specimens in their collection as follows— "One of the females is wholly chestnut-brown above; while one of the males has one elytron almost wholly chestnut-brown, the other one being of a normal hue."

I have one specimen, a male, taken at Springfield, Ohio, on May 14, 1915. This specimen was of the natural color. It remained this way for at least two years. While teaching at the State Teachers College at Valley City, North Dakota, I showed this specimen to some of my students in the Spring of 1918, and was surprised to find that the right elytron of this male had changed to a chestnut-brown. I did not notice this specimen again for about two years, when at Gainesville, Florida, I opened the box again, and was very greatly surprised to find that the beetle had changed back to its normal color. It remained this way for three or four years, when the right elytron again changed to the chestnut-brown color. At the present time, both elytra are chestnut-brown in color.

When I first noticed the change in color, I explained it by saying that when the pin had been run through the right elytron, that some of the body fluids had come into contact with the elytron, and that these fluids had finally caused the elytron to change to the chestnut-brown color. When the elytron had changed back to its original color, I was puzzled in trying to find an explanation.

I have the following pinned specimens—One female, taken at Gainesville, Florida, June 18, 1919, which has remained normal in color; one female, Atlanta, Georgia, July 11, 1928, in which the right elytron and the thorax have changed to a chestnut-brown color; one male, Atlanta, Georgia, October 1, 1927, in which both elytra and the thorax have changed to a reddish-

brown color; one male, Atlanta, Ga., July 8, 1928, which has remained normal in color.

I have a male from Farmville, Virginia, which I took from the pupa case on May 5, 1925. This was an adult specimen. During the past year, the right elytron has changed to a chestnut-brown color.

I have the following papered specimens—one female, Atlanta, Ga., July 8, 1928, in which both elytra and the thorax have changed to a chestnut-brown color; one female, Atlanta, Ga., July 10, 1928, which has remained normal in color; one female, Atlanta, Ga., July 8, 1928, which is now changing in color (both the elytra and the thorax); one male, Atlanta, Ga., July 11, 1928, in which the thorax has changed to a chestnut-brown color; one male, Atlanta, Ga., July 9, 1928, which has remained normal in color; one male, Griffin, Ga., June 22, 1930, which has remained normal in color; one female, Atlanta, Ga., June 18, 1929, in which both elytra and the thorax have changed to a chestnut-brown color; one female, Atlanta, Ga., September 3, 1928, which has remained normal in color; one female, Atlanta, Ga., July 11, 1929, in which both the elytra and the thorax are changing in color; one female, Atlanta, Ga., July 15, 1929, which is changing in color (both the elytra and the thorax); one female, Atlanta, Ga., July 2, 1927, in which both elytra and the thorax have changed to a chestnut-brown color.

All of the specimens were normal in color when captured. All have been kept under the same conditions.

The most peculiar of these specimens is the male from Springfield, Ohio, in which the right elytron changed to a chestnut-brown color, and then again changed back to the normal color, and thus remained for at least four years, when the right elytron again changed to the chestnut-brown color, and finally the left elytron changed to the chestnut-brown color. The thorax of this specimen has remained normal in color during all of these color changes, so far as I have observed the color changes. The Atlanta, Ga., July 11, 1928, specimen is also interesting in that the thorax only has changed in color. The three specimens which are changing in color present a peculiar appearance. I believe that they will finally have the same color as the others which have changed in color.

**A Parasitic Hymenopteron as a Vector of an Insect Disease.**

The importance of insects as vectors of human disease has been appreciated for many years. Yellow fever, malaria and other diseases are now largely controlled by combating their insect vectors. More recently the role of insects as carriers of plant diseases has been established. Such diseases as curly-top in sugar beets and tip-burn in potatoes are spread by means of insects. However that insects may serve as carriers of insect diseases has not been generally recognized.

Insect parasites which normally pass from host to host may carry disease. The parasitic Hymenoptera which paralyze their hosts by stinging may carry disease organisms on their ovipostors. If the insect which is stung is carried to the nest of the Hymenopteron and there devoured, the presence of germs on the ovipositor is not a factor in the spread of disease among a general population of insects. However when the insects which are stung are allowed to remain where they are, and the parasite passes from insect to insect the ovipositor of the stinging insect may be a factor in spread of disease. In addition when the insect stung is not always completely paralyzed and may be able to move about the importance of disease transmission is greater than when the insect is completely paralyzed.

*Microbracon hebetor* Say [Braconidae] stings larvae of the Mediterranean flour moth, *Ephestia kühniella* Zeller. Eggs are not deposited on the paralyzed caterpillars but are laid under or near the larvae. The wasp larvae on hatching crawl to the host and feed on it as external parasites. At times the host larvae are incompletely paralyzed. Also the parasite larvae do not always find the host. Among the host larvae is a sporozoan disease caused by *Thelohania ephestiae* Mattes. The earliest foci of the disease occur in the ganglia of the central nervous system. The disease can be recognized when the larvae are still alive by the diseased larvae having a large head and a small body. It is of interest that the infected larvae have badly coordinated crawling movements.

The transfer of *Thelohania ephestiae* Mattes by the wasp *Microbracon hebetor* Say rests on the following evidence: The disease cannot be transmitted by mouth. Diseased larvae can be kept in the same culture dish with healthy larvae without infecting them. The disease follows parasitic attack. The first point of infection is in the ganglion pierced by the parasitic wasp. Later the causative organism is found in both the nervous system and the fat body. NELLIE M. PAYNE.

## 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., Acadêmie 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.
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista Entomologia, São Paulo, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.

# Entomological Literature

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

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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## Doings of Societies

The ninth annual Rocky Mountain Conference of Entomologists was held in Pingree Park, Colorado, August 15 to 20, 1932, inclusive. A total of 88, which is the largest number to have attended any of the Conferences, registered during the week. Forty-six of these were directly interested in entomology; the others being friends or members of families.

A total of 10 sessions were held for the presentation of papers: The following is a list of the more formal subjects discussed:

Arachnida.—Life History of the Hour Glass Spider, P. B. Lawson.

Coleoptera.—White Grubs, C. L. Fluke; White Grubs in Iowa, Bernard Travis.

Homoptera.—Cercopidae, Katherine C. Doering; Taxonomic Aspects of Aphids on Ribes, Miriam A. Palmer; The Potato Psyllid, L. B. Daniels.

Lepidoptera.—Codling Moth Control in Missouri, Leonard Haseman; *Stretchia plusiiformis* Hy. Edwards, a Pest on Gooseberries, J. L. Hoerner; The Cabbage Looper on Lettuce, S. C. McCampbell; *Mincola scitulla* Hulst., an Enemy of Stone Fruit in Idaho, Claude Wakeland.

Orthoptera.—Grasshopper Bait Tests in Colorado, F. T. Cowan.

Diptera.—Notes on the Stratiomyiidae in Colorado, Maurice T. James.

Hymenoptera.—Paper Wasps of Utah, C. L. Hayward; The Romance of the Honeybee, F. B. Paddock.

General.—Pasture Insect Investigations, Donald A. Wilbur; University Life in England and Civic Life on the Continent, Illustrated, J. E. Ackert; Remarks on Insecticide Research, C. H. Richardson; Entomological Supplies, Alexander B. Klots; sub-Specific Nomenclature of Insects, Alexander B. Klots; The Role of Insects in the Food of Trout in the Rocky Mountain Region, John W. Scott; The Preparation of Granulated Honey for the Market, R. G. Richmond; Faunal Survey of Colorado, F. Martin Brown.

Symposium.—Entomological Collections of the Rocky Mountain Region. Leaders, Vasco M. Tanner, F. Martin Brown and C. L. Fluke.

The symposium on entomological collection for the Rocky Mountain region led to the appointment of a committee consisting of F. Martin Brown, Vasco M. Tanner and Geo. M. List, Chairman, to encourage the various workers that collect

in the Rocky Mountain region to return to museums in that area, representative material whenever this is possible. It was felt there is a very urgent need for this cooperation between workers of the various sections in order to build up more representative collections in the west that will be available for students of the region.

More than the usual number of systematists were present at the meeting, which resulted in a large number of specimens being taken. The following is a list of entomologists attending the meeting: F. B. Paddock, Bernard Travis, C. H. Richardson, Ames, Iowa; Geo. A. Dean, J. E. Ackert, Donald A. Wilbur, C. R. Collins, Manhattan, Kansas; Katherine C. Doering, Paul B. Lawson, Lawrence, Kansas; Claude Wakeland, Moscow, Idaho; Leonard Haseman, Columbia, Mo.; Alexander B. Klots, Elsie B. Klots, Rochester, N. Y.; Otis Wade, Eugene F. Powell, L. M. Gates, Lincoln, Nebraska; A. W. Lindquist, Uvalde, Texas; C. L. Fluke, Madison, Wisconsin; C. L. Hayward, Vasco M. Tanner, Provo, Utah; Lee Jeppson, Brigham City, Utah; John W. Scott, Laramie, Wyoming; L. G. Davis, Grand Junction, Colo.; J. H. Newton, Chas. M. Drage, Paonia, Colo.; Harold E. Rice, E. R. Bliss, Greeley, Colo.; F. Martin Brown, Colorado Springs, Colo.; Orville Hitchcock, Montrose, Colo.; Maurice T. James, Boulder, Colo.; M. A. Palmer, L. B. Daniels, John Weaver, S. C. McCampbell, C. A. Bjurman, R. G. Richmond, G. M. List, Lee Jenkins, Leonard Sweetman, C. P. Gillette, F. T. Cowan, J. L. Hoerner, Jack Manweiler, S. Arthur Johnson, C. R. Jones, Fort Collins, Colo.

Officers elected for 1933 were C. P. Gillette, Chairman; Geo. A. Dean, Vice-chairman; Geo. M. List, Secretary, and C. R. Jones, Treasurer.

George M. List, Secretary.

## OBITUARY

Dr. William Jacob Holland, director emeritus of the Carnegie Museum, Pittsburgh, Pennsylvania, author of the well-known and widely used *Butterfly Book* and *Moth Book*, died on December 13, 1932, at the age of eighty-four years.

# EXCHANGES

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

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

**Wanted**—Names and addresses of those desiring Coleoptera and Lepidoptera of southwest Arkansas.—Miss Louise Knobel, E. 3rd St., Hope, Arkansas.

**Wanted**—October, 1919, and December, 1919, copies of Bulletin of the Brooklyn Entomological Society. Cash. Harriet A. Wickwire, 55 Tompkins St., Cortland, N. Y.

**Wanted for Cash or Exchange**—Uncommon species of North American Lepidoptera. Several of each kind. D. V. Brown, Pleasanton, California.

**Butterflies**—Desire correspondence from Western United States, Canada and Alaska. Will exchange rare California material for specimens from your locality. Lloyd M. Martin, P. O. Box 52, Roscoe, California.

**Exchange**—Local Venezuelan (South America) species of lepidoptera offered in exchange for North American species. Oscar Zuloaga, P. O. Box 263, Caracas, Venezuela.

**Exchange.**—Desire Lepidoptera, particularly specimens and data of Wisconsin and U. S. Catocala. Exchange for same. Wm. E. Sieker, 46 Breeze Terrace, Madison, Wisconsin.

**Will buy or exchange** — Pinned Microlepidoptera and papered Pieridae of North America. Full data with all specimens. Named material of all groups offered. Alexander B. Klots, University of Rochester, Rochester, N. Y.

**Wanted** — Names and addresses of those desiring Insects from Tennessee. Will collect there during June-September, in all orders. Correspondence solicited. B. Benesh, 107 Argonne Drive, North Chicago, Ill.

**Wanted** — West Coast Geometrids for cash or in exchange for California Butterflies. Edward Guedet. P. O. Box 305, Napa, Calif.

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

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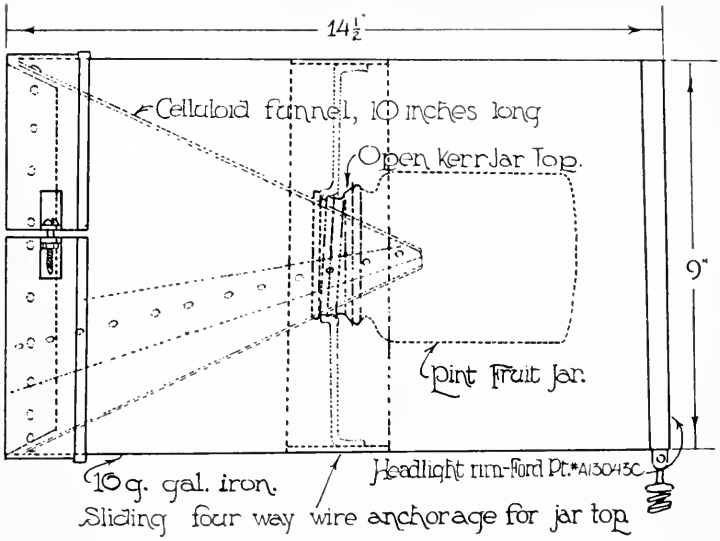

FIG. 1. A schematic drawing of an insect trap for a headlight of an automobile.
FIG. 2. An insect collecting trap on the headlight of an automobile.
Hall, Hull and Dove.

# ENTOMOLOGICAL NEWS

VOL. XLIV. FEBRUARY, 1933 No. 2

## New Method in Sand Fly Studies (Diptera: Chironomidae).

By D. G. HALL, J. B. HULL, and W. E. DOVE, Division of Insects Affecting Man and Animals, U. S. Bureau of Entomology.

(Plate II.)

The present paper describes some methods for (1) obtaining adult sand flies, (2) the preservation of the natural shape and color of such adults, and (3) the preparation of immature stages for microscope slides. These methods are satisfactory in our studies on sand flies, and it is thought that other entomologists may find them useful in their work.

### AN AUTOMOBILE-HEADLIGHT INSECT TRAP.

An inexpensive, easily transported light trap used to collect insects at night is herein described. It is adapted for use on the headlight of one of the small popular makes of automobiles.

In order to obtain information on the seasonal incidence of sand flies in different marsh areas it was necessary to devise a means of collecting these midges. It was learned that sand flies are attracted to artificial light, and that they can be trapped by the use of such light. Since the areas in which sand flies breed are often some distance from available electric lines, illumination was secured from the headlight of an automobile. by the use of such light. The trap described below is efficient in collecting sand flies and it is not cumbersome to handle.

If one takes an automobile headlight rim and a jar top rim to a tinner, he can have the metal parts of the trap assembled. When this is accomplished, it is an easy matter for one to make a cone from a sheet of heavy celluloid.

A cylinder 14 inches long is rolled from a sheet of 16 gauge galvanized iron so that its diameter is the same as that of a headlight rim of an automobile. This cylinder is soldered to the headlight rim so that the end receiving the rim can be fastened to the reflector of the automobile headlight. When in



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use the trap replaces the rim and lens ordinarily used in the headlight. A second rim, 2 inches wide, is made so that the ends fasten together with a small bolt. This is made large enough to serve as a band around the front end of the cylinder. To the edge and on the inside of this band the tinner solders a 1-inch strip of sheet iron which is punched with small holes at intervals of about 3 inches. It is soldered at an angle so that a celluloid cone can be anchored to it. (Figs. 1 and 2.)

Another 2-inch rim is made so that it slides on the inside and about midway of the cylinder. It supports a jar top so that the latter may receive a pint size fruit jar. The jar top is anchored by soldering 4 wires on the outside and bending them so that the free ends can be soldered to the inside of the rim. (Figs. 1 and 2.) When the pint jar and the trap are placed in position, it is possible to slide this rim so as to provide ample clearance between the bottom of the jar and the bulb of the headlight. Also, this sliding feature permits one to vary the length of the cone of the trap.

It is not difficult to make a cone for the trap. It is best to cut a pattern from a large piece of heavy paper and use this in cutting the sheet of celluloid. If one uses a 10-inch radius and draws a circle, he can mark off a distance on the circumference of this circle which will be of the same length as the circumference of the front end of the cylinder. This distance may be obtained by actual measurement or by multiplying the diameter of the cylinder by 3.1416. The ends of such a line are connected to the point in the center of the circle. As the pattern is drawn on the paper, allowance is made for overlapping of the ends of the celluloid so that the cone can be fastened together with turn-under rivets. Such rivets are used ordinarily as paper fasteners and are provided with a split point. They serve also in anchoring the cone to the front rim of the trap.

When the trap is in operation, the companion headlight of the car is not allowed to burn. Sometimes it is also advisable to cut off or cover the tail light. Large insects may be kept from the trap by means of coarse screen wire. Effects of colored lights can be studied if gelatin filters of such colors are mounted between clear glass lenses and placed in position in the rear rim of the trap.

### A Preservative for Adult Sand Flies.

When specimens of *Culicoides, Leptoconops* and other biting midges are killed and kept in a dry pill box, or placed immediately on card points, they do not retain the normal shape. When they are preserved in alcohol, they do not retain the pollinosity and color pattern. The following formula was found to satisfy our requirements in preserving these small Diptera:

| | |
|---|---|
| Alcohol, ethyl, 95 per cent | 85 cc. |
| Formalin, 10 per cent | 15 cc. |
| Glycerine | 5 cc. |

Living or newly killed specimens are placed in the solution and are allowed to remain in it as long as one desires. This period should not be less than 24 hours. The solution serves as a preserving fluid or as a treatment for specimens preparatory to mounting them on tips. When pinned specimens are desired, it is necessary to dehydrate them slowly and completely. They are placed successively in 85 per cent, 95 per cent, and absolute ethyl alcohols, and xylol, allowing a full ten-minute period in each change. Instead of transferring the specimens with forceps or a camel's-hair brush, we find it satisfactory to use a small tip pipette in draining off the solutions. In this way the changes of solutions are made in one vial. During the process of clearing in xylol the specimens are given a normal position on folded strips of filter paper, so that the wings are in contact with the paper. The specimens and paper are gently removed from the solution and allowed to dry. The specimens are then mounted on tips in the usual manner.

### Hetherington's Solution.

For detailed studies of chitinous structures in entomological work, cleared specimens are usually necessary. A solution reported by Hetherington [1] for nematodes was found effective in fixing, clearing, and dehydrating dipterous larvae and non-pigmented insects.

The solution consists of:

| | |
|---|---|
| Absolute alcohol | 20 cc. |
| Chloroform | 15 cc. |
| Acetic Acid (Glacial) | 5 cc. |
| Phenol Crystals | 10 cc. |

Since this is a fixing as well as a clearing agent, it is not necessary to kill or fix specimens in any other way. The freshly collected or living specimens are simply dropped into the solution. Mature muscoid larvae fix and clear satisfactorily in freshly prepared solutions in about 24 hours, while newly hatched larvae will clear in about one-half that time. When specimens appear clear enough they are transferred to a mixture consisting of equal parts of this solution and oil of wintergreen. After about 15 minutes they are transferred to pure oil of wintergreen. When the specimens are sufficiently infiltrated, which usually requires over-night treatment, they are mounted in neutral balsam containing a few drops of oil of wintergreen.

Internal chitinous structures such as the buccopharyngeal apparatus of dipterous larvae or the internal genitalia of non-pigmented insects clear nicely in this solution. Owing to instant fixation, the specimens usually die in normal positions. Since fixing, clearing, and dehydration are accomplished in one solution, much time is saved.

The solution has some disadvantages. Fifteen days after it is prepared it loses its clearing power. It is, therefore, necessary to make up small quantities, and use only fresh material. Since it does not remove color it is not usable on pigmented chitin. The use of oil of wintergreen causes the specimen to assume a slightly yellowish tinge. This color is not objectionable in the study of the material. The specimens are comparable to those mounted in balsam for a few years.

## Summary.

1. A trap for collecting insects is described for use on the headlight of an automobile.

2. A preserving fluid is reported which gives natural shape and color in specimens of sand flies.

3. Hetherington's solution for nematodes is reported as useful in fixing and clearing dipterous larvae and non-pigmented insects for microscope slides.

[1] Jour. Parasit. 9: No. 1, Sept., 1922.

## Observations on the Beetle Mordellistena nigricans (Coleop.: Mordellidae).

By Anna May French.

This paper is a record of observations made on the stem-boring beetle, *Mordellistena nigricans* Melsheimer. This beetle is an inhabitant of the pith cavity of *Desmodium dillenii,* which grows on dry exposures on the wooded hills about Ithaca, New York. The stems are erect and woody, growing to a heighth of about three feet, and tapering from base to tip. However, the pith cavity remains practically the same size throughout. This cavity is just the right size to comfortably accommodate the full grown larvae. The pith is soft, moist, and decidedly spongy.

The larvae were found in the fall of 1929. At that time of year *Desmodium* stalks of two sorts are present: those that were produced the preceding summer and those of a year's standing. The larvae were not found in any case in the old stems. In the shoots of the season, the percentage of infestation is very high, two-thirds of the stems containing the larvae. Only one beetle larva was found in any of the stems examined.

### Other Inhabitants of the Stems.

On the Desmodium stems were found galls made by the larvae of a *Lasioptera.* The galls were compound, the number of larvae found in any one gall varying from two or three to eight. The adults of these Diptera first emerged two weeks preceding the adult beetles. Mating was observed soon after the emergence of the adults. The adults lived but a short time. Mordellid beetles have been said to feed upon various dipterous larvae inhabiting stems or old wood. However it does not seem likely that these larvae are fed upon by the beetle, since the galls do not connect with the pith cavity, nor were the beetle larvae found in their vicinity.

A parasitic hymenopteron was found in the stems in two instances. The adults of these emerged at the same time that the adult beetles emerged from the other stems.

### The Larva.

The larvae found in the fall varied slightly in size, being from five to six millimeters long. There was no increase in

size noted during the winter. The body is cylindrical in form; when in the stem, the posterior part of the abdomen is slightly arched. It is of a light cream color with the exception of the dark brown mandibles. The whole body is very lightly chitinized—the chitin being somewhat heavier at the ends. The caudal portions of the abdomen and the head and thorax are quite hairy. The skin of the larvae was so thin that care had to be taken to keep from puncturing it. A moistened camel's hair brush was used for transferring specimens.

The larvae have no eyes and only small vestiges of antennae. The three-jointed thoracic legs are short and fleshy, and there are no tarsal claws. There are no ventral prolegs on the abdomen. However on the first six segments on the dorsal side are six proleg-like tubercles, a specialization which admirably fits the larvae for their stem dwelling habits and forms the most distinctive external character. On the caudal end of the abdomen is an anal sucker which also aids in locomotion.

### Larval Habits.

The pith cavity of the desmodium is just the right size to comfortably accommodate the larva but there is no chance for it to turn around. The larvae face toward the top of the stem in all cases. Their position in the stem however, varies. When the stems were brought in the larvae were found uniformly near the base of the stem. Towards spring they were found closer and closer to the top. In the stem the larvae move rapidly and backwards and forwards with equal facility. This can readily be observed in a partly opened stem. In order to observe this process more clearly, a larva was placed in a glass tube having about the same bore as the pith cavity of the desmodium. The movement could then be observed in detail. While the body is held in place by the legs, it contracts, moving the anal disk forward. The anal disk is attached, the legs release their hold, the body lengthens and the prolegs distend in a wave which proceeds from the last one to the first. Thus the body is very firmly anchored while being pushed forward.

Frass is sometimes found gathered together in some cranny in the pith, and sometimes it is scattered. In either case it is not abundant.

### The Pupa.

The pupa when first found was of a creamy white color, except for the black eyes. By the following day, however, the tibia and tarsi of all the legs, the antennae, the genitalia, the mouthparts, and the wing-pads were dark brown or black. The remainder was tan rather than cream colored. By the third day the whole pupa was dark.

The head was bent under the prothorax. It was covered with numerous fine hairs, appearing almost fuzzy when seen with a lens. The eyes were large and very black and shiny. The serrate, eleven segmented antennae lay along the wing pads, close to the prothorax. The wing pads were dark brown, covered with fine hairs and showed the longitudinal tracheae quite plainly. On the dorsal side of each of the first four of the seven visible abdominal segments was a pair of flattened appendages, each bearing a row of recurved spines on its outer edge. Doubtless these serve the purpose of anchoring the pupal skin when the adult emerges. They correspond in position to the dorsal "prolegs" of the larva.

A glass tube having the diameter of the larval burrow was used in observing the transformation of the pupae to the adults. The beetles could be clearly seen and at the same time excess handling was avoided.

The pupa has no means of locomotion, but it twitches from side to side, moving the tarsi and mouthparts inside of the pupal skin.

The life history was observed only from the time of the finding of the larvae in November to the emergence of the adults in late April and early May. When found the larvae were apparently full grown. The entire winter is spent in the larval state. Attempts to force the development by keeping the larvae at room temperature failed. Only those which were left out of doors all winter developed. Stems were opened at regular intervals in order to determine the time of pupation. The first pupa was found on April twenty-third, and the last one on May eighth. The adult emerges in from three to four days. The first one appeared on April twenty-sixth.

## The Nesting Habits of Paranysson, an African Genus of Fossorial Wasps (Hymenoptera, Sphegoidea).

By J. Bequaert, Department of Tropical Medicine, Harvard Medical School, Boston, Mass.

Some twenty years ago, in February, 1912, I spent a week at Kasenga, in the Katanga District of the southeastern Belgian Congo (in lat. 10° 15′ S. and long. 28° 45′ E.), waiting for an opportunity to continue my journey. One day I noticed a flourishing colony of *Paranysson melanopyrus* (Smith) [1] busily at work in the open central yard of the station. At that time, the habits of *Paranysson* were unknown and I am not aware that they have been studied to any extent since. G. Arnold (1923, Ann. Transvaal Mus., X, 1, p. 13) writes of this genus, apparently from personal observation: "These insects dig short and oblique tunnels in sandy soil. I have never found them with prey, the nature of which is still unknown. *P. quadridentatus* Cam. has a most powerful odor of bugs."

In the colony which I observed, each nest consisted of a nearly straight, vertical shaft, 6 to 8 mm. wide, sunk in the bare sand to a depth of about 75 cm. (2½ ft.). The lower end of the shaft branched into a few short, more or less horizontal galleries or cells, placed at about the same level in various directions. Each cell measured 10 to 12 mm. in length and 4 to 5 mm. in diameter. The entrance to the burrow was hidden by the loose sand thrown out from the shaft and forming an elliptical mound, about 12 cm. long, 9 cm. wide and 3 cm. high. Through the larger axis of this mound ran a curved tunnel, slightly wider than the shaft into which it led, while it opened on the narrow side of the mound. The sand was more closely packed together and apparently cemented, either by moisture or by saliva, about the tunnel. Often a female wasp was seen resting in the tunnel, with her face in the doorway.

One of the nests dug up comprised three cells, one of which was open and empty, while the other two were closed and contained each a nearly full-grown wasp larva, dirty white in color with a slight bluish tinge. In other nests I found cells with

[1] Identified by Dr. G. Arnold, of the Rhodesia Museum, Bulawayo.

prey and young wasp larvae. In all cases the prey consisted of larvae at different instars of a pentatomid bug, *Natalicola pallidus* Westwood.[2] As a rule, six or seven of these bugs were stored in each cell; they were not dead, but merely paralyzed, as shown by the slight movements of antennae and legs.

F. F. Kohl and Ant. Handlirsch regarded *Paranysson* as at most subgenerically distinct from *Nysson*. But R. E. Turner, in 1914 (Ann. Mag. Nat. Hist., (8) XIV, pp. 337-359), showed that these two groups have little in common. Turner united *Paranysson*, *Sericophorus*, *Zoyphium* and *Sphodrotes* into a subfamily Paranyssoninae. He pointed out that *Paranysson* differs from *Nysson*, among other points, in the single tibial spur of the middle tibiae and the deep excision of the outer (or lower) margin of the mandibles.

Turner's conclusions are fully supported by my observation of the habits, which shows that *Paranysson* is a true predacious wasp, digging its own nest and bringing in its own prey for the offspring. *Nysson*, on the other hand, is from all accounts an inquiline or cleptobiont in the nests of other fossorial wasps of the subfamily Gorytinae. G. Arnold (1929, Ann. Transvaal Mus., XIII, 4, p. 218) writes of *Nysson* that "by some authors they have been regarded as parasitic in their habits, but there is no evidence to support such a view." I believe, however, that the following observations, on two European and two North American species, leave little doubt as to the inquiline habits of the true Nyssoninae, which were suspected many years ago by Shuckard, Taschenberg and others.

C. Ferton (1901, Ann. Soc. Ent. France, LXX, pp. 107-108; 1923, La Vie des Abeilles et des Guêpes, pp. 152-153[3]) saw the female of *Nysson dimidiatus* Jurine, at Bonifacio, Corsica, opening the burrows, dug in the soil, of *Gorytes* (*Arpactus*) *elegans* (Lepeletier). The *Nysson* would enter the burrow and, if she found the *Gorytes* cell incompletely provisioned and without the egg, would leave the nest at once, closing up the en-

[2] Identified by Dr. H. Schouteden, Director of the Congo Museum at Tervueren, Belgium.

[3] Fig. 27 of this posthumous volume of collected papers, edited by E. Rabaud and F. Picard, does not represent a *Nysson*.

trance; she would then remain in the neighborhood, watch for the *Gorytes*, and reënter the burrow some time later. Ferton, however, was unable to find either the egg or the larva of *Nysson*. G. Adlerz (1910, K. Svensk. Vet. Ak. Handl., XLV, No. 12, pp. 33-38) was more successful with *Nysson maculatus* (Fabricius), in Sweden. He not only observed this wasp entering the burrows of *Gorytes* (*Arpactus*) *tumidus* (Panzer), but in four different cells, belonging to three nests which he dug up after seeing *Nysson* entering them, he found the *Nysson* egg concealed under the folded wings of one of the leafhoppers that had been stored by the *Gorytes* female. In a fourth nest he discovered a small *Nysson* larva in the same position.[4]

G. P. Barth (1907, Bull. Wisconsin Nat. Hist. Soc., V, 3, pp. 145 and 147), in Wisconsin, observed on two occasions a female *Nysson fidelis* Cresson entering the burrow of *Gorytes canaliculatus* Packard by quickly scratching it open, then remaining for a short while, and closing the entrance again after coming out. Upon excavating these two nests, the *Nysson* egg was not found in one case; but in one of the cells of the other nest, in addition to the *Gorytes* egg placed upon one of the leafhoppers stored as prey, another egg was found unattached on the floor of the cell. This egg was similar in shape to that of the *Gorytes* egg, but smaller and less shiny. E. G. Reinhard's recent observations on *Nysson* (*Brachystegus*) *hoplisivora* Rohwer, in Maryland, are even more illuminating (1925, Jl. Washington, D. C., Ac. Sci., XV, pp. 172-177; 1929, The Witchery of Wasps, pp. 262-271). The female of this wasp enters the burrows of *Gorytes* (*Hoplisus*) *costalis* Cresson, breaking through the barricade of loose sand at the entrance, tarries a few seconds within the nest, and upon emerging, carefully rearranges the sand over the doorway. Upon opening nests visited by the *Nysson*, a cell was found on several oc-

[4] In their account of the habits of *Nysson*, A. H. Hamm and O. W. Richards (1930, Trans. Ent. Soc. London, pp. 103-104) mention a number of species found associated in various ways with species of *Gorytes* (*s. lat.*). Most of the relations they list (apart from the observations by Ferton, Adlerz and Reinhard) seem to be based on mere circumstantial evidence. These authors appear to have overlooked Barth's paper.

casions containing both the *Gorytes* egg and the *Nysson* egg attached to the prey brought in by the *Gorytes* female. In every case the *Nysson* egg was skillfully concealed under the folded wings of the tree-hopper serving as prey to the *Gorytes*. The egg of the *Nysson* is laid before that of *Gorytes* and, as it hatches first, the young *Nysson* larva feeds for a short time on the prey and then explores the cell for the egg of its host, which it devours. The *Nysson* larva may now feed without danger of molestation upon the store of provisions accumulated by the *Gorytes* female.

G. Arnold (1923, *Loc. cit.*) gives the distribution of *Paranysson* Guérin (including *Helioryctes* Smith and *Mesopalarus* Brauns; *Pseudohelioryctes* Ashmead also is a synonym) as "African, Indian and N. American regions." The few Indian species, such as *P. assimilis* (Bingham), do not appear to be generically separable from the African forms. The Nearctic species, however, which Cresson, Ashmead and others referred to *Paranysson*, are not in any way related to that genus; but, as recognized by R. E. Turner (1914, *Loc. cit.*, p. 339) and by S. A. Rohwer (1921, Proc. U. S. Nat. Mus., LIX, pp. 404-405), they are typical Nyssoninae. Rohwer considers that they form a subgenus of *Nysson*, which he calls *Zanysson* Rohwer. *Paranysson*, as well as the remaining Paranyssoninae, are therefore confined to the Old World.

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**Mantis Captures Hummingbird (Orthop.: Mantidae).**

On September 28, while working in my garden, I heard my neighbor give a yell; on asking her what was the matter, she said "a big, green bug about a foot long, with long arms with teeth on them, had caught a hummingbird, and with this stick I knocked the bug down." We searched all along the honeysuckle covered fence but could not find the "bug," but we did find the hummingbird; which was alive, and in a few minutes flew away seeming none the worse for its experience. There is no doubt but that the insect was the Japanese mantis (*Paratenodera sinensis* Sauss.), which is quite common around Philadelphia. It would have been interesting to know how the combat would have ended had the combatants been allowed to finish the struggle. Knowing the strength and hold the female mantis has in those front legs, I believe the mantis would have won out. PHILIP LAURENT, Philadelphia.

## Notes on some New Jersey Dragonflies (Odonata).

By B. Elwood Montgomery, Purdue University, Lafayette, Indiana.

While at Moorestown, New Jersey, during the summer of 1930, Esther Barrett Montgomery and I used much of our spare time to study and collect dragonflies. Eleven hundred and eighty-six specimens, representing 46 species were secured. Many of these species are common and already well known from the localities where we captured them, but a few are considered rare insects and some were taken in new localities; one species has not been reported previously from New Jersey.

I am indebted for a few specimens and for information concerning collecting grounds to several members of the staff at the Japanese Beetle Laboratory, especially to Dr. Henry Fox who took me to several localities in South Jersey where we made many interesting captures. Mr. E. B. Williamson has checked the determination of a few species.

3.* Progomphus obscurus Rambur. Along a stream in the pine barrens, near Browns Mills, June 15, 4 ♂. These specimens which measure 46, 47, 47, and 49 mm., in length, are considerably smaller than other specimens of this species which I have seen.

83. Anax longipes Hagen. Lily Lake, a small body of fresh water near the ocean, Cape May, August 10, 1 ♂.

97. Aeshna umbrosa Walker. Moorestown, August 28, 1 ♂.

148. Somatochlora tenebrosa Say. A female was found alive inside an insectary at the Japanese Beetle Laboratory, August 7.

168. Dorocordulia lepida Hagen. Taunton Lakes, July 27, 1 ♀.

171. Nannothemis bella Uhler. Browns Mills, June 15, 3 ♂ 1 ♀. Found only in a small bog, not more than ten feet in diameter, at the margin of a stream.

175. Celithemis monomelaena Williamson. Clayton, July 20, 1 ♂.

* The numbers are those of the Handbook of the Dragonflies of North America by Needham and Heywood.

177. CELITHEMIS MARTHA Williamson. Clayton, July 20, 1 ♀. Captured in a small area partly grown up with low vegetation and partly mud shore, between a lake and an open woodland, with the preceding species. Dragonflies, other than *Perithemis tenera* Say, were not common here, but one each of *Libellula incesta* Hagen, *Pachydiplax longipennis* Burmeister, and *Ischnura posita* Hagen were taken and two species of *Tramea* were seen.

219. SYMPETRUM SEMICINCTUM Say. Rancocas Park, July 29, 1 ♀. Frequent visits were made to this locality thruout the summer. The collecting grounds consisted of the weedy margin of a lake formed by a dam in Rancocas Creek bordered by wooded hills and the highlands nearby where only sparse vegetation and a few pines grew. During the day the lake margin was usually a lively dragonfly community, including such species as *P. tenera*, *Libellula luctuosa* Burmeister, *L. cyanea* Fabricius, *L. pulchella* Drury, *L. incesta*, *P. longipennis*, and *Erythemis simplicicollis* Say, but in the late afternoon when the hills cast shadows across the lake, these conspicuous species disappeared. At this time of day the highlands, where few, if any, dragonflies were found earlier, became the haunt of *P. tenera*, *L. luctuosa*, and *L. pulchella* and occasionally *Plathemis lydia* Drury, *Sympetrum vicinum* Hagen or Tramea. In the vegetation near the lake were found *Agrion maculatum* Beauvois, *Lestes inaequalis* Walsh, *L. rectangularis* Say, *L. vigilax* Hagen, *Enallagma geminatum* Kellicott, *E. signatum* Hagen, *E. vesperum* Calvert, *I. posita*, and *I. verticalis* Say. These seemed to become more active as the shadows fell across the lake and the larger species left them in peace.

298. NEHALENNIA GRACILIS Morse. Fisher's Dam, August 6, 1 ♀; Taunton Lakes, July 30, 3 ♂ 1 ♀, August 7, 5 ♂ 2 ♀.

299. NEHALENNIA INTEGRICOLLIS Calvert. Fisher's Dam, August 1, 1 ♀; Taunton Lakes, July 30, 3 ♂ 1 ♀.

300. NEHALENNIA IRENE Hagen. Fisher's Dam, August 1, 1 ♀; Taunton Lakes, July 30, 2 ♂. This and the two preceding species were taken at each locality only in bog areas; at Taunton Lakes this bog area was in deep shade and the odor of bog gas was very noticeable. The number of each species

captured may be taken as an index of the relative abundance of the species in these localities. Since my earlier collecting experience in the lake region of northern Indiana, when the veteran Odonatologist Williamson taught me that Nehalennias are rarities, I have made special effort to hunt out the probable *Nehalennia* habitats in each locality and to collect until no more specimens can be found.

306. ENALLAGMA DIVAGANS Selys. Browns Mills, June 15, 1 ♂. Associated with *Argia violacea* Hagen, *I. posita* and *I. verticalis* on a small stream in the pine barrens.

322. ENALLAGMA VESPERUM Calvert. This species was taken frequently at Taunton Lakes, Medford Lakes, Rancocas Park and Fisher's Dam from July 18 to August 25. Many of our collecting trips into the pine barrens were made in the late afternoon—after the official hours for work—and extended until dusk, thus including the time when this species is on the wing.

328. ENALLAGMA WEEWA Byers. Fisher's Dam, August 1, 1 ♂, August 6, 80 ♂, August 18, 7 ♂ 1 ♀. We made frequent visits to three localities in the pine barrens, Medford Lakes, Taunton Lakes and Fisher's Dam, but the last named was the most interesting and profitable of the three. Each of the three is a series of lakes formed, I was told, by dams impounding the water in former bog lands or swamps. Medford Lakes, and Taunton Lakes to a much less degree, are surrounded by cottages and summer homes until little undisturbed shore line remains. At Medford Lakes only four species, *P. longipennis*, *E. vesperum*, *E. pictum* Morse and *I. verticalis*, were taken; at Taunton Lakes these four and fourteen others were collected, but all that were taken in numbers, except *E. pictum* of which 24 specimens were secured here, are common and widely distributed. Fisher's Dam included a variety of habitats, including lakes of deep, open water, shallow areas with varying densities of vegetation, flowing canals and bogs and the region was almost undisturbed except for occasional visits by workmen who keep the dams and canals in repair.

Specimens of *weewa* were taken only along a relatively open canal. They seemed to alight on the herbage along the stream

less frequently and to hover more closely to the water than is the habit of the closely allied species, *E. exsulans* Hagen, which is so familiar a species along Indiana streams. Altho quite numerous at the time of our visits the large number secured was the result of "specialized" and continued collecting. The specimen taken on August 1 was recognized as rather unusual in the field and as new to me when I had had an opportunity to study it more closely, and we returned on August 6 determined to secure further specimens. These were secured by wading the canal and exchanging nets frequently in order to have one dry enough to swing swiftly as the low flight of the species made it necessary to skim the surface of the water on almost every stroke. At this time the canal bed was covered with a layer of soft mud, four to eight inches deep, and a considerable amount of vegetation was growing in it; the water was eight to ten inches deep and the current was quite swift. However, before the time of our next visit, August 18, workmen had removed the vegetation and most of the soft mud from the canal bed. *E. weewa* was much less abundant than on the earlier dates, but this decrease may have been due to the approach of the end of its season as all of the specimens taken, even on the earlier dates, were violet-gray pruinose from age.

Other species collected along the canal on these dates were *Boyeria vinosa* Say, August 6, 4 ♂, teneral, *Agrion apicale* Burmeister, August 1, 11 ♂ 9 ♀, August 6, 18 ♂ 10 ♀, August 18, 4 ♂ 7 ♀, *A. maculatum*, August 1 and 6, 1 ♀, each date, and *A. violacea*, several on each of the three dates. Four other Enallagmas, *geminatum* Kellicott, *vesperum*, *pictum*, and *civile* Hagen were taken at Fisher's Dam but none of them was associated with *weewa*.

This species has been known previously only from Florida, Georgia and South Carolina. It is strange that any insect as abundant as we found *weewa* at this locality would escape notice in a region which has been studied so thoroly by entomologists, unless its occurrence is local or sporadic, or unless it has not been recognized as separate from a more common and

widely distributed species. It may be that specimens of *weewa* from this region exist in collections under the name of *exsulans*.

Since the above was written, Dr. Calvert has informed me that he has studied the specimens from Three States Point, Patcong Creek and Mullica Hill recorded in the *Insects of New Jersey* (Rept. N. J. State Museum for 1909, 1910) as *Enallagma exsulans*, and has found those from Patcong Creek to be *E. weewa*, those from the other two localities to be true *exsulans*. At the time of collection (1899) he had labeled the Patcong Creek specimens "E. exsulans old."

## Dragonflies from High Altitudes in Colorado (Odonata).

By R. D. Bird and G. Olin Rulon, University of Oklahoma, Norman, Okla.

The following report is based on collections of Odonata made by Mr. Rulon during July and August, 1931, at elevations of 9000 to 12000 feet in the vicinity of Gothic, Colorado. Gothic, now the seat of the Rocky Mountain Biological Station, sponsored by the University of Oklahoma, is a ghost mining town situated a short distance from Crested Butte.

The first adult Odonata were noticed on July 21 at a small stagnant pool surrounded by sedge and grass. This pond is at an elevation of 9600 feet between Gothic and Avery Mountains, in the center of a small swamp about one mile and one-half northwest of the Station. It was filled with debris. Thick scum was on the surface of the water. Sphagnum was abundant. *Somatochlora semicircularis* 1 ♂, and *Coenagrion resolutum* 4 ♂, were taken.

The second collection was made on July 25 at Meridian Lake about three miles northwest of Crested Butte and west over Gothic Mountain from the Laboratory. The lake is at an elevation of 9000 feet, is one and one-half miles long, about one hundred and fifty yards wide, has no outlet, and is fed by drainage from the surrounding hills. It is about fifty feet deep but contains much moss and debris about the edge. Grass, aspen and spruce come close to the shore. A few *Aeschna*, probably *palmata*, were seen; and *Enallagma boreale* 9 ♂ 6 ♀, and *Enallagma clausum* 1 ♂ 1 ♀, were taken.

A series of seven old beaver dams two and one-half miles south of the Laboratory at 9100 feet were the scene of three collections. The land about the ponds was swampy and supported a thick growth of *Carex* with an occasional willow. Here Odonata were found in abundance. The following captures were made: July 28, *Aeschna palmata* 1 ♂, *Lestes disjunctus* 4 ♂, *Enallagma clausum* 1 ♂ 2 ♀; July 30, *Aeschna palmata* 3 ♂ 2 ♀; August 8, *Aeschna palmata* 11 ♂ 1 ♀, *Aeschna interrupta interna* 1 ♂, *Sympetrum vicinum* 1 ♂ 2 ♀ (teneral).

One collection was made on July 29 at a small lake situated at a height of 12000 feet in Sylvanite Basin. This lake was shallow, had no outlet, several floating islands and was surrounded by a marshy margin supporting a growth of *Carex*. The pH of the water was 7.4. The following were collected: *Aeschna palmata* 1 ♂, *Somatochlora semicircularis* 16 ♂ 1 ♀, *Lestes disjunctus* 3 ♂, *Lestes uncatus* 1 ♂, *Coenagrion resolutum* 6 ♂ 1 ♀, *Enallagma boreale* 4 ♂.

A collection was made on August 4 at Lost Lake. This is a small deep lake about three miles northwest of the laboratory with very steep banks (approximately 60°). It was fed by drainage from Bellevue and Baldy Mountains but had no outlet. There was much debris of logs and sticks close to the edge; vegetation on the banks was *Carex*, and grass; elevation 11000 feet. Four male *Aeschna palmata* were taken.

In addition to the collections of Mr. Rulon, the senior author, while following the trail up Copper Creek to Corundum Pass on August 3, 1930, took *Somatochlora semicircularis* and *Enallagma boreale* at 10300 and 11000 feet respectively.

To summarize, the following nine species of Odonata were taken at Gothic, Colorado, from July 21 to August 4, 1931:

| | |
|---|---|
| 1. *Aeschna palmata* Hagen | 9100 to 12000 feet |
| 2. *Aeschna interrupta interna* Walker | 9100 feet |
| 3. *Somatochlora semicircularis* Selys | 9600 to 12000 feet |
| 4. *Sympetrum vicinum* Hagen | 9100 feet |
| 5. *Lestes disjunctus* Selys | 9100 to 12000 feet |
| 6. *Lestes uncatus* Kirby | 12000 feet |
| 7. *Coenagrion resolutum* Hagen | 9600 to 12000 feet |
| 8. *Enallagma boreale* Selys | 9000 to 12000 feet |
| 9. *Enallagma clausum* Morse | 9000 to 9100 feet |

# ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., FEBRUARY, 1933.

## ENTOMOLOGY AT THE CONVOCATION WEEK MEETINGS, DECEMBER 27 TO 31, 1932.

Our annual summary of the entomological items of the programs of the American Association for the Advancement of Science and Associated Societies, held at Atlantic City, New Jersey, follows:

The numbers of papers bearing on insects, including those in symposia and non-duplicating demonstrations were:

| | |
|---|---|
| Entomological Society of America | 38 |
| American Association of Economic Entomologists | 130 |
| American Society of Zoologists | 18 |
| American Society of Parasitologists | 3 |
| American Phytopathological Society | 3 |
| Ecological Society of America | 3 |
| Genetics Society of America | 14 |
| Phi Sigma Biological Research Society | 1 |
| American Society for Horticultural Science | 1 |
| Potato Association of America | 1 |
| Total | 212 |

These papers were distributed in subject as follows:

i

| | |
|---|---|
| *General Entomology | 8 |
| *Collecting and Rearing Methods | 4 |
| *Cytology | 4 |
| Anatomy | 5 |
| *Physiology | 28 |
| Ecology | 6 |
| Behavior | 1 |
| *Geographical Distribution | 10 |
| Variation | 1 |
| Genetics | 14 |
| *Taxonomy | 7 |
| *Parasites of Insects | 12 |
| *General Economic Entomology | 17 |
| *Insecticides | 28 |
| Apiculture | 12 |
| Insects Affecting Man | 1 |
| do. Cereals and Field Crops | 13 |
| * do. Truck Crops | 10 |
| * do. Ornamental & Greenhouse Plants | 8 |
| * do. Fruits & Fruit Trees | 30 |
| * do. Forest & Shade Trees | 7 |
| *Insects Carrying Plant Disease germs | 3 |
| Household Insects | 3 |

ii

| | |
|---|---|
| *Acarina | 4 |
| Araneina | 1 |
| Orthoptera | 12 |
| Plecoptera | 1 |
| Homoptera | 10 |

*Heteroptera ..... 4
*Thysanoptera ..... 8
Coleoptera (excluding Japanese Beetle) .....18
* Japanese Beetle ..... 4
Hymenoptera (excl. Honey Bee) .....14
Honey Bee ..... 7
*Lepidoptera (excl. Codling Moth, Oriental Fruit Moth and Corn Borers) .....21
* Codling Moth .....11
* Oriental Fruit Moth... 6
* Corn Borers ..... 5
*Diptera (excluding *Drosophila*) .....22
* *Drosophila* .....12

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

The total number of papers listed was 27 more than for the New Orleans meeting in 1931 and 32 more than for the Cleveland sessions of 1930. Increases in the numbers of papers for 1932 were shown in those subjects starred (*).

The Entomological Society of America met on December 27 and 28, in Haddon Hall Hotel, under the presidency of Prof. J. J. Davis, of Purdue University, Prof. H. B. Hungerford, of the University of Kansas, secretary. The annual symposium was on The Influence of Civilization on the Insect Fauna of North America, and the annual public address was by Dr. J. M. Swaine, on The Influence of Insect Life on Forest Development.

The American Association of Economic Entomologists met December 28 to 30, at the opposite end of a hall from the Entomological Society, making it easy to go from one to the other. Prof. W. P. Flint, of the University of Illinois, was president and Mr. A. I. Bourne, of Amherst, Massachusetts, secretary. There was a special discussion of The Problem of the Codling Moth and its Control.

The entomologists' dinner in th same hotel on December 29 at 6.15 P. M., was presided over by Prof. Flint who called on Mr. W. C. O'Kane to act as toastmaster. To take the minds of all present from troubles at home, he called, as speakers those who had recently been on entomological journeys, and interesting responses were made by Messrs. J. J. Davis (Europe and the Paris Congress), Kistliuk (West Indies and South America), Phillips (Russia), Claassen (China), Gardener (Japan), Swaine (Australia) and Bishopp (Texas).

Meetings of both societies are planned for Chicago in June and at Boston next December.

## Samia cecropia Moth falls prey to Jumping Spider, Phidippus tripunctatus (Lepid.: Saturniidae; Araneae: Salticidae).

The giant silkworms appear to lead an extremely hazardous life with birds and various predaceous and parasitic forms taking heavy toll. The writer wishes to record an additional enemy which he recently observed in the act of attacking a Cecropia moth.

On June 6, 1932, a male Cecropia emerged from a cocoon which the writer had placed on a window sill between the window and window screen. The moth climbed up on the screen where its wings unfolded and dried. Several hours later a small, grassland jumping spider, *Phidippus tripunctatus,*[1] was observed stalking the moth, creeping up upon it, then scuttling away at any movement of the wings or antennae. After watching this performance at intervals for about two hours, the writer was rewarded by seeing the spider which was then about one inch away from the moth, leap upon the side of the moth. The moth fell off the screen and lay on its back on the window sill, moving its wings weakly in an attempt to get up. The spider was attached to the right side of the moth over the middle pair of legs and had its cephalothorax buried in the thick pubescence.

After fifteen minutes or so the spider was removed. Blood oozed out on the pubescence at the point of feeding. The moth was able to walk but the middle pair of legs and the right leg of the third pair were useless. The moth was able to move its wings but was unable to fly. The moth was caged and lived for ten days but did not recover the use of its legs and wings. Had the spider been permitted to continue feeding it would no doubt have killed the Cecropia in a short time in spite of the great disparity in size.

J. R. Stear, Koppers Research Corp., Ligonier, Penna.

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## The Effectiveness of the Sting of Aenoplex carpocapsae Cushman (Hymen.: Ichneumonidae).

In 1931 observations were made of the preservative property of the sting of the parasite *Aenoplex carpocapsae* Cushman upon the larvae of the codling moth, *Carpocapsae pomonella* Linne. The full grown spinning larvae were allowed to spin their cocoons in bits of corrugated paper and then were presented to *Aenoplex* for parasitization.

The female parasite mounts the corrugated paper and probes

[1] Identified by Prof. W. M. Barrows, Ohio State Univ., Columbus, Ohio.

it with her ovipositor until a vulnerable spot is found and then with a quick thrust she forces her ovipositor into the cocoon and stings the larva within, laying an egg at the point of stinging.

No matter how soon the cocoon is ripped open after the female has made her thrust and departed, the host is found immobile except for slight futile squirmings of the abdomen. The motor nerves have been paralyzed by the poison of the sting. The stung larva provides meat which remains fresh even after the parasite has fed for many hours and the supply has been nearly consumed.

The stung codling moth larvae were grouped in three categories according to their physical condition: *fresh*, when the color was creamy and pink and the body plump; *deteriorating*, when the skin was discoloring in places; and *dead*, when the larva was discolored thruout. These differences were noted, because the host larvae did not die at the end of a definite period following the sting, they died slowly and in parts as does a plant. Apparently as a result of the stinging the various cells of the body were slightly disassociated so that the death of one did not affect the condition of its neighbor for some time. Even when the tip of the abdomen is discoloring, the cells of the thorax may still remain alive.

The stung larvae remained *fresh* a maximum of 73 days, with an average of 26 days and a minimum of 41 hours. The period of *deterioration* averaged 12½ days, with a maximum of 26 days and a minimum of 42 hours. Thus from the time of the sting to death the preservative property of the female's sting extends over an average of 34¾ days with a maximum of 97 2/3 and a minimum of 5½ days.

These periods cover a great variety of conditions, including those in which the codling moth larva was stung, but not fed upon, and varying thru different stages of parasitization. In one instance the host was fed upon for 184 hours (7 2/3 days), and still remained fresh after the death of the parasite. Nature's methods of preservation are certainly efficient.

H. Elliott McClure, Urbana, Illinois.

## Dragon-flies predacious on Tabanus spp. (Dipt.: Tabanidae)*.

The extensive coastal marsh areas of Louisiana, especially those west of the Mississippi River, are notorious for their enormous numbers of tabanids, mainly species of the genus

* From the Parasitology Laboratory, Department of Tropical Medicine, Tulane Medical School, New Orleans, Louisiana.

*Tabanus*. The writer, while motoring to or from Buras, Louisiana (60 miles south of New Orleans on the west bank of the Mississippi River) has frequently found the radiator of his car packed with scores (more than one hundred in certain instances) of *Tabanus* spp., chiefly the "greenheads." Fishing parties along the uninhabited bayous of the Gulf Coast complain bitterly of these pests. In many localities the source of blood meals of these flies must be cold-blooded vertebrates, since domestic animals are not present within a radius of many miles and man is an infrequent visitor. Muskrats probably furnish a fraction of the blood meals.

On May 4, 1932, a collecting trip to the mouth of Grand Bayou, Louisiana (Bay Bastian) revealed an abundance of *Tabanus* spp. Dragonflies were also especially abundant, particularly the "green jacket," *Mesothemis simplicicollis* Say. Investigation revealed the fact that the latter species was feeding extensively on *Tabanus conterminus* Walk. and *T. nigrovittatus* Macq.† These horse-flies are rather swift fliers but are quite unable to cope with the "green jacket." The tabanid being seized in the air by the dragon-fly (between its legs) the latter landed on a blade of marsh grass or twig, maintained its balance with the last two pairs of legs and used at least one of the prothoracic legs to manipulate its prey. Commencing with the head the dragon-fly ingested the entire *Tabanus*, including all appendages—the whole process requiring not more than 3-4 minutes. The dragon-flies were so intent on the feeding that they could be captured by hand. In one instance a dragon-fly was picked up and its prey escaped, but being injured, was placed in front of the predator which readily seized it and continued its meal in spite of the observer holding it by the wings.

Other species of dragon-flies were not observed feeding on the horse-flies but probably do so on occasion.

The writer is aware of no other observations of adult Odonata feeding on tabanids.‡ The fact that they can capture and ingest species of this size (body length=1.5 cms.) seems quite remarkable and in regions where they become abundant must play an important rôle in the control of these pests.

E. HAROLD HINMAN.

† The writer is indebted to Dr. J. G. Needham, Cornell University, for the identification of the dragon-flies and to Dr. Alan Stone, United States National Museum, for the identification of the horse-flies.

[‡ The late Mr. Herbert Campion, in his two papers on "Some Dragonflies and Their Prey," has recorded instances of adult Odonata feeding upon tabanids in Africa. Ann. & Mag. Nat. Hist. (8) xiii, p. 500, 1914, and (9) viii, p. 243, 1921.—EDITOR.]

## Disturbances in the domestic tranquility of Chalybion caeruleum (Hymen.: Sphecidae).

A single cell of *Chalybion caeruleum* built on the inside of the writer's car permitted the observation of some unusual habits of this species. The car had been out of the garage for several hours each day and no doubt the wasp, on account of these interruptions, had some difficulty in finding its nest. The mud cell was first noticed on June 26 at 1 P. M., when it was about completed but not provisioned or sealed. During the remainder of June 26, the car was out of the garage and was not returned until 7 A. M. on June 27. From this time until the afternoon of June 29, the car was in the garage and little attention was paid to the nest. As a matter of fact it was quite forgotten by man but not by wasp, for, on the afternoon of June 29 the car was taken out again and it was noticed that the cell had been provisioned and sealed. The following morning it was discovered that a second cell had been started. The car was backed about ten feet out of the garage but the wasp failed to locate its nest. At 11 A. M. the car was shifted to the right side of the two car garage rather than the left, the original position. By 1 P. M. the nest was completed but not sealed. On July 1 no additional change was evident and apparently the nest was left open to be provisioned. An extended auto trip interrupted the observations for the car was out of the garage from July 2 to July 5. It was supposed that the wasp had surely abandoned the nest but the writer was surprised on July 9 to find that the second cell, upon which work had of necessity ceased on July 2, had been provisioned and sealed.

A few years ago the writer observed a species of *Chalybion* in Panama building a nest on the outside of a screen. While the wasp was away gathering a load of mud, a match was forced through the screen and across the opening of the cell which at this time was nearly finished. On its return, the wasp added a little mud to the edge of the nest and seemed much disturbed by the obstruction. She returned three times and worked a little mud on the edge of the cell but could not continue her building. After the third time she did not return and the nest was never finished.

Apparently the mud-dauber can withstand considerable inconvenience in nest building and can locate her nest even when it is moved several feet from its original location but cannot compete with impossible building conditions.

S. W. Frost, The Pennsylvania State College.

# Entomological Literature

COMPILED BY 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 **figures within brackets** [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of ENTOMOLOGICAL NEWS for 10c. The number of, or annual **volume**, and in some cases the part, neft, &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.—Bodenheimer, F. S.**—Principle of population movements among insects. [37] 8: 18-20. **Coldewey, H.**—Twee jaren vlindervangst met electrisch licht. [101] 75: 182-187. **Goffe, E. R.**—Nomenclatorial opinions of the 5th Entomological Congress, Paris, July 1932. [Jour. Ent. Soc. So. England] 1: 47-50. **Jacot, A. P.**—Evaluation of the forest flora population. [4] 64: 265-267. **Lindinger, L.**—Strenge winter und die insektenwelt. [17] 49: 237-238. **Matteson, J. H.**—Une lettre du V Congres International d'Entomologie, Paris, France, 16 Au 23 Juillet 1932. [39] 16: 40-45. **Muir, F. A. G.**—Biographical sketch. The work of Dr. Frederick A. G. Muir in the biological control of sugar cane insects in Hawaii. [37] 8: 141-152. **Needham, J. G**—The Thomas Say Foundation gets under way. [68] 76: 567-568. **Oudemans, J. T.**—Obituary. [101] 75: i-xvi, ill. **Plummer & Landis.**—Records of some insects predacious on Epilachna corrupta in Mexico. [7] 25: 695-708, ill. **Robertson, C.**—About nomenclature. [90] 67: 53-61. **Rodeck, H. G.**—Arthropod designs on prehistoric Mimbres pottery. [7] 25: 688-693, ill. **Ross, H.**—Praktikum der Gallenkunde (Cecidologie). [Biol. Studienb., Berlin] 12: 312 pp., ill. **Turner, J. T.**—Races. [21] 44: 149-150.

**ANATOMY, PHYSIOLOGY, ETC.—Aubertot, M.**—Origine proventriculaire et évacuation continue de la membrane péritrophique chez les larves d'Eristalis tenax. Les sacs péritrophiques des larves d'Aeschna (Odonates

Anisoptères); leur évacuation périodique. [69] 111: 743-745, 746-748, ill. **de Boissezon, P.**—Localisation du Glycogène et du fer chez Culex pipiens. [77] 111: 866-867. **Brolemann, H. W.**—La contraction Tachygenétique des Polydesmiens (Myriapodes) et leurs affinités naturelles. [Bull. Soc. Zool. France] 57: 387-397, ill. **Dampf, A.**—Concentration of Microfilariae by the salivary secretions of bloodsucking insects. [68] 77: 20-21. **Danilova & Zubareva.**—On the influence of light on the larval development of Anopheles maculipennis. [in Russian]. [Bull. Inst. Rech. Biol. Perm] 8: 63-64, ill. **Faber, A.**—Die lautausserungen der Orthopteren II. [46] 26: 1-93, ill. **Hase, A.**—Ueber starrezustände bei blutsaugenden wanzen. [88] 20: 967-971, ill. **Hirschler, J.**—Sur le développement de la symétrie bilatérale des ovocytes chez Cicindela hybrida. [Arch. Zool. Exp. et Gén., Paris] 74: 541-547, ill. **Janda, V.**—(Du phototactisme des larves et des insects parfaits de l'Anthrenus museorum). [Mem. Soc. R. Sci. Bohemi] 1931, No. 29: 1-42, ill. **Johnson, C. G.**—The oviposition and ovipositor of Notostira erratica. [Trans. Ent. Soc. So. England] 8: 50-57, ill. **Lycklama à Nijéholt, H. J.**—Melanisme bij lepidoptera. [101] 75: 29-34, ill. **Metcalfe, M. E.**—Notes on the structure and development of the reproductive organs in Philaenus spumarius. [53] 75: 467-481, ill. **Miller, F. W.**—Muscle variations in the tibia of several species of aphids. [5] 39: 64-67, ill. **Pawlowsky Stein & Perfiljew.**—Experimentelle untersuchung über die wirkung des phlebotomusstiches auf die menschenhaut. [Z. f. Parasitenkunde] 5: 1-13, ill. **Pemberton, C. E.**—Irritation caused by the sting of the bethylid wasp, Holepyris hawaiiensis. [37] 8: 125-126. **Pepper, J. H.**—Observations on a unidirectional flight of army cutworm moths and their possible bearing on aestivation. [4] 64: 241-242. **Shapiro, H.**—The rate of oviposition in the fruit fly, Drosophila. [92] 63: 456-471, ill. **Speicher, B. R.**—Dominance of two kidney allelomorphs in Habrobracon juglandis. [92] 63: 372-380, ill. **Stammer, Hans-Jürgen.**—Zur biologie und anatomie der leuchtenden pilzmückenlarve von Ceroplatus testaceus (Fungivoridae). [46] 26: 135-146, ill. **Süffert, F.**—Phänomene visueller anpassung. [46] 26: 147-316, ill. **Yagi, N.**—Temperature characteristics of pulsation and growth in mosquito pupae, as basis for determination of lower developmental threshold point. [Bull. Imp. Agric. Exp. Sta. Japan] 3: 213-216.

**ARACHNIDA AND MYRIOPODA.**—***Chamberlin & Ivie.**—North American spiders of the genera Cybaeus and Cybaeina. [Bull. Univ. Utah] 23: 43 pp., ill. **Hixson, H.**

—The life history and habits of Ixodes sculptus (Ixodidae). [Iowa State Coll. Jour. Sci.] 7: 35-42, ill. *Hoffmann, C. C.—Monografias los Scorpiones de Mexico. Part 2. [Ann. Inst. Biol., Mexico] 3: 243-282, ill. Jacot, A. P.—Concerning Oudemans' "Kritisch Historisch Overzicht der Acarologie" in its bearing on nomenclature of the moss-mites. [5] 39: 59-63. Kästner u. Beier.—Ricinulei. Pseudscorpionidae. [Handbuch der zoologie], Bd. 3. Hft. 2, p. 99-192.

THE SMALLER ORDERS OF INSECTS.—Ewing, H. E.—The male genital armature in the order Anoplura, or sucking lice. [7] 25: 657-669, ill. *Needham, J. G.—Three new American mayflies (Ephemerop.). [4] 64: 273-276, ill. Walker, E. M.—The nymph of Gomphus quadricolor (Odonata). [4] 64: 270-273, ill.

ORTHOPTERA.—Burt, D. R. R.—The venation of the wings of the leaf-insect, Pulchriphyllium crurifolium. [Spolia Zeylanica] 17: 29-37, ill.

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PRAKTIKUM DER GALLENKUNDE (CECIDOLOGIE) by Prof. Dr. HERMANN ROSS, pages i-x, 1-312, 181 text figures, Julius Springer, Berlin, 1932. 24 R M., bound 25.60 R M.

This is a comprehensive discussion of the origin and development of plant galls and the ecology of the producers. The first

part is devoted to a general account of the gall-bearing plants, the groups of gall-producing animals and the gall-making plants, the matter being largely a consideration of typical species.

The second, and by far the larger part of this work, gives detailed, well illustrated accounts of representative species, such as the pouch leaf gall on elm, *Tetraneura ulmi*, a species known to occur in America, the pouch leaf gall of *Pemphigus filaginis* on poplar, and representatives of a considerable series of aphid poplar galls. The conical galls on beech leaves produced by *Mikiola fagi* and *Hartigiola annulipes*, various pouch galls produced by gall mites on linden, willow and alder, the velvet masses or erineums caused by gall mites, the local thickenings or blisters produced by gall mites, and fungi, such as *Puccinia*, *Ustilago* and *Rhytisma*, are noticed and illustrated. There is a chapter on the hollow willow galls of *Pontania*, another limited to the deformation of entire leaves, some of which we would hardly class as galls, one is devoted to leaf mines, the next deals with marginal leaf rolls and leaf folds, the work of gall midges, aphids or mites, and then comes a consideration of galls on leaf stems and leaf veins. Terminal bud galls, spruce bud galls, shoot galls or twig galls, bark or cambium galls, deformations of the entire shoot or shoot system, root galls produced by various weevils, bacteria and eel worms, deformations of the entire plant or the greater part of it by eel worms or plant bugs, flower galls and fruit galls caused by insects, fungi or gall mites, are dealt with in a series of chapters. An account of the Cynipidae follows, those exhibiting no alternation of generations, such as *Aylax* and the rose gall wasps, *Rhodites*, being treated separately from the species occurring upon oaks and maple, many of which exhibit that very interesting phenomenon known as alternation of generations. This latter part is particularly interesting, since in several instances the galls of the two generations are illustrated. The value of this work is greatly increased by an extended bibliography, by a special food plant index classified by the type of the galls and a detailed index.

The author has given us an exceedingly interesting discussion of the numerous forms producing galls upon plants in northern Europe. It is written largely from a botanical aspect, and yet gives the biological data so far as they have been recorded. The work will be of interest to American entomologists because although few of the species noticed actually occur in this country, practically all of the gall makers are represented here by closely related species. The admirable series of illustrations add greatly to the value of this book.—E. P. Felt.

# EXCHANGES

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

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

**Wanted**—Names and addresses of those desiring Coleoptera and Lepidoptera of southwest Arkansas.—Miss Louise Knobel, E. 3rd St., Hope, Arkansas.

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**Exchange.**—Desire Lepidoptera, particularly specimens and data of Wisconsin and U. S. Catocala. Exchange for same. Wm. E. Sieker, 46 Breeze Terrace, Madison, Wisconsin.

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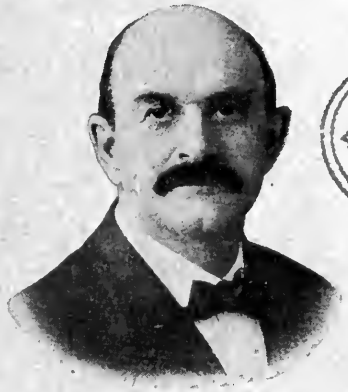

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows:

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| United States and possessions, Central and South America | $3.00 |
| Canada | 3.15 |
| Foreign | 3.25 |

Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance
One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 7.00
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# ENTOMOLOGICAL NEWS

VOL. XLIV. MARCH, 1933 No. 3

## On the Effectiveness of Protective Adaptations (Lepidoptera).

By HAROLD O'BYRNE, Webster Groves, Missouri.

The theories concerning the various aspects of the subject of protective adaptation have received a vigorous attack at the hands of Mr. W. L. McAtee ('32), who has amassed an immense quantity of data on the food of birds, based on examinations of the contents of their stomachs. The great value of so many definite records cannot be denied, but his interpretation of the result of his investigation is open to serious question.

Mr. McAtee obtains the following result from his tabulations: that the number of identifications in each of the various taxonomic groups bears a general relation to the frequency with which the animals belonging to those groups occur in nature. I agree with him as to the higher groups—phyla, classes, and orders; and, in general, families also, although there are some important exceptions. His classification of data does not consider categories smaller than families, so any conclusions that can be drawn regarding the effectiveness of protective adaptations cannot apply to adaptations that involve smaller units. His method is thus limited in its application. Having arrived at this result, he goes on to mention many instances where birds have eaten supposedly "protected" species, and comes to the conclusion that protective adaptations are of little or no effectiveness in influencing birds in their selection of food, and that the theories regarding protective adaptations are inadequate to explain them. I do not think that the results of his investigation warrant such a conclusion.

In the first place, he has concentrated his attack upon the types of protective adaptation that have been least substantiated and are still disputed—disagreeable tastes and odors, and warning coloration—while he glosses over the much more important one, concealing coloration. If he had given this last as full

consideration as he did the others, it would lead to conclusions exactly opposite. For if birds consume as many cryptically colored animals, in proportion to their abundance, as they do conspicuously colored ones, then they are evidently seeking the former in preference to the more easily found conspicuous animals. This would indicate that the latter are less suitable for food, and is therefore favorable to the adaptation theories.

My second objection to Mr. McAtee's conclusions is that his method does not take into consideration the circumstances under which the food of birds is obtained. For example, butterflies and many grasshoppers, while in flight, are among the most conspicuous of all insects. We should, therefore, expect them to be eaten by birds in greater proportion than many other insects. Mr. McAtee finds that this is not the case; it seems reasonable to believe, therefore, that their concealing coloration while at rest is the compensating factor. Again, most insects, after they have completed the task of reproduction, become more sluggish and less successful in hiding themselves—effects of "old age." Birds should be expected to devour a larger proportion of such relatively more available prey. If protective adaptations help to preserve their lives until this time, its purpose is accomplished, even though they are eventually eaten by birds. It is therefore absolutely necessary to know the circumstances of capture in order to judge the effectiveness of protective adaptations.

My third criticism is that Mr. McAtee has failed to take into account all of the factors involved in the balance of nature. The number of progeny of a pair of animals that survive to reproduce their kind is dependent upon their fecundity, upon the survival of the offspring under optimum conditions, upon the effectiveness of all of their protective adaptations, and opposed to these, upon the toll taken by the environment (the "resistance of the environment"—see Chapman, '31, chap. viii), including their destruction by all predaceous enemies. Mr. McAtee has considered only a fraction of the resistance of the environment. Determination of the effect of protective adaptations must await the evaluation of the other factors. The destruction of animals by predaceous foes may be taken as

the resultant of two factors, the defensive adaptations of the animals preyed upon—in structure, color, and behavior—and the aggressive adaptations of the attacking animals. The development of these has been not unlike that of human methods of warfare, where each improvement in defensive fortification has been met by an increase in the effectiveness of weapons of attack. In like manner, the development of protective adaptations in animals preyed upon has been accompanied by improved adaptations for aggression in predators. The *status quo* has been maintained; forms unable to keep up with the procession have been left by the wayside for the paleontologists to ponder over. Discussion of the effectiveness of protective adaptations will accomplish little unless we consider their development along with that of the corresponding aggressive adaptations of predaceous animals.

For these reasons I believe that Mr. McAtee has failed to prove his case. Furthermore, his discussion of many of the examples that he cites in support of his contention are misleading; I shall comment upon a few that refer to the Lepidoptera, as I am familiar with that order.

Referring to the larvae of Geometridae which are supposed to be protected through their resemblance to twigs, he says (p. 58) that "such a defense depends upon immobility whereas these caterpillars must be in motion the greater part of the time while searching for and devouring food." My observation of geometrid larvae has shown them to be generally slow of movement, except when disturbed, and they are often motionless for considerable lengths of time. It would be interesting in this connection to determine how many of them are nocturnal feeders and rest in the daytime when most birds are active.

Mr. McAtee lists 113 records of birds eating Rhopalocera, of which 24 are larvae and 2 pupae. Of the remaining 87 which deal with adults, not one refers to the best known North American example of supposed "protected models" in mimicry, *Danais plexippus* Linn. Although this abundant species is one of our most conspicuous butterflies, and is everywhere avail-

able to birds, not a single one of the 80,000 birds examined had eaten one.

Then he says (p. 59) that there are two records for *Papilio* species and six for *Vanessa* species, "supposedly the best protected forms." I do not believe that such a claim has been made for the entire genus *Papilio;* one group of them are regarded as being "protected," the "pharmacophagous" group (Punnett, '15), of which *P. philenor* Linn. and two or three stragglers into the southern part of the country are the only representatives north of Mexico. He does not say what species were found. As to *Vanessa,* his application of the name is confusing; but their "protected" qualities are doubtful and have always been disputed. All of the species known to me, that belong to the closely related genera variously called *Vanessa, Aglais, Pyrameis,* etc., by different authors, are protectively colored on the lower surface of the wings.

Mr. McAtee dismisses the supposed difficulty of making identifications of Lepidoptera in bird stomachs by describing the fuzzy appearance of the material due to the presence in it of lepidopterous scales, and he says, further, that identifications can often be made from wing venation in cases where none of the original coloration remains. I wonder how often birds devour butterflies and moths, wings and all, as compared to the frequency with which they pull the wings off and eat only the body. When they do not eat the wings, the difficulty of making determinations would be greatly increased, and in many cases identification would be impossible.

*Conclusion.* Mr. McAtee's conclusion that protective adaptations are not effective does not necessarily follow from the result he obtains from his analysis of the contents of bird stomachs. That the food of birds is generally distributed among the taxonomic groups in proportion to the abundance of individuals and their availability to birds only shows that the majority of animals possess some kind of protective adaptation. Mr. McAtee's argument is faulty because he selects for his attack only certain adaptations and does not consider the others. However, he is entirely right in subjecting the

theories on protective adaptation to more critical investigation than they have received heretofore. This cannot be denied, whatever the merits of his conclusions.

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## Notes on Colorado Orthoptera.

By MORGAN HEBARD, Philadelphia, Penna.

Our revisionary studies on the Great Plains Orthopteran fauna have steadily progressed since we published on the Orthoptera of Colorado in 1929. A few nomenclatorial changes have been made and these, with several records of particular interest we note below, while a small but interesting series of the species taken in the vicinity of Boulder by F. B. Isely in 1931 is listed.

ARENIVAGA ERRATICA Rehn. Cortez, V, 19, 1925, 1 ♀. Durango was the only previous record of this southwestern cockroach from the state.

YERSINIOPS SOLITARIUM (Scudder). This genus was proposed by Hebard in 1931.[1] The species was previously referred to *Yersinia* Saussure, that genus now restricted to a single very distinct Mexican species.

PARATETTIX CUCULLATUS (Burmeister). We have recently noted, in discussing the Cucullatus Group, that there are no recognizable races of this species and that, though best considered distinct from *mexicanus* (Saussure), it shows definite divergence toward that insect in the southwestern portion of its range.[2]

PARATETTIX MEXICANUS EXTENSUS MORSE. In discussing the Cucullatus Group we also found that *toltecus* (Saussure) is a synonym of *mexicanus mexicanus* (Saussure) but that the insect which had hitherto been recognized as *toltecus* represents a race for which the oldest name available is *extensus*.

[1] Trans. Amer. Ent. Soc., LVII, p. 114.
[2] Trans. Amer. Ent. Soc., LVIII, p. 223.

SYRBULA FUSCOVITTATA Thomas. Texas Creek, IX, 18 and 19, 1919, (R. C. Shannon), 1 ♂. Canyon City was the only previous Colorado record for this southern species.

ARPHIA CONSPERSA Scudder. In 1931 [3] we placed *Arphia frigida* Scudder as a synonym of *conspersa*. Though typically the northern and mountain dwelling insect appears distinct from that of the Great Plains, very large series which we have studied show such gradual transition from one to the other that we do not believe they can be distinguished as races.

MELANOPLUS BOREALIS STUPEFECTUS (Scudder). From examination of the entire original series we find that the type (a male selected by us in 1929, from Taos Peak, New Mexico) correctly represents a race of *borealis* from the Rockies of southern Colorado and northern New Mexico, but that the females so described are all referable to *M. dodgei bohemani* (Stål), an insect which was not described until two years later (1878), but specimens of which Scudder also recorded in 1876 incorrectly as *Pezotettix marshalli*.

MELANOPLUS PACKARDI Scudder. Although *M. foedus* Scudder is not a synonym of *packardi* as indicated by us and generally believed in 1929, our records of *packardi* then given are probably correct.

In a series of eighty-four specimens now before us the caudal tibiae are pink in half, blue in half. These were taken May 23 to October 29 and are from Julesburg, Ft. Morgan, Greeley, Ft. Collins, Boulder, Denver, Poudre River, Pingree Park at 9000 feet, Pine Grove, Colorado Springs, La Junta and Canyon City.

MELANOPLUS FOEDUS FOEDUS Scudder. Julesburg, VII, 29, 1910, (Rehn and Hebard), 1 ♂, 5 ♀. Greeley, 3 ♂, 1 ♀. Denver, (Stoner), 1 ♀; VII, 30, 1895, 1 ♂; VII, 20, 1897, 1 ♂. Lamar, VII, 18, 1901, 1 ♂. La Junta, IX, 1, 1909, (Rehn and Hebard), 1 ♂, 1 ♀. Grand Junction, 1 ♂.

Though also very common in eastern Colorado, this insect is apparently confined to the river flats where it is particularly numerous in high weedy areas, whereas *packardi* is generally distributed over the plains and also occurs in the foothills. In western Colorado *foedus foedus* is less abundant, while *packardi* is there probably extremely local.

In Colorado this insect has the median pronotal dark band weak or obsolete, the general coloration is more uniform and yellowish than that of the majority of specimens of *packardi*

[3] Proc. Acad. Nat. Sci. Phila., LXXXIII, p. 147.

and all we have seen have the caudal tibiæ pink. These features do not aid in distinguishing specimens of *foedus foedus* from those of *packardi*, however, in other portions of their distribution.

MELANOPLUS FOEDUS FLUVIATILIS Bruner. This insect was reduced to racial status by us in 1931,[4] when we stated that it quite possibly represents merely a local environmental adaptation of *foedus foedus*.

SCUDDERIA sps. The grounds given by Caudell for using *Phaneroptera* in place of *Scudderia*, which we accepted in 1929 for American species, have been found untenable. Under *Scudderia* must therefore be assigned *texensis* Saussure and Pictet and *furcata furcifera* Scudder.

MICROCENTRUM RHOMBIFOLIUM (Saussure). Grand Junction, IX, 1, 1931, 1 ♀. This record extends the known range of the species considerably northward, as it was previously known in Colorado only from Cedar Edge.

STEIROXYS TRILINEATUS (Thomas). Cerro Summit, Montrose County, VIII, 21, 1896, (C. P. Gillette), 1 ♀. Wills Ranch is the only previously known Colorado record.

STENOPELMATUS FUSCUS (Haldeman). Redland Mesa, near Grand Junction, VII, 1922, (W. Yetter, under rock), 1 ♂. Grand Junction, X, 1926, 1 ♀. Though the species had been recorded from Colorado only from Cedar, it probably occurs throughout the state except at high elevations.

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The following small collection was made by F. B. Isely in the vicinity of Boulder from July 27 to August 14, 1931, in plains, foothills and mountain environment.

No. 1. Roggen, Weld Country, 5000 feet, in sand hills.

No. 2. Boulder, Boulder County, 5300 feet, and nearby foothills up to 6300 feet.

No. 3. Nederland and Rainbow Lakes, Boulder County, 8200 to 11000 feet.

DIAPHEROMERA VELII VELII Walsh 2 ♂, No. 1. We discussed and placed as a southern race of this species Caudell's *mesillana* in 1931.[5]

MERMIRIA MACULIPENNIS MACCLUNGI Rehn 1 ♂, No. 1.

OPEIA OBSCURA (Thomas) 1 ♂, 1 ♀, No. 1 and No. 2.

AMPHITORNUS COLORADUS (Thomas) 2 ♂, 4 ♀, No. 2.

CORDILLACRIS OCCIPITALIS OCCIPITALIS (Thomas) 1 ♂, 1 ♀, No. 2.

CHORTHIPPUS CURTIPENNIS (Harris) 6 ♂, 1 ♀, No. 2 and No. 3.

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[4] Proc. Acad. Nat. Sci. Phila., LXXXIII, p. 187.
[5] ENT. NEWS, XLII, p. 65.

NEOPODISMOPSIS ABDOMINALIS (Thomas) 1 ♂, No. 3. This genus was erected in 1932 by Bei-Bienko [6] to include this single nearctic species.

GOMPHOCERUS CLAVATUS (Thomas) 1 ♂, No. 3.

AGENEOTETTIX DEORUM (Scudder) 2 ♂, 2 ♀, No. 2.

ARPHIA PSEUDONIETANA (Thomas) 3 ♂, No. 2.

CAMNULA PELLUCIDA Scudder 2 ♂, 2 ♀, No. 3.

DISSOSTEIRA CAROLINA (Linnaeus) 2 ♀, No. 2.

SPHARAGEMON EQUALE (Say) 2 ♂, 1 ♀, No. 2.

TRACHYRHACHIS KIOWA KIOWA (Thomas) 1 ♂, 4 ♀, No. 1.

TRIMEROTROPIS PALLIDIPENNIS PALLIDIPENNIS (Burmeister) 1 ♀, No. 1.

TRIMEROTROPIS CAMPESTRIS McNeill 2 ♀, No. 3.

TRIMEROTROPIS HUMILIS (Morse) 2 ♂, 1 ♀, No. 3, (at 8200 feet). Though revisionary studies will probably split up the genus *Trimerotropis* as at present understood, further studies of this and allied species prove that they should be assigned there at least for the present. Certainly *humilis* superficially strongly resembles *Spharagemon equale* (Say) in certain of the localities where it occurs, but we are convinced that the two species are derived from distinct phyla. The relationship to the Mexican *Trimerotropis tolteca* Saussure is very much closer than some series would suggest and extreme geographic variation appears to occur in each.

TRIMEROTROPIS AGRESTIS McNeill 1 ♂, 2 ♀, No. 1.

CIRCOTETTIX RABULA RABULA Rehn and Hebard 1 ♀, No. 3.

PAROPOMALA WYOMINGENSIS (Thomas) 2 ♂, 2 ♀, No. 1.

SCHISTOCERA LINEATA Scudder 1 ♂, No. 1.

HESPEROTETTIX VIRIDIS VIRIDIS (Thomas) 1 ♂ (decidedly recessive), No. 1. Further studies of enormous series have convinced us that *gillettei* Bruner is a synonym of *nevadensis* Morse and the *nevadensis* and *pratensis* must both be placed as races of *viridis*.[7]

HESPEROTETTIX SPECIOSUS (Scudder) 2 ♂, No. 1.

MELANOPLUS DIFFERENTIALIS (Thomas) 1 ♂, No. 1.

MELANOPLUS BIVITTATUS (Say) 1 ♂, No. 1.

MELANOPLUS DAWSONI (Scudder) 2 ♂, 2 ♀, No. 3.

MELANOPLUS FEMUR-RUBRUM FEMUR-RUBRUM (DeGeer) 4 ♂ (2 from No. 1 large and pale, 2 from No. 2 small).

MELANOPLUS INFANTILIS Scudder 1 ♂, No. 3.

MELANOPLUS LAKINUS (Scudder) 1 ♀, No. 2.

MELANOPLUS MEXICANUS MEXICANUS (Saussure) 4 ♂, 2 ♀, No. 3.

[6] Eos, VIII, p. 56.

[7] Proc. Acad. Nat. Sci. Phila., LXXXII, p. 392, (1930).

MELANOPLUS FOEDUS FOEDUS Scudder, 1 ♂, No. 1.
MELANOPLUS ANGUSTIPENNIS (Dodge) 2 ♀, 2 ♀, No. 1 and No. 2.
MELANOPLUS FLAVIDUS FLAVIDUS Scudder 3 ♂, No. 1.
MELANOPLUS BOWDITCHI BOWDITCHI Ssudder 1 ♀, No. 1.
PHOETALIOTES NEBRASCENSIS (Thomas) 1 ♀, No. 3.
ORCHELIMUM CONCINNUM DELICATUM Bruner 2 ♂, 2 ♀, No. 1.
CONOCEPHALUS FASCIATUS FASCIATUS (DeGeer) 4 ♂, 4 ♀, No. 1 and No. 2.
CONOCEPHALUS STRICTUS (Scudder) 1 ♀, 1 ♂, No. 2.
CONOCEPHALUS SALTANS (Scudder) 1 ♂, 1 ♀, No. 2.

## Descriptions of New Species of the Dipterous Family Ephydridae.

By EZRA T. CRESSON, JR., Philadelphia, Penna.

**Paralimna piger** new species.

The facial markings of this species suggest those of *punticornis* Cress. but here we have no flattened area on the second antennal segment.

Head scarcely broader than high; eyes round. Frons distinctly broader than long; chocolate brown with ochreous lineation; ocellar bristles almost aligned with anterior ocellus; profile, convex. Face almost as broad as long; profile slightly humped above line of upper bristles; median transverse sulcation not noticeable; ochreous gray, heavily discolored with chocolate brown, especially between antennae on the hump, as two median vertical stripes and on facialia, leaving the foveae, parafacies and oral margin, ochreous gray. Two subequal bristles each side as strong as frontorbitals; the uppermost above line of buccal orbit, with about five fine bristles below. Cheeks one-fourth height of head; medianly brown, leaving orbits and oral margin, grayish. Antenna above center-line of eyes, separated by about width of third segment; second normal; third twice as long as broad, arista with ten hairs. Tormae sericeous white.

Mesonotum chocolate brown with grayish longitudinal lineation, becoming more gray and irrorated laterally. Mesopleura for most part brown, becoming irrorated medianly; pleura otherwise grayish, scutellum almost uniformly brown except laterally. Brown bands of abdomen broader than the ochreous gray ones with distal margins sharp and scarcely recurved mesally; median stripe sharply defined and rather broad to apex of abdomen. Ventral lobes gray, irrorated; those of basal segments more discolored.

Legs slightly grayish; bases of all tarsi tawny, especially of hind pair. Fore femora of male with anterior flexor ciliation of about ten apically curved slightly flattened bristles confined to the medial three-fourths; the longest, proximally, about three-fourths diameter of femora. Post-flexor ciliation confined to basal-half, of about five very long bristles equalling diameter of femora. Flexor surfaces not noticeably sulcate. Fore tibiae slightly bowed. Wings elongate, slightly obscured; veins brown; crossveins blackened; second costal section slightly more than twice as long as third: second of fourth vein slightly more than length of third. Length, 3.3 mm.

*Type.*—♂; ECUADOR. (H. H. Parish; 1914). [U. S. N. M., no. 44805].

*Paratype.*—1 ♂; topotypical. Smaller than type (2.7 mm.) and not in as good condition, but apparently similar otherwise.

**Paralimna luctans** new species.

Were it not for the silvery spot on the second antennal segment, I would strongly suspect this to be *bistriata* Hendel or *cilifera* Hendel from the Bolivian-Argentina region.

The frons is much broader than long, dark brown to blackish, with some ochreous lineation above lateral and ocellar bristles; frontorbitals slightly in advance of line of frontals. Frontofacial profile evenly convex. Face about as broad as long with slight interfoveal hump, grayish but much discolored with ochre and brown especially above; the two submedial longitudinal marks more or less evident; the median transverse sulcation very evident in certain aspects and runs obliquely into the facialia laterally. Upper facial bristles about as strong as the anterior frontorbital, and are slightly above line of buccal orbit, with about five hairs below. Cheeks whitish, about three-fourths diameter of eye. Antennae above center-line of eyes, black, dark pilose; second segment with distinct silvery spot above; arista with about eleven hairs.

Mesonotum ochraceous with irrorations and suggestion of three interdorsocentral brown lines. (Lateral margins and mesopleura stained and markings not discernible; pleura otherwise whitish). Scutellum broad as long, grayish, darker basally. Abdomen with a continuous median brown stripe, broadest on third segment; basal brown segmental bands with convex margins, attenuating laterally, not extended over onto ventral lobes; mesal portion of ventral lobes of second and third segments brown.

Femora grayish; basal segment of fore, two or three of

middle and hind, tarsi, tawny. Fore femoral ciliation of male composed of slightly flattened, pointed, not apically curved bristles which are nearly as long as diameter of femora at about middle of series which runs to minute hairs before distal extremity; their tibiae are normal. Wings rather noticeably brown tinged. Second costal section more than twice as long as third; posterior crossvein somewhat blackened but not noticeably clouded. Length, 4 mm.

*Type.*—♂ ; Posadas, Misiones, ARGENTINA. January 13-15, 1927. (F. & M. Edwards). [British Mus. N. H. Coll.].

*Paratype.*—1 ♀ ; topotypical.

**Paralimna sera** new species.

This species may be distinguished by the blackish upper portion of the face which is concolorous with the anterior part of the frons.

Frons almost quadrate, convex in profile, dark brown to black with obscure grayish lineation; ocellar triangle attenuated and attaining anterior margin. Face broad as long, prominent in profile with little or no median hump and no median transverse sulcation; bluish gray with upper portion except parafacies blackish; uppermost bristle long and slender, aligned with buccal orbit, with about two shorter hair-like bristles below. Cheeks one-half diameter of eye. Antennae about on center-line of eye; second segment normal; third, twice as long as broad; arista with eight hairs, somewhat curving at tips. Tormae sericeous white.

Mesonotum dark golden brown with gray dashes suggesting vittation; irrorations absent except on the lateral gray areas. Scutellum concolorous, gray laterally. Mesopleura brown above and below without irroration; pleura otherwise whitish gray. Abdomen elongate; basal one-half to three-fourths of segments two to five, broadly produced to apices medianly (forming a broad median stripe) and narrow apical margins, opaque brown, leaving a narrow, medianly interrupted subapical gray fascia on these segments.

Legs grayish; one or two basal segments, pale. Fore femora of male beneath with anterior flexor series of rather short, flattened, slightly curved bristles mostly confined to distal half; posterior series normal, confined to basal half. Wings brownish, crossveins not noticeably darker. Length, 4.5 mm.

*Type.*—♂ ; Yallahs Valley, Blue Mountains, JAMAICA. February 24, 1911. [Am. Mus. N. H.].

*Paratype.*—1 ♂ ; topotypical.

**Nostima scutellaris** new species.

Very similar to *N. picta* which also occurs in the western United States; differing in the entire yellow legs, more shining mesonotum and opaque, black frons.

Black; third antennal segment below, palpi, legs including fore coxae excepting apices of tarsi, yellow. Halteres whitish. Wings immaculate, yellowish hyaline, irridescent, with pale veins.

Opaque; frons velvety black with narrow silvery orbits; face pale yellow in male, white in female, with narrow silvery orbits; cheeks white. Mesonotum subopaque to shining, with broad medial stripe dusted anteriorly with brown, limited laterally at dorsocentral lines by conspicuous whitish lines which become broader posteriorly occupying nearly entire lateral part of mesonotum, this dilation varying according to aspect, but always most persistent anteriorly; these lines continue to an intense white spot at lateral angles of scutellum. Scutellum and posterior medial margin of mesonotum, velvety black. Pleura black above, white below, the line of demarkation very sharp; metanotum grayish. Abdomen polished with a brown pollinose basal medial area.

Structurally similar to *picta* Fallen.

*Type.*— ♂ ; Michigan City, INDIANA, June 29, 1915. (J. M. Aldrich). [U. S. N. M., no. 44806].

*Paratypes.*—1 ♂, 4 ♀ ; topotypical. 1 ♂ ; Lafayette, Indiana, June 17, 1915. (J. M. Aldrich). 1 ♀ ; same locality, and collector, June 11, 1915. Sweeping from grass. 1 ♀ ; same locality and collector, March 30, sweeping over grass. 1 ♀ ; same locality and collector, May 30, 1916. 1 ♀ ; Vincennes, Indiana, (J. M. Aldrich). 1 ♀ ; Peoria, ILLINOIS, May 20, 1918, (J. M. Aldrich). 1 ♀ ; same locality and collector, August 26, 1917. [all U. S. N. M.].

**Napaea vanduzeei** new species.

This species seems to be closely allied to *pinguis*, which species however has a glistening white face, sharp abdominal margins and less strongly marked wings.

Black; halteres pale yellow; tarsi brown to tawny. Somewhat shining; sparingly dusted with brown except on abdomen where it is whitish. Frontal vittae rather more shining, but not conspicuously so. Structurally similar to *N. pinguis* (Walker). Face yellowish white, not glistening; rather straight,

slightly oblique in profile. Mesonotum with one to two post-dorsocentrals discernible; scutellum as broad as long, triangular, with distinct apical conical tubercle; distance between the apical bristles about one-half their length. Abdomen uniformly bluish tinge and whitish pruinose; lateral margins revolute but scarcely turned under. Wings strongly tinged with brown; crossveins broadly clouded and distal portions of second, third and fourth veins narrowly clouded; whitish areas proximad and distad of anterior crossvein and the three or four near the posterior one, well marked. (Type shows a very short appendage near tip of second vein, also a crossvein between second and third before curve of second); second costal section at most twice as long as third; last two sections of fourth subequal. Length, 3.5 mm.

*Type.*—♀; Niagara Falls, New York, July 21, 1913. (M. C. VanDuzee). [A. N. S. P., no. 6497].

*Paratype.*—2 ♂; East Aurora, New York, July 28, 1912. (M. C. VanDuzee). [These specimens do not show any distinct appendage or crossvein as in type, but one has a crossvein near tip of second to costa in both wings.]

**Scatella troi** new species.

A species similar to *stagnalis* Fallen, but larger, with gray face and abdomen, and strong lateral basal scutellar bristle.

Black; halteres knob pale yellow, pedicle brownish. Opaque to subopaque; medifrons, mesonotum and scutellum somewhat shining. Dusting of frons, thorax and scutellum above, golden ochreous or brown, becoming grayish below; that of face, metanotum and abdomen plumbaceous. Wings infuscated with four somewhat indistinct but large diluted spots: one in middle of submarginal cell, one sub-basal and one distomedian in first posterior, and one subapical in discal cell.

Structurally similar to *stagnalis* Fall. Face with three to four subequal, stout, dorsoclinate bristles in lower part of lateral series which are noticebly different from the two to three smaller lateroclinate bristles in upper part of the series. Cheeks much broader than width of third antennal segment. Antesutural dorsocentrals wanting or hairlike; postacrosticals absent, but presutural pair strong. Scutellum with strong lateral basal bristle besides the usual curved seta near apex. Abdomen elongate, scarcely as broad as thorax; fifth segment truncate, as long as third and fourth together. Wings very long, with second vein slightly curving into costa. Length, 3.5 mm.

Female sex unknown.

*Type.*— ♂ ; Troy, IDAHO. May 31, 1908. (E. T. Cresson, Jr.) [A. N. S. P., no. 6498].

*Paratypes.*—2 ♂ ; Husum, WASHINGTON, June 28, 1917, (A. L. Melander), [Coll. Melander]. 3 ♂ ; Clarkston, Washington, March 8, 1908, [Coll. Melander]. 1 ♂ ; Kendrick, Idaho. June 7, 1917, [Coll. Melander].

**Scatella laxa** new species

A species structurally similar to *stagnalis*, but larger, more shining, with white to gray face.

Black, with halteres fulvous. Upper surfaces dark, somewhat shining, brown pollinose; face, cheeks, pectus, legs, and apical portion of abdominal segments faintly, white to gray. Medifrons differentiated from the small opaque frontalia. Antesutural dorsocentrals undeveloped; postsutural acrosticals absent, but sutural pair strong. Scutellum with a lateral downcurved hair near apical bristles. Wings infuscated, with four to five distinct diluted spots, that one in submarginal cell generally occupying full width of cell. Length, 2.2 mm.

*Type.*— ♂ ; Berkeley Hills, Alameda County, CALIFORNIA, April 11, 1908. (E. T. Cresson, Jr.). [A. N. S. P., No. 6499].

*Paratypes.*—3 ♂ , 9 ♀ ; topotypical.

**Scutella quadrinotata** new species.

In some respects similar to the western *laxa* just described, but the cheeks are broader and the wings with only four spots.

Color of the dusting on the frons and thorax above, golden to greenish gold, becoming grayish on the under surfaces; of the abdomen, more grayish green with distal margins of the segments noticeably whitish gray; of the face, densely bluish gray. Frons medianly nearly polished; mesonotum, scutellum and abdomen somewhat shining.

In structure similar to *stagnalis* but more robust, with broader cheeks which are at least equal to that of third antennal segment. Wings with only four well defined whitish spots; the one usually in the second posterior cell being absent. Length, 2 mm.

*Type.*— ♂ ; Colden, NEW YORK. August 3, 1913. (M. C. VanDuzee). [A. N. S. P., No. 6500.]

*Paratypes.*—2 ♂ , 3 ♀ ; topotypical with same date.

## Atrytone bimacula ♀ aberration contradicta, aber. nov. (Lepid.: Hesperiidae).

By R. A. Leussler, Omaha, Nebraska.

While collecting in a moist meadow at Valley, Nebraska, on July 5, 1932, a locality which has yielded a few specimens of *Atrytone bimacula* (G&R) each summer for several years past, the writer took a female without spots.

The specimen is slightly above average in size, having an alar expanse of 40 mm. The entire upper surface is uniformly fuscous except for a few fulvous scales along costa of forewings, as is usual in normal females of this species. The fringes are whitish as in normal individuals. Head, thorax, palpi and antennae as in normal individuals.

Underside, differs from normal only in the absence of the usual two spots on primaries, in place of which there is a single faint, very narrow and rather indistinct vertical line 2 mm. in length.

While there is a difference of opinion among Lepidopterists regarding the propriety of naming aberrations, I deem it advisable to bestow a name upon the insect described above, and as the absence of the usual two spots on forewing contradicts the specific name *bimacula* I propose for this ♀ aberration the name *contradicta*.

Unspotted individuals of *Atrytone vestris* and *Thorybes pylades* have been described and named and for that reason I feel it is desirable to call attention to this unspotted *bimacula*.

Males of *bimacula* from this locality vary greatly in the amount of fulvous on primaries. In occasional specimens a considerable area surrounding the stigma is fulvous and the inner portion of secondaries overlaid with bronzy, giving them the appearance of a dwarfed *arpa* (Bdv. & Lec.). In others the fulvous is limited to a narrow strip below the stigma, suggesting the possibility of a tendency toward a uniformly fuscous insect.

### Curator of Insects at Boston.

Mr. Richard Dow writes that he has been appointed to take care of the insects at the Boston Society of Natural History. He says: "I am only working part time, and the position is nominally temporary."

## Thecla halesus, its Life cycle and Habits (Lepid.: Lycaenidae).

By J. R. Haskin, Auburndale, Florida.

I have always been particularly interested in *halesus* since the day, twenty years or more ago, when I first saw it in the uplands of Arizona feeding on the fall-blooming *Bigelovia graveolens*. The books said it was supposed to breed on mistletoe, but I could see none of it on the sparse and stunted oaks in the vicinity.

It was not until 1932 that I had a real opportunity to study its life habits, and it was in Florida twenty-five hundred miles away that I again found it in April on the great fragrant clusters of Saw Palmetto, *Serenoa serrulata*. Several species of oak and quantities of mistletoe were in the neighborhood of Beirce's Woods between Lake Ariana and Lake Whistler.

On April 10 I took a badly worn female *halesus* on a flowering cluster of saw palmetto. It was placed in a breeding cage with sprigs of mistletoe and two kinds of oak.

April 11-12. Found 18 eggs on mistletoe and four on live oak, scattered singly. Under a low power glass these look like minute, bleached, beachworn Sea Urchin shells. Echinoidea. (When I was a boy in Maine, we called them oar eggs.) At the top of the egg the micropyle is depressed, the center a transparent green. Cross section about 1/40″ diameter.

April 18-19. Eggs all hatched. Of the four on live oak two died and two crawled into the mistletoe. I therefore decided to feed them on mistletoe. It is difficult to do this for the young, tender mistletoe dries up in a few hours, whether or not the twigs are kept in water. This necessitates transferring the tiny larvae each day to fresh leaves and they are so exactly the color of the mistletoe that it is hard to find some of them. In fact several were lost before I realized how painstaking a search was required to locate them. These larvae are pale greenish yellow with a dark spot on rump. They are hairy, the hair darker than the body. Body tapers from front to rear.

April 21. The larvae are now about one-eighth inch long, a bright leaf green in the sunlight with the hairs gleaming brightly. Some have a tiny spot on back of 2nd and 11th

segments. These young larvae eat the surface off the top of leaves leaving small transparent spots.

April 24. Cast skins for 2nd instar. Now a darker green with faint yellowish and light green stripes. A tiny diamond shaped mark on 2nd segment. Length three-thirty seconds of an inch, slug-shaped, tapering to rear.

April 28. Cast skins again. Solid green, hairy, skin and hair exactly resembling the surface of mistletoe leaf. The spot on 2nd segment is white, diamond-shaped with two tiny lines across it. The larva is slug-shaped, with an overhanging fluted curtain-like border that covers and conceals a very small, brown head and small legs. This curtain touching the leaf all around accentuates the slug-like appearance of the larva. It is very slow and sluggish in its movements. Size 10/32 x 3/32 inches.

May 1. Casting skins again. Darker green with traces of russet red covered with minute whitish spots and slightly hairy. The diamond-shaped spot under a glass proved to be white with a fine black border and a pair of fine lines cutting it lengthwise. The small brown head is tucked under a cowl-like hood. So perfectly do they resemble the mistletoe leaf that at times they are hard to locate. They now are large enough to eat the whole leaf. Size 18/32 x 6/32 inches.

May 4. Becoming more slug-shaped than ever, the skin curiously roughened, the segments distinguishable.

May 8. Have grown to 1 x 10/32 inches, thick, slug-shaped, slow moving. The side fringe or curtain is very noticeable and covers feet and head. Faint, wavy lines of greenish on sides and back. Minute dots on sides of last 8 segments. Hairs are whitish. When drawn up resting they are 3/4 x 10/32 inches.

May 11. Have spun their girdles on green mistletoe leaves lying on edge on the bottom of the cage. One is on side of cage near leaves.

May 12. Have formed chrysalids of the Thecla type, abdomens much larger than thorax. In a general way they look like the illustration in Holland's *Butterfly Book*, Plate V, figure 26, and are almost the same size, being 10/16 of an inch long, with abdomen 6/16 inch wide and 10/16 inch high. The color is a rusty, mottled brown. Ridge of thorax has coarse

yellow bristles with a double row of clumps of the same on four segments of abdomen. On sides of 2nd segment are tiny spots which, under the glass, look like small black ears partly edged with white. The bottom of the chrysalis is flat and fits closely against its support.

May 28. Butterflies emerged, from this date to June 2, except one which may be dead or which may emerge in the fall.

In Florida *halesus* appears to breed over a considerable period. The only reason more are not seen is that they spend their days in trees and are to be taken only when attractive flowers bring them down within reach. I have taken occasional fresh specimens every month from September 12 to January 19, and all through April also when Palmetto was in bloom. I obtained numbers of eggs from confined females in April, October, and December. One taken in October laid 65 eggs singly and in clusters on mistletoe in two days. Another laid fifty-two in three days in December.

It seems to be rather long-lived for a butterfly. A fresh male taken January 19 was fed on sweetened water and lived forty days until February 28. Its wings gradually wore out and a couple of cold nights finally weakened it. As it grew used to captivity it actually seemed to display a certain intelligence for each day when I opened the cage to feed it with sugared water on a camel's hair brush, it would prick up its antennae and observe my movements alertly. As the brush approached it would unfold its proboscis and show very plainly that it understood what was coming to it.

## A Change of Name in the Genus Melanoplus (Orth., Acrididae, Cyrtacanthacrinae)

In a recent paper on the Puer Group of the genus *Melanoplus* (Univ. Mich. Mus. Zool., Misc. Publ. 23, p. 56, 1932) I described a new species from the east coast of Florida under the name *Melanoplus insignis*. Unfortunately I overlooked the fact that *insignis* had already been used by Hebard (Proc. Acad. Nat. Sci. Phil., 1917, p. 266) for a Mexican race of *Melanoplus desultorius* Rehn. I therefore propose the new name *Melanoplus indicifer* to replace *Melanoplus insignis* Hubbell 1932 (not of Hebard 1917).

T. H. Hubbell, University of Florida, Gainesville, Florida.

## Observations on Dianthidium ulkei (Cresson). (Hymenoptera: Megachilidae.)

By Charles H. Hicks, University of Colorado, Boulder, Colorado.

During the summer of 1932 the resin worker bee, *Dianthidium ulkei* (Cresson),* was found nesting at or near Owens Lake, a few miles east of Boulder, Colorado. The females were solitary in habit and usually built their nests in natural (?) cavities or short tunnels in the soil. The nests consisted of one or two cells, constructed of pebbles, sticks, stems or other suitable objects, cemented and held together by means of some resinous or gummy substance. The completed and provisioned cell or cells of a given nest were further protected to the outside by means of a number of pebbles and the like, carried by the female and placed in the open tunnel above. A somewhat detailed account of certain of the habits of this bee is given below.

On September 6 a female, *D. ulkei*, was first observed flying low and coming to rest on a dandelion leaf at 10:15 in the morning. After a brief pause, she flew to and into an entrance in the ground some 4 inches away. The nest tunnel was unusually short and the orifice situated at such an angle that at this time of day the rays of the sun reached within. It was therefore easy to see the bee as she entered head first, inspected the cell or deposited some nectar, backed out, turned about and backed into the cell. The latter action was to enable her to brush the collected pollen from her ventral scopa.

This bee was gone 23 minutes on a collecting trip and remained in the cell on her return a total time of one minute and 16 seconds in depositing her load. She was then caught for identification. The ends of her wings were worn and frayed, giving evidence of much use and wear previous to this time. She must have built and provisioned other nests prior to my arrival on the scene.

The nest was dug out and found to consist of two cells. One was complete and the space above it seemingly filled in

* The insects mentioned in this account have been determined by Dr. T. D. A. Cockerell.

with debris; the other was incomplete and but partially provisioned. The upper or anterior ends of these cells were close to the surface where they had been formed in an angle between two rocks. The unfinished cell was definitely and firmly attached to the surface of one stone but the other was apparently not attached at all.

Whether this bee selected a natural cavity in which to build her nest or whether she excavated a place in which to form her cells are questions difficult to answer from the facts at hand. It did seem, however, that some excavation must have taken place as the upper edges of the walls gave evidence of previous work. It is a rather widespread habit for the Anthidiine bees to select nesting holes formed by other insects and such a method is probably followed, at least in part, by *D. ulkei.*

The cells of this nest had been constructed of plant stems, dried leaves, seeds and other vegetable material, with an occasional pebble or hard piece of soil held together by a resinous material. Some of the stems were long and extended beyond the end of the cell proper. These extensions gave the cell somewhat the appearance of the larval cases of certain Caddis flies. The use of so much plant material in these cells may have been due in this instance to its abundance in the immediate area. Other cells, formed by the same species nesting where pebbles were abundant, contained more pebbles than sticks or stems.

The stems and sticks from one cell numbered 50 and varied from a few millimeters to 17 in length. The very anterior end of the cell or the cap was solely of clear resin. The entire length of the cell proper, not including the twigs or straws which extended beyond the anterior end, measured 14 mm. It was 12 mm. thick at the widest point, having a rounded base and narrow orifice or entrance 4 mm. in diameter. The inner surface of the cell was of smooth resin, apparently quite free from pebbles or sticks.

The pollen, in a completed cell, is quite moist and fills the lower two-thirds of the inner space. The egg of the bee is laid upon the top of this mass. It is clear, light in color, curved and apparently rests with each end touching the food below. A resin cap is later built across the opening above it, thus closing the entrance to the cell. If this cell then be opened, the

food content quickly loses its moisture in the dry atmosphere of Boulder, thus preventing the young bee larva from feeding, growing or developing. Special moist conditions must be secured for an opened cell to enable the insect to successfully reach maturity.

A nest finished at noon on September 12 and opened on the morning of September 14 contained a larva 3 mm. long, flat on the food mass, which had already begun feeding. A space of 4 mm. was empty above it and between it and the resin cap. The opened cell was enclosed at the laboratory within a celophane covering and sealed, but it dried out, nevertheless, and the larva lived a stunted life for a few days, after which it perished.

Another nest, taken on September 12, had an entrance tunnel formed at a slight angle, with walls smooth on the inside and a diameter measuring 6 mm. This tunnel opened into the side of a small mound of rather rocky soil, although others found elsewhere have sometimes been in soil nearly free from stones or gravel. The inner surface of the tunnel was smooth and appeared to have been pounded or worked on by an insect when the soil was moist. A few soil droppings at the orifice gave evidence of earlier work but whether it was done by this bee or another animal is a question.

This bee, at the time, was making periodical visits to a slope 18 feet away where she was selecting pebbles, twigs and the like, and carrying them to the nest. She was soon caught for identification and the cell dug out. A completed cell was found just below the surface and with one side attached to a rock. This cell had a distinct cup-shaped depression at the anterior end formed by the side walls some 4 mm. beyond the anterior cap of resin.

An interesting and important variation in nest site selection and nest building was met with on the afternoon of September 17, just outside the city limits of Boulder. This bee, much to my surprise, was found carrying and depositing pebbles loosely on the nearly flat surface of a rock. Certain bees of the genus *Anthidium* habitually fill in the upper tunnel above the cell of a nest with loose pebbles but all pebbles, previously observed used by bees of the genus *Dianthidium* and placed on rocks,

have been carefully or firmly held together with resin. The nearly flat surface of the rock arose at almost right angles near its center and into this area had been placed the pebbles and the one cell of the nest.

Removal of the nest material revealed the one cell, horizontal in position, fully provisioned and containing the large curved, clear egg of the bee at the slightly lower end. The pebbles immediately about the pollen and egg were loosely held together by resin; the remaining pebbles and sticks had but barely a trace of resin, here and there, among them. The total number of objects the bee had carried, at the time of her capture and hence probably not the absolute maximum, was 920. This consisted of 880 pebbles and 40 small sticks and stems. Thus the bee had journeyed to and from this rock some one thousand times in its building, provisioning and attempted concealment of the nest.

Still another variation of habit is evidenced from a record * of the species found nesting in an old cell of *Anthophora neomexicana* Ckll., near Boulder. The single cell was built mainly of clear resin, with possibly some soil or a little other material, and attached to the side and upper walls of the inside of the large mud cell of *A. neomexicana*. The cocoon was light brown and had a mammillary projection at the anterior end similar to that found on the cocoons of other species of the genus.

Dr. Cockerell has kindly given me the following data on specimens now in his collection: Boulder, Colorado, University Campus, July 15, T. D. A. Cockerell; Boulder, Colorado, July 17, W. P. Cockerell; on *Grindelia,* Boulder, Colorado August 9, W. P. Cockerell one specimen, T. D. A. Cockerell one specimen; on *Grindelia serrulata,* Boulder, Colorado, September 3, T. D. A. Cockerell; Boulder, Colorado, September 9, S. A. Rohwer; also Raton, N. Mex., fall; and Pecos, N. Mex., no date. These records, in addition to my own captures and date of observations point to a single generation a year and that a late summer or fall one, although our data may be insufficient to definitely determine this.

*Hicks, Charles H. Nesting Habits and Parasites of Certain Bees of Boulder County, Colorado. Univ. Colo. Studies. Vol. XV, No. 3. p. 250, 1926.

## Observations in the Genus Samia (Lepidoptera: Saturniidae).

By Harriet A. Wickwire and Adèle Calale, Cortland, New York.

It is well known that moths of *Samia cecropia* will mate with moths of *Samia gloveri* when placed in cages, if mates of their own species are not present. However, we have never seen an account similar to an experiment which we tried one June night, so we submit our experience for what it may be worth.

On the night of June 4, 1932, two unmated females of *Samia gloveri* were put in a cage and taken into the woods near Venice Center, New York. The cage was set on the ground, several yards in front of the glaring headlights of our car. At 1.30 A. M. a male *Samia cecropia* moth appeared from the rear of the headlights, flying low. He crossed the lighted area and was caught as he hovered over the cage containing the female *gloveri* moths. Between 1.30 and 2 A. M., four *cecropia* males flew from the same direction as the first moth, to the caged *gloveri* females. When two of these males were introduced inside the cage with the *gloveri* moths, copulation occurred immediately.

On June 14, 1932, we "tied out" a newly-emerged female moth of *Samia gloveri* in our garden in Cortland, New York. The next morning we found this moth unmated, so the experiment was repeated the following night. The following morning the moth was found in copulation with a *Samia cecropia* male.

We consider that these cases prove that *Samia gloveri* is, as yet, not far enough removed from *cecropia* to have lost sexual attraction for the latter species.

At the time of the experiment there were many *cecropia* females in Central New York; yet the *gloveri* females, thousands of miles away from the boundaries of their habitat, lured the *cecropia* males away from their kind. This fact raises interesting speculations.

What would happen in a locality where both species were found? Would they interbreed freely?

Is there any such locality?

What was the original cause of differentiation between these two species?

Was it geographical only?

When did the separation occur?

For two years we have tried to rear hybrids of these two species, but have been unsuccessful. A mysterious disease started working rapidly on one or the other of the parent stocks. This disease infected all the larvae in the third stage. It brought weeks of work to naught. In our experience the hybrids have been the last to succumb. We believe this to be the disease which Eliot and Soule described in "Caterpillars and Their Moths," and which they considered especially fatal to *gloveri* larvae. The symptoms were those of diarrhea.

We will be grateful for any information which anyone can give us regarding the causes, prevention, or cures for this disease. Usually it has appeared after the first or second molt, and has proved most virulent among the Attacine group. *Tropaea luna* has never been affected by it, neither has *Automeris io* or *Telea polyphemus*.

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**The Winter Stage of Sibine stimulea (Lepid.: Eucleidae).**

The larva of *Sibine stimulea,* popularly known as the Saddleback moth, because of a large green patch on the back of the larva, resembling a saddle-cloth, while the saddle is represented by an oval purplish brown spot, reaches full growth in late summer. It then spins a smooth dark brown ovoid cocoon in which it passes the winter.

To ascertain whether the larva passes the winter in the cocoon as larva or pupa, I gathered several specimens in September, 1931, which I found feeding on a pear tree. Being rather large, they required little feeding, and within a week had spun cocoons. In the latter part of the following April, I opened these cocoons, and in each case I found that the larva was still in the larval stage. This would seem to indicate that the larva hibernates in the cocoon during the winter. Furthermore, as the adults do not fly until June and July, it would also appear that the larva does not change into a pupa until the latter part of May or the first part of June.

Birger Richard Headstrom, Medford Hillside, Massachusetts.

# Entomological Literature

COMPILED BY 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 figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of ENTOMOLOGICAL NEWS for 10c. The number of, or annual volume, and in some cases the part, nefl, &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.—Bishopp, F. C.**—Mosquitoes kill live stock. [68] 77: 115-116. **Griffin, F. J.**—On the dates of publication of "Palisot de Beauvois, Insectes rec. Afr. Amér.," 1805-(1821). [75] 10: 585-586. **Hingston, R. W. C.**—Some smart insects. [Nat. Mag.] 21: 55-60, ill. **Holland, W. J.**—Reminiscences of a naturalist. [76] 1933: 191-192. **Jones, F. M.**—Insect coloration and the relative acceptability of insects to birds. [36] 80: 345-385, ill. **Melander, A. L.**—Fighting insects with powder and lead. [76] 1933: 168-172. **Strand, E.**—Nochmals: Nomenklatur und ethik. [Folia Zool. et Hydrobiol., Riga] 4: 103-133. **Strand, E.**—Nachtrag zu meinem artikel "Nochmals: Nomenklatur und Ethik." [Folia Zool. et Hydrobiol.] 4: 188-189. **Strand, E.**—Miscellanea nomenclatorica zoologica et palaeontologica. [Folia Zool. et Hydrobiol.] 4: 193-196.

**ANATOMY, PHYSIOLOGY, ETC.—Beattie, M. V. F.**—The physico-chemical factors of water in relation to mosquito breeding in Trinidad. [22] 23: 477-496, ill. **Cappe de Baillon, P.**—La bipartition monstrueuse du pronotum chez les Coléoptères. [24] 101: 245-266, ill. **Currie, G. A.**—Some notes on the biology and morphology of the immature stages of Harpobittacus tillyardi (Mecoptera). [Pro. Linn. Soc. N. S. W.] 57: 116-122, ill. **Hilton, W. A.**—Nervous system and sense organs. [13] 24: 64-66, ill. **Janisch, E.**—The influence of temperature on the life-history of insects. [36] 80: 137-168, ill. **Jobling, B.**—A revision of the structure of the head, mouth-part and salivary

glands of Glossina palpalis. [Parasit.] 24: 449-490, ill. **Kontkanen, P.**—On the larval digestive tract of Acanthocinus aedilis (Ceramb.). [Ann. Soc. Zool.-Bot. Fenn. Vanamo] 12: 91-106, ill. **Mer, G.**—The determination of the age of Anopheles by differences in the size of the common oviduct. [22] 23: 563-566, ill. **Miller, D.**—The buccopharyngeal mechanism of a blow-fly larva (Calliphora quadrimaculata). [Parasit.] 24: 491-499, ill. **Verlaine, L.**—L'instinct et l'intelligence chez les Hyménopteres. [Mem. Soc. R. Sci. Liége] 17, 13: 1-16.

**ARACHNIDA AND MYRIOPODA.—Alfaro, C. E.**—El ácaro del cafeto. (Epitetranychus althae) [Escuela Nac. Agric., Costa Rica] 1932: 26 pp., ill. **Denis J.**—Les Araignées au fond des houillères. [24] 101: 267-280. ***Gertsch, W. J.**—Notes on American spiders of the family Thomisidae. [40] No. 593: 22 pp. ***Mello-Leitão.**—Opiliões do Brasil. [Rev. Mus. Paulista] 17: 1-505.

**THE SMALLER ORDERS OF INSECTS.—*Jordan, K.**—Two new American species of Siphonaptera. [9] 66: 14-17, ill. ***Jordan, K.**—Siphonaptera collected by Mr. Harry S. Swarth at Atlin in British Columbia. [Nov. Zool.] 38: 253-255, ill. ***Light, S. F.**—Termites of western Mexico. [67] 6: 79-162, ill. ***Moulton, D.**—The Thysanoptera of South America. [105] 451-484, ill.

**ORTHOPTERA.—*Little, V. A.**—A new Melanoplus (Acrididae) of the texanus series. [10] 34: 153-155, ill.

**HEMIPTERA.—*Barber, H. G.**—A new Sciocoris from Texas (Pentatomidae). [10] 34: 149-150, ill. **de Long & Davidson.**—Some new species of Eugnathodus (Cicadellidae). [43] 33: 55-58. **Lowry, P. R.**—Cicadellidae leafhoppers of New Hampshire. [43] 33: 59-80. **Takahashi, R.**—Two new species of Eulachnus del Guercio (Aphididae). [10] 34: 150-153.

**LEPIDOPTERA.—*Hayward, K. J.**—New forms of Pieris phileta (Pieridae). [105] 2: 434-437. **Hoffmann, F.**—Beitrag zur geographischen verbreitung der neotropischen Syntomiden. [14] 46: 213-215. **Hoffmann, F.**—Ueber den lichtfang von Heteroceren in der südbrasilianischen Serra. [17] 50: 6-8, cont. ***Jones, W. W.**—The description and biology of Nepticula braunella new species (Nepticulidae), a species of leaf miner on Prunus ilicifolia and the variety integrifolia. [67] 6: 49-78, ill. ***Meyrick, E.**—Exotic microlepidoptera. 4: 321-352. **Michael, O.**—Bemerkungen ueber Agrias. [14] 46: 215. ***Prout, L. B.**—New exotic Geometridae. (S). [Nov. Zool.] 38: 103-126.

*Richards & Thomson.—A contribution to the study of the genera Ephestia (including Strymax), and Plodia (Phycitidae), with notes on parasites of the larvae. (S). [36] 80: 169-250, ill. **Schütze, K. T.**—Die biologie der kleinschmetterlinge. Frankfurt am Main. 1931. 235 pp. **Spitz, R.**—Catalogo das collecões dos macrolepidopteros do Museu Paulusta, com annotacões, ate 1929. [Rev. Mus. Paulista] 17: 833-893.

**DIPTERA.**—*Fischer, C. R.—Um genero e duas especies novas de Rhopalomeridae do Brasil, e o pupario de Willistoniella pleuropunctata. [105] 2: 441-450, ill. **Goffe, E. R.**—Meigen "Nouvelle Classification des Mouches a deux Ailes" 1800. [Trans. Ent. Soc. So. England] 8: 58-64. **Hodson, W. E. H.**—The large narcissus fly, Merodon equestris (Syrphidae). [22] 23: 429-448, ill. **Macfie, J. W. S.**—Ceratopogonidae from the wings of dragonflies. [101] 75: 265-283, ill. *Malloch, J. R.—A new genus of diopsid-like Diptera (Periscelidae). (S). [Stylops] 1: 266-268, ill.

**COLEOPTERA.**—*Borgmeier, T.—Dois novos coleopteros ecitophilos do Brasil (Staphylinidae). [105] 2: 397-401, ill. *Boucomont, A.—Synopsis des Onthophagus d'Amerique du Sud (Scarab.). [24] 101: 293-332. *Boucomont, A.—Genre nouveau et espèces nouvelles ou peu connues de Bolbocerini. [Scarabaeidae]. (S). [25] 37: 262-268. *Horn, W.—Ueber die bewertung der äusseren geschlechtsmerkmale für die systematik und neues über neotropische Odontochilae (Cicind.). [105] 2: 401-410, ill. *Liebke, M.—Die Galerita-arten des Rio de la Plata-Stromtales (Carabidae). [105] 2: 415-420. *Melzer, J.—Novos generos e novas especies de Cerambycideos do Brasil (Cerambycidae). [105] 2: 420-434, ill. *Méquignon, A.—Sur les Chelonarium des Antilles avec descriptions d'espèces nouvelles (Byrrhidae). [25] 37: 243-246. *Obenberger, J.—Neue neotropische Trachydinen. Eine serie von neuen neotropischen Agrilusarten. (Buprestidae). [Folia Zool. et Hydrobiol.] 4: 233-239; 239-262. *Spaeth, F.—Ueber die mit Metriona erratica verwandten arten (Chrysom. Cass.). [Folia Zool. et Hydrobiol.] 4: 263-270. **Vandel, A.**—La spanandrie, la parthénogenèse géographique et la polyploïdie (?) chez les Curculionides. [25] 37: 255-256.

**HYMENOPTERA.**—**Borgmeier, T.**—Leptogenys crudelis Fr. Smith, 1858 (Formicidae). [105] 2: 485. *Cockerell, T. D. A.—Rocky Mountain bees. IV. [40] No. 595: 3 pp. *Conde, O.—Cimbicinen aus dem Museu Paulista (Tenthred.). [105] 2: 437-441, ill. *Santschi, F.—Quelques fourmis inédites de l'Amérique centrale et Cuba. [105] 2: 410-414, ill.

In Days Agone. Notes on the Fauna and Flora of Subtropical Florida in the Days When Most of Its Area was a Primeval Wilderness. By W. S. Blatchley, Author of "The Coleoptera of Indiana," etc. The Nature Publishing Co., Indianapolis, 1932. 338 pp., 15 half-tone plates, chiefly of landscapes. $2.00, postage extra.—This book "deals mainly with the distribution and habits of the more interesting forms of plant and animal life which I saw during six trips made between the years 1911 and 1922 into extreme southern Florida. From the great mass of material in my field note books I have sorted out such facts of scientific interest as I thought would be of value and have brought them together in permanent form. Especially have I given the exact type locality and local habitat of many of the more than 200 new species of Coleoptera and 50 new species of Heteroptera which I have described from Florida. I mention also the stations and conditions under which many of the rare forms described by others may be taken."

The book is written in diary form and arranged under six chapters of unequal length: I Around the coasts of southern Florida—1911 (pp. 9-169), II The Okeechobee Wilderness—1913 (pp. 170-254), III Again the Okeechobee Wilderness—1918 (pp. 255-270), IV The Southern tip of the United States—1919 (pp. 271-297), V The lower west coast and Ten-thousand Islands—1921 (pp. 298-315), VI Okeechobee for the last time—1922 (pp. 316-331). Many an observation on plant and bird, fish and reptile, and not forgetting the human species, is met as one turns the pages. No one who has visited Florida, or any region with a similar biota, can fail to be interested by them. The insects which receive most attention are the Coleoptera, Heteroptera, Orthoptera and Lepidoptera; they are mentioned usually under their technical names and not infrequently brief descriptive notes enable the reader, who picks them up in the localities described, to identify them. Other aspects of nature are not neglected and we conceive that the volume may be very useful as a naturalist's guide. We wish, however, that it had a table of contents, a map and a fuller index, in which all the specific and generic names were entered. These additions would enable one to find again, much more quickly than can now be done, many a species whose identity is concealed under a family name in the index.—P. P. Calvert.

## OBITUARY.

With deep regret we record the death of Edward Bruce Williamson, student of the Odonata, at Ann Arbor, Michigan, on February 28, 1933, as the result of a severe paralytic stroke on February 17.

# EXCHANGES

**This column is extended only for wants and exchanges, not for advertisements of goods and service for sale. Notices not exceeding three lines free to subscribers.**

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

**Wanted**—October, 1919, and December, 1919, copies of Bulletin of the Brooklyn Entomological Society. Cash. Harriet A. Wickwire, 55 Tompkins St., Cortland, N. Y.

**Wanted for Cash or Exchange**—Uncommon species of North American Lepidoptera. Several of each kind. D. V. Brown, Pleasanton, California.

**Butterflies**—Desire correspondence from Western United States, Canada and Alaska. Will exchange rare California material for specimens from your locality. Lloyd M. Martin, P. O. Box 52, Roscoe, California.

**Exchange**—Local Venezuelan (South America) species of lepidoptera offered in exchange for North American species. Oscar Zuloaga, P. O. Box 263, Caracas, Venezuela.

**Exchange.**—Desire Lepidoptera, particularly specimens and data of Wisconsin and U. S. Catocala. Exchange for same. Wm. E. Sieker, 46 Breeze Terrace, Madison, Wisconsin.

**Will buy or exchange**—Pinned Microlepidoptera and papered Pieridae of North America. Full data with all specimens. Named material of all groups offered. Alexander B. Klots, University of Rochester, Rochester, N. Y.

**Wanted**—Names and addresses of those desiring Insects from Tennessee. Will collect there during June-September, in all orders. Correspondence solicited. B. Benesh, 107 Argonne Drive, North Chicago, Ill.

**Wanted**—West Coast Geometrids for cash or in exchange for California Butterflies. Edward Guedet, P. O. Box 305, Napa, Calif.

**Wanted**—Western species of Bumblebees, all three castes; also Psithyrus and Catocala. A. P. Morse, Peabody Museum, Salem, Mass.

**Will Buy** Agromyzidae from North, South, Central America and the West Indies. Special prices for reared material with host records and pressed specimens of mines. S. W. Frost, Arendtsville, Pennsylvania.

**Wanted**—Hypenids and other quadrifid Noctuids from all parts of North America by exchange or purchase. A. Glenn Richards, Jr., Dept. Biology, Univ. of Rochester, Rochester, N. Y.

**Wanted**—Names and addresses of those desiring insects from Wisconsin. Will collect in all orders from May to October. Correspondence invited. George Kettler, Platteville, Wis.

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# ENTOMOLOGICAL NEWS


## APRIL, 1933

Vol. XLIV No. 4

SMITHSONIAN INSTITUTION
APR 13 193
NATIONAL MUSEUM


CHARLES WILLISON JOHNSON
1863-1932.

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows:

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| United States and possessions, Central and South America | $3.00 |
| Canada | 3.15 |
| Foreign | 3.25 |

Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance.
One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 7.00
Ten issues " 11.00, " 20.00, " 35.00, " 60.00

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ENTOMOLOGICAL NEWS, 1900 Race Street, PHILADELPHIA, PA.

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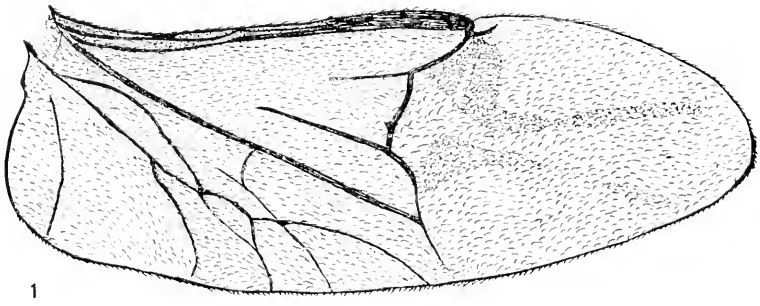

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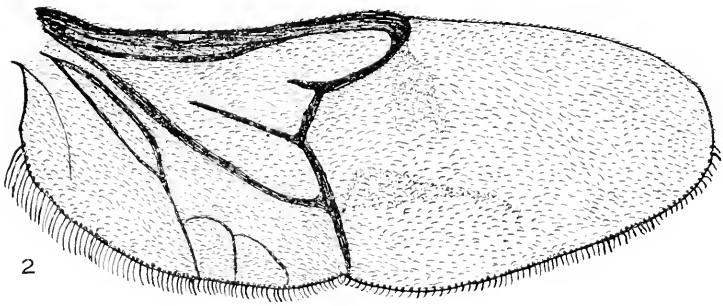

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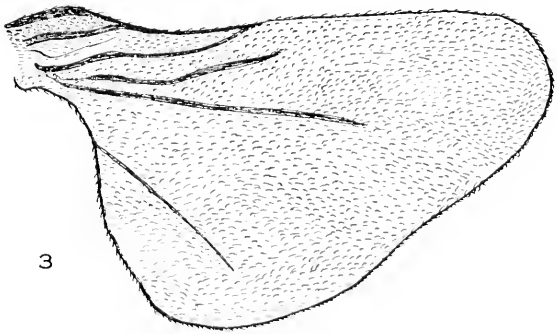

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1—HELICHUS (DRYOPS) FASTIGIATUS SAY. 2—LIMNIUS ELEGANS LeCONTE. 3—STENELMIS CRENATUS SAY.—SEGAL.

# ENTOMOLOGICAL NEWS

VOL. XLIV. APRIL, 1933 No. 4

## The Hind Wings of Some Dryopidae in Relation to Habitat (Coleop.).

By BERNARD SEGAL, Rochester, New York.

(Plate III.)

The small aquatic beetles of the family Dryopidae are remarkable in their habits as well as in their morphology. A study of the structure of the hind wings of these beetles reveals some interesting facts. They occur within the family in three types: 1) fully developed. 2) reduced. 3) vestigial.

A direct correspondence was found between the type of the wing and the habitat of the species.

The fully developed hind wing is elongate and rounded at the apex. The entire surface is thickly clothed with fine fixed hairs, or aculeae. These are seen under the microscope to cover the wing membrane as well as the veins. The outer margin is fringed with longer and thicker hair. These can be seen with the naked eye forming a border from the anal angle to the mid-apical angle. Their bases of insertion are annular, thus distinguishing them from the surface hairs. The fringe-setae are longest at the anal angle and decrease in size as they approach the apex.

The fully developed wing consists of two distinct areas, the venation area occupying the proximal 2/3 of the wing, and the clear, transparent, apical area. The limits of these two areas are marked by a slight constriction on the costal margin, and a deeper incision on the outer margin.

The venation of the hind wing is of the Cantharid type. Using Forbes' system of vein nomenclature, and compared with the hind-wings of European species of Dryopidae figured by Forbes (1922) and by Kempers (1900), the venation may be interpreted as follows:

1. Costa, subcosta and radius all arise separately at the base of the wing, run independently for a short distance and then



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crowd closely together towards the costal margin, and terminate roundly as a thick vein at the end of the venational area of the wing.

2. Radial sector is atrophied at the base and appears as a recurrent segment of the radius near the distal end of the venation area.

3. Media has also lost its base but is somewhat longer than Rs. It starts at about the mid-venation area, and bends towards the outer margin of the wing. But before reaching the margin it coalesces with cubitus forming a loop.

4. Cubitus originates at the base and runs obliquely across the venation area toward the outer margin, where it joins media before reaching the margin.

5. Four anal veins are usually present, but these vary and offer difficulties in tracing their courses.

6. Cross-vein R-M obliquely joins radial sector and media.

7. There are usually two irregular dark spots in the apical area which are probably traces of lost veins.

In the reduced type of wing, the clear apical area is shortened or lost entirely, and the anal veins are decreased in number and less distinct.

Based on the degree of development of the hind wings, the genera of Dryopidae would be grouped in the following manner:

1. *Helichus (Dryops)* with the most fully developed wings in all its species is evidently the most primitive and should be placed at the beginning of the series.

2. *Limnius* should follow, with fully developed wings in the three species occurring in New York, with fewer and more abbreviated anal veins than in *Helichus*.

3. *Helmis* with at least one species, *Helmis quadrinotatus*, having individuals with short wings. The reduction consists, besides the loss of the clear apical area, in the disappearance of the cross vein, and a further decrease in the number of the anal veins.

4. *Stenelmis*, with the most common species, in our locality, *Stenelmis crenatus* Say, having vestigial wings. Specimens of this species were collected at different seasons and situations, and more than 100 beetles were examined for their hind wings.

5. *Macronychus* with the only species that occurs in New York, *M. glabratus* Say, reaching the highest degree of degradation. The hind wings of this species are short, rounded, scale-like rudiments.

Because of the lack of *Ancyronyx* in our vicinity, no great number of specimens were available for dissection. The few that were examined, however, exhibited the same rudimentary type of hind wings as that found in *Macronychus*.

None of the species of *Dryopidae* are known to take wing, although their nearest relatives, *Psephenus lecontii* of the family Psephenidae, and *Lara avara*, of the family Laridae, fly with great agility. Considering the habits of the Dryopidae, one is led to the following conclusions:

These insects at first retreated into swiftly running waters; gradually they became adapted to quiet waters, and with it lost use of wings. *Psephenus* inhabits torrents and rapids. It is also found on overhanging bushes and emerging stones. *Lara* is found riding the current on logs in swift, cold streams (Darlington, 1929). Both of these can fly as well as swim. *Helichus, Limnius,* and *Helmis* are dwellers of the underside of stones and logs in small creeks, while *Machronychus* and *Ancyronyx* have retreated into quiet waters, ponds, and swamps.

The dangers of the quick-running current necessitates the use of the wing. The further adaptation was in the direction of going into safer waters, under stones, and the ability to retain the air supply for a longer period, thus being able to live in the safety of the pool and among the stones and pebbles on the bottom of streams and creeks. This new habitat shifted the function of locomotion from the wings to the legs, and those species with the most reduced wings have the longer legs.

A study of the larval forms bears witness to the way in which their adaptability to aquatic life advanced. Those species that are found in the riffles and having fully developed wings have, in the larval stage, laterally prolonged lobes on the body segments. These lobes are used to hold fast to the stones. They decrease as the habitat changes from swift running to quiet waters. The larval form ranges from the limpet-shaped *Psephenus* and *Helichus* to the nearly circular larvae of *Ancyronyx*.

The trend of adaptation, then, has been:

1. From semi-aquatic to fully aquatic habitat.
2. From the dangers of swiftly running, to the safety of quiet waters.
3. Loss of wings and increase in length of legs and claws.
4. Change in body structure of larvae, from circular, limpet-shaped, or lobed, to round, worm-like.

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DARLINGTON, P. J., JR., 1929. On the Dryopid beetle genus *Lara*. Psyche, Vol. XXXVI, pp. 328-331.

FORBES, W. M. T., 1922. The wing-venation of the Coleoptera. Ann. Ent. Soc. of Amer., Vol. XV, pp. 328-345.

KEMPERS, K. J. W., 1900. Het Adersystem der Keverlengels. Tyd. voor Ent., Vol. XLIII, p. 192.

WEST, L. S., 1929. Life history notes on *Psephenus lecontei* Lec. Battle Creek College Bull., Vol. III (No. 1).

EXPLANATION OF PLATE III.

Fig. 1. Hind wing of *Helichus fastigiatus* Say. Fully developed type.

Fig. 2. Hind wing of *Limnius elegans* LeConte. Fully developed, fringed.

Fig. 3. Hind wing of *Stenelmis crenatus* Say. Reduced type.

## A Corduline Dragonfly from Mexico (Odonata).

By JAMES G. NEEDHAM, Cornell University, Ithaca, New York.

In a small collection of insects, that was made incidentally to a botanical excursion in Mexico by Dr. L. H. McDaniels of Cornell University, there was a single dragonfly, which, by rare chance, is the first Corduline dragonfly to be recorded from that country. It is a fine male specimen of a new species of the genus *Gomphomacromia*.

The rarity of neotropical Cordulines (and of Macromiines as well) has been noted by Dr. Calvert (Biol. Centr. Amer., Neuropt., pp. 197-8, 1908), Dr. Ris (Archiv. of Naturg. 82:174. 1916), and others. The range of *Gomphomacromia* is along the backbone of the continent. The type species is the antipodean *G. paradoxa* Brauer, coming from Chile; *G. fallax* McL. is central, coming from Ecuador and adjacent parts of Brazil; while this new species is northern. Other species that in times past have wrongly been placed in *Gomphomacromia* have gradu-

ally been eliminated, the last one *Neocordulia volxemi* Selys, by myself in Annals of the Entomological Society of America 1:279, 1908, where I also showed the affinities of this genus to be with Cordulines rather than with Macromiines.

The three species are readily separable by color characters, as follows:

1. Front of synthorax blackish, with a pair of distinct oblong antehumeral yellow spots ..... *paradoxa*
   Front of synthorax brown with a yellow longitudinal stripe on the middorsal carina, and without distinct antehumeral pale spots ..... 2
2. Abdominal segments 9 and 10 in the male black above, *fallax*
   Abdominal segments 9 and 10 in the male yellow above, *mexicana*, n. sp.

**Gomphomacromia mexicana** sp. n.

Length 45; expanse 58; abdomen 33; hind wing 27.

This is a slender blackish species, having the thorax striped and the abdomen spotted with yellow. Face olivaceous, darker across the middle of the labrum, and lighter on the broadly concave prominence of the frons. Labium yellowish. A black cross stripe through the ocelli runs narrowly down the rear of the frons along the margin of the eyes to the blackish mandibles. The low transversely depressed vertical tubercle is brown. Occiput brown, paler in the middle and fringed on the margin with long tawny hairs. This fringe is continued down the carina at the rear of the eyes, the hairs becoming whitish. Rear of head black except on the occiput, and a small spot below the lateral eye tubercle.

Prothorax blackish above with a yellow transverse front border. Synthorax blackish, clothed in front with long tawny hairs. The ridges of carina, crest and collar are narrowly yellow. There is an obscure, pale brownish area before the humeral suture, and there are two broad yellow oblique bands each side, one beneath each wing.

Wings hyaline, a little flavescent at base and with black veins and stigma. Ante- and postnodals forewing 7:8 and hind wing 5:9, with those in the area R1 near the stigma becoming oblique, and the first of the two cross veins under the stigma simulating a true brace vein. There is an extra bridge crossvein (two in all). There are no planates. The triangles are free from cross veins. Beyond the triangle in the front wing are first two rows then one row (for most of the distance), then a rapidly increasing number of rows of cells where veins M4

and Cu1 rapidly and widely diverge to the wing margin. There are three cubito-anal cross veins (counting the one that bounds the uncrossed subtriangle) in the fore wing, and two in the hind wing. The triangle in the hind wing is a little beyond the arculus, and the sectors of the arculus are short stalked, and about equally stalked, in both wings. The anal loop is not footshaped, lacking the toe: it is short, composed of six cells in two rows that are separated by an ill-defined and very zig-zag midrib. The male anal triangle is two-celled and bordered by a gray membranule.

The legs are black, with the under side of the front femur yellow. The claws appear bifid at tip, the stout inferior tooth being almost at the apex.

The abdomen is quite slender, slightly thickened on a few segments at both ends. Segments 1 and 2 are thinly clad with long tawny hairs, and 10 and appendages with shorter denser black hairs. The color is blackish with a pair of submedian dorsal yellow spots on segments 2-7, large on 3 and 7, small on 2 and 4-6: dorsum of 9 and 10 mostly yellow; apical border of 1 olivaceous; sides of 2 beneath and the broad platelike hamules, yellowish. Appendages black, as long as segments 9 and 10 together, the superiors regularly decurving to their obtuse and slightly dilated tips, which lie in the wide apical notch of the broad plate-like, slowly upcurving inferior. The latter is concave and shining above, convex and hairy beneath. There is a slight pale angulation of the under side of the superiors near the middle.

This species is near *G. fallax*. It agrees with that species and differs from *G. paradoxa* in larger size, in having five or six cross veins between the oblique vein and the apparent brace vein at the stigma (postnodals of the second series), where that species usually has three; also, in having the triangle of the hind wing more distant from the arculus, and the origin of vein A2 more distant from the anal crossing (Ac).

This species differs from *G. fallax* in the large pale yellow campanulate spots that nearly cover the dorsum of abdominal segments 9 and 10 and in the form of the superior appendages of the male, these being in *G. mexicana* longer, much more strongly decurved to their blunt clavate tips.

*Type* C. U. No. 1127. A single male specimen collected by Professor L. H. MacDaniels at Teotlhuacan, Mexico, on July 26, 1921, and now in the Cornell University collection.

## Prothetely in an Elaterid Larva (Coleop.).*

By C. A. Thomas, Pennsylvania State College.

In the spring of 1930 the writer dug up from his garden a number of larvae of *Monocrepidius lividus* DeG., a rather common wireworm in southeastern Pennsylvania. These larvae were placed in a cellar, in individual salve cans, and remained there throughout the remainder of their larval existence, or until they pupated in midsummer. The temperature of the cellar during this period gradually rose from 55° F. to 72° F., but at no time was it warmer than the latter temperature. Pupation among this lot of *M. lividus* larvae began in mid-June, and they had all, except one, pupated by mid-August. Although this individual was apparently under practically the same conditions of temperature, soil moisture, food, etc., as the others, it had not shown any indication of going into the pupal stage when examined on August 25. At the next examination on September 8, however, it was found that this larva had molted. Instead of a normal pupa, however, there was found an abnormal individual combining some characters of the pupa with those of the larva. An examination of the literature showed that this phenomenon is very rare among Elaterid larvae, only one other case, that by Hyslop (1916) having been recorded, although it is occasionally found among larvae of other families and orders, as noted in the appended list of references.

Since this phenomenon is so rare, this specimen is here described and figured in detail:

*Head.* Mouthparts apparently normal in shape and size, and typically larviform, except for a slight distension of the membranes of the palpi. Antennae larviform, slightly distended. Mandibles normal. A pigmented, pupiform eye arises from a pigmented area on each side of the head, just behind the base of the antenna (fig. 3). These eyes closely resemble those of the *Melanotus* larva described by Hyslop.

*Thorax.* Prothorax normal throughout, without any distension of the membranes. Meso- and metathorax each with a

* Publication authorized by the Director of the Pennsylvania Agricultural Experiment Station, January 16, 1933, as Technical Paper No. 578.

pair of sac-like wing pads, somewhat pupiform, but shorter and more bag-like, and without any indication of the striation found in the normal pupal wing. The mesothoracic wings are more than twice the size of the metathoracic wings. All wings seem to rise directly from the integument of these segments, with no visible sutures (figs. 1 and 2).

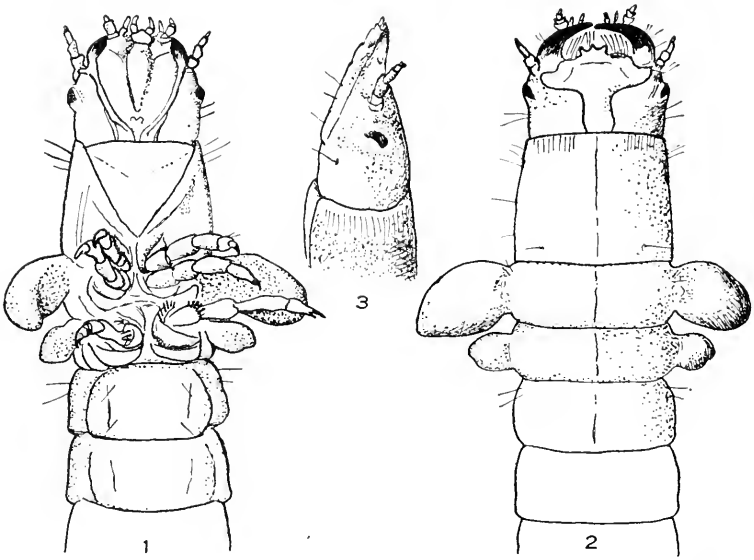


Fig. 1—Ventral view: Details of eyes, extended palpi and antennae, legs and wing-pads.
Fig. 2—Dorsal: Eyes and comparative size of wing-pads.
Fig. 3—Lateral view of head, showing the "eye".

*Legs.* The trochanters and coxae of all legs are larviform except that the heavy chitinous bristles or spines of the pro- and mesothoracic coxae are very much reduced in size and number; those of the metathoracic legs are about normal for the larva. Femora of all legs larviform, but membraneous and without spines except on the metathoracic legs. Tibiae pupiform on all legs. Tarsi pupiform, except for the prothoracic legs (fig. 1).

*Abdomen.* Entirely larviform, except that the row of bristles on the under side of the tenth segment is greatly reduced in size and number. No papillae are found on any of the segments (plate 1).

The molted skin from which this specimen emerged shows no unusual developments of any portion of the body or legs.

With only one such abnormal specimen at hand, it is impossible to prove a definite cause for this phenomenon. As noted above, the lot of larvae containing this specimen was not exposed to any temperature higher than 72° F. during the several months they were in the cellar. Hence high temperature can probably be ruled out in this instance, as the larvae are often exposed to considerably higher temperatures than this outdoors. Plenty of food was supplied to all members of this lot of larvae. Although the soil moisture was not accurately measured, there surely were other cultures which had approximately the same moisture content as that in which this abnormal specimen appeared. Such larvae undoubtedly encounter great extremes of soil moisture and temperature in the field, although, of course, they are generally able to leave very dry soil and go into the moister soil below. I have never seen this abnormality among many thousands of larvae outdoors, and it is interesting to note that practically all of the instances of this phenomenon described in the literature were among larvae being reared under artificial conditions.

The following list of references to the records of this phenomenon among insect larvae is appended in the hope that it may be of use to others interested:

## References.

Bataillon, E.—1893—La Metamorphose du ver a soie et le determinisme evolutif. Bull. Scient. France et Belgique, vol. 30, p. 18.

Stated that the accumulation of $CO_2$ is a controlling factor in bringing about metamorphosis. Any artificial condition which would vary activity of the enzymes or change the concentration of the $CO_2$ would alter the phenomena concerned in metamorphosis, and thus might cause these abnormalities.

Barber, H. S.—1914—Prothetely or semi-pupal stage in *Lopheros fraternus* Rand. Psyche, XXI, p. 190.

Some individuals brought indoors and kept at abnormally high temperatures became prothetelous. He believed that certain phases of metamorphosis were hastened while other phenomena remained unaltered.

Boving, A. G.—1906—Bidrag til kundskaben om Donaciin larveneres natur-historie, p. 241, Copenhagen, Denmark.

Transl. into English-Sonderabd. Int. Rev. Hydrobiol. Hydrograph, p. 101, 1910.

Recorded an abnormal *Donaciid* larva (Coleoptera).

Busck, A.—1897—Larvae of *Anthrenus varius* showing wing pads. Proc. Ent. Soc. Wash., vol. 4, p. 123.

Found six larvae of *A. varius* showing this phenomenon.

Carpenter, G. H.—Insect Transformation, p. 257. Methuen & Co., London.

Stated that such precocious appearance of wing rudiments is instructive because if we accept these abnormalities as examples of reversal to an old ancestral condition, we conclude that among the ancestors of primitive endopterygote insects, wing rudiments appeared outwardly before the pupal stage in the life history.

Chapman, R. N.—1926—Inhibiting the process of metamorphosis in the Confused Flour Beetle (*Tribolium confusum* Duval.).

Journ. Exptl. Zoology, vol. 45, p. 293.

Experiments showed that abnormalities in his *T. confusum* larvae were associated with an undetermined gas produced by the adult when it was irritated, although this probably was not the only cause. Only 10% of the larvae exposed to this gas showed abnormalities, and none were found among the controls. Mature larvae emerged with a combination of larval and pupal structures, and pupae emerged as deformed adults. The phenomenon seems to be Metathetely.

Dawson, R. W.—1931—Report of two cases of metathetely in Polyphemus larva (*Telea polyphemus* Cramer). Ent. News, XLII, p. 125.

Two metathetelous larvae of *T. polyphemus* appeared from eggs incubated at 25° C. for 11 days, then exposed to progressively declining temperatures for periods of 3 to 5 days. Dawson suspected a causal connection with the descending temperatures. The head capsule, mouth parts and antennae were distended; the thoracic legs and prolegs partly so.

Dewitz, J.—1905—Untersuchungen uber die Verwandlung der Insektenlarven. II. Archiv für Anat. u. Physiol., Physiologische Abt., Suppl. Band, p. 389.

Believed that enzymes are not present in the egg, but begin to develop in the young larva, reaching greatest activity in the larva about ready to pupate. After pupation, enzyme activity diminishes until the adult, like the egg, exhibits no activity of these particular enzymes.

Hagen, H. A.—1872—Stettin. Ent. Ztg., p. 392.

Found Prothetely in larvae of silk worms, *Bombyx mori.*

Hein, S. A. A.—1920, 1924—Studies on variation in the

Meal Worm (*Tenebrio molitor* L.). Biological and genetical notes on *T. molitor*. Journ. of Genetics, vol. 10, p. 227. II—Variations in tarsi and antennae-Ibid. 1924, p. 1.

Described *T. molitor* larvae with rudimentary wings. These were found only in individuals with abnormally long larval stages, in which pupation was delayed or inhibited.

HEYMONS, R.—1896—Flugelbildung bei der Larve von *Tenebrio molitor*. Sitzungber. d. Ges. Nat. Fr., Berlin, p. 142. 1899—The development of wings in the larvae of *T. molitor*. Entomologists Record, vol. 11, p. 67.

Described winged larvae of *T. molitor*. Antennae had six segments rather than the normal four. Abdominal tergites and eyes resembled the pupal condition.

HYSLOP, J. A.—1916—Prothetely in the Elaterid genus *Melanotus*. Psyche, XXIII, no. 1, 2 pl.

Found a specimen of *M. communis* Gyll. in this condition in the laboratory. He believed that an abnormal humidity at or shortly before the time of pupation was the causative stimulus of this phenomenon. This individual appeared during a period of minimum moulting immediately preceding a very abrupt and extensive moulting period. It is predominately larviform, but with pupiform eyes and well developed, non-striated wing pads. "This case seems to be a carrying forward of larval characters into the pupal stage rather than a carrying back of pupal characters into the larval stages."

KEMNER, A.—1914—Ent. Tidsk. (Swedish), XXV, pt. 1-2, p. 87.

KOLBE, H. J.—1903—Uber vorschnelle Entwickelung (Prothetelie). Allgem. Zeitsch. fur Ent., Bd. 8, p. 1-9, 25-30.

Discussed premature development of imaginal antennae, maxillae and legs in larvae of *Dendrolimus pini* L. (Lepid.) He called this "Prothetelie," meaning "to run before completion." Stated that the histoblasts of the abnormal organs had metamorphosed before the entire insect had completed its metamorphosis, resulting in a larva with the wings, maxillae and legs of a pupa.

LENGERKEN, HANNS VON—1924—Prothetelie bei Coleopterenlarven. Zoologischer Anzeiger, v. 58, p. 179, 323, 3 figs.

PEYERIMHOFF, P. DE — 1911 — Sur un cas de Prothetelie-*Malthodes batillifer* Cantharides. Bull. Soc. Ent. France, p. 327.

PRUTHI, H. SINGH—1924—Studies on insect metamorphosis. I. Prothetely in Mealworms (*Tenebrio molitor*) and other insects. Effects of different temperatures. Proc. Cambridge Philosoph. Soc. (Biol. Sciences), v. 1, no. 3, p. 139.

Stated that Prothetely had never been observed in true wireworms, though not uncommon in Tenebrionid larvae. Believed

it due to retarded development. Factors promoting prothetely: I—Prolongation of larval life by keeping larvae at too high or too low temperatures; II—Direct effect of temperature. The metamorphosis of the larva is inhibited, but there is a tendency for the pupal organs to appear at the proper time. Therefor these organs are not mature. Experiments showed that very high temperatures delayed the development and produced more abnormalities. The metamorphosis was inhibited, while the pupation was overdue, but there was a tendency of the organs to appear at the proper time. Pruthi calls this Neoteny or inhibited development.

1927—Prothetely in insects. Nature, March 12.

Summary of the same information as above.

Riley, W. A.—1908—The abnormal appearance of external wing buds in larvae of holometabolous insects. Ent. News, vol. 19, p. 136.

Riley found prothetelous larvae of a common Pyrochroid beetle, *Dendroides canadensis*, with the compound eyes and antennal segments of the adult partially developed. He suggested that this is not atavism, i. e., a harking back to the period when the larvae bore wings, but rather seems to be a premature development in which characters normally present in the pupal stage are present abnormally in the larva.

Silvestri, F.—1905—Metamorfosi e Costumi della *Lebia scapularis*. Redia, 11.

Found a pro-nymphal stage with short external wing rudiment preceding the pupal stage in *L. scapularis*. This also occurs in some males of the parasitic Strepsiptera.

Strickland, E. H.—1911—Some parasites of *Simulium* larvae and their effects on the development of the host. Biol. Bull., vol. 21, p. 302.

Found that the action of the parasite somehow prevented the wing histoblasts from developing normally. He called this "Metathetely, or running behind completion," meaning that the whole insect had metamorphosed normally except for the wing pads, which were greatly retarded and reduced. He believed it due to keeping the larvae at abnormally high temperatures. This probably results in an increased supply of the enzymes which cause the histoblasts to develop.

Tragardh, I.—1912—Fauna och Flora, p. 245.

Williams, F. X.—1914—Prothetely in the Larva of *Photuris pennsylvanicus* DeG. Psyche, XXI, p. 126.

Found *P. pennsylvanicus* larva with a pair of well-developed wing pads on the meso- and metathorax. These pads were developed indoors under artificial conditions. Other larvae remaining outdoors did not show this condition.

## A New Lycaenid Transition Form (Lepid.)

By C. N. Rudkin, San Marino, California.

Lycaena xanthoides (Bdv.), tr. form **gunderi**, new tr. form.

*Lycaena xanthoides* (Boisduval) is described "from the mountains of California" by its author in part as follows: "Underneath of a russet gray, with a great number of black points . . ." (Dessous d'un gris roussâtre, avec une infinité de points noirs . . .) (Ann. Soc. Ent. Fr., (2), 10, 292, 1852.) Most specimens coincide roughly in this respect with the description, but in most examples the spots are somewhat grayish and are centered with minute white dots. (Examples of race *luctuosa* (Watson & Comstock) (Bull. Am. Mus. Nat. Hist., 42, 453, 1920) from the type locality in the Tehachapi Valley, Kern County, California, nearly always have the dots of a brilliant black with the white centers entirely absent, although this characteristic is not noted by the authors in the original description.)

Specimens of *xanthoides* from other localities vary considerably in the intensity of the black markings of the secondaries, and occasional specimens turn up in which the black markings are entirely absent from the underside of the hind wings. Otherwise these specimens appear to be exactly the same as typical examples, except that the females of the type series have considerably less of the light markings on the upper surface of the primaries than the average of the species. Intermediate specimens are found in which some of the spots are completely absent while others are of full intensity.

*Holotype* ♂ July 16, 1932; Bouquet Canyon, Los Angeles Co., California: *Allotype* ♀ June 1, 1921; same locality: both deposited in the type collection of the Academy of Sciences at San Francisco. *Paratypes*: 2 ♂'s June 21, 1931: 2 ♂'s May 14, 1932: 2 ♂'s May 21, 1932: 1 ♂ May 26, 1932: 1 ♀ June 1, 1921: 6 ♀'s May 26, 1932: all paratypes from same locality as the holotype and allotype. One pair of paratypes deposited in the Gunder collection at Pasadena, Calif.; the remainder held in the author's collection. Classification: change of pattern; immaculism, well developed.

These transition forms represent the extreme development of a tendency to immaculism well-marked in this species, and also apparent in the nymotypical forms of several species of the Lycaeninae (Chrysophaninae of authors) and in transition

forms of other species of this sub-family. Melanifusism, the opposite tendency, of which this sub-family might theoretically be capable, has not yet come under my observation in this species.

Named for Mr. J. D. Gunder of Pasadena, Calif.

## New Records of Odonata for the United States (Lblidae)

I have a nymph of *Miathyria marcella* sent me by Dr. W. L. McAtee from Florida. Being a nymph it is clearly a resident—not a storm-wind scatterling; and this adds another genus to our known fauna.

Dr. McAtee has obtained for me the following information concerning this specimen:

It was collected about midway between Fort Pierce and Okeechobee, Florida, in a roadside ditch created by the construction of State Highway No. 8. This specimen was taken in a minnow seine while collecting fishes. The water was less than three feet deep and contained an abundance of bushy pondweed (*Naias guadalupensis*). Short-nosed gars, sun fishes, warmouth bass, bullheads, and several species of killifishes were abundant in this ditch. The water was fresh at the time of this visit, but the presence of blue crabs (*Callinectes* sp.) would indicate that it had been mixed with brackish water from the Fort Pierce end of the ditch at some fairly recent date. The collection was made March 23, 1932 by F. M. Uhler and A. L. Nelson of the Biological Survey.

Also, I have seen a specimen of *Dythemis velox* that was collected near Auburn Alabama. Hitherto I have not known of its occurrence eastward of Texas.

J. G. NEEDHAM, Cornell University, Ithaca, N. Y.

## Society Reduces Dues.

At its first monthly meeting for the year 1933, the Lorquin Entomological Society of Los Angeles, California, cut its annual membership dues exactly in half. A few years ago the dues of the Society were $2.50. This amount has gradually been reduced until now the yearly payment is only 50 cents, which is no more than enough to cover the cost of routine expense. It has been found that this policy of low cost membership keeps older members from resigning and attracts new and younger members as well, especially during these times of "depression." Present membership is 60. Average attendance 35.

F. W. FRIDAY, *Secy.*

## An Unusual Invasion of the Clothes Moth, Tineola bisselliella (Lepid.: Tineidae).

By Glenn W. Herrick, Cornell University, Ithaca, New York.

Clothes moths have either become more abundant and more injurious during the past twenty years or householders have come to realize more keenly the depredations of the larvae. Nevertheless, we have not thought of this frail moth as having a tendency or indeed the capability of developing in enormous numbers even under most favorable conditions and then of migrating to dwelling houses at some distance from its breeding place. Given the proper conditions there is, however, no logical reason why clothes moths should not develop in swarms as do many other insects. Indeed our recent experience with these moths indicates that an abnormal increase in the numbers of them comparable to the outbreaks of other insects is an accomplished fact. The following quotation from a letter of one of our correspondents will afford the setting for the incident, the sequel of which, to say the least, is interesting.

"In a recollection covering nearly 50 years, I cannot recall anything approaching the invasion of moth in my residence from which I am at present suffering, and I am very seriously concerned with the fear that hundreds of dollars' worth of damage may be done to various woolen fabrics in my house unless drastic measures are taken without delay.

About two months ago, as nearly as I can recall it, we began noticing in the evening occasional moth millers flying in our living rooms and would usually try to kill them with the fly swatter or the hand. The number of these moth millers has grown steadily greater until at present we feel almost as though we were being overwhelmed with them. In a small entrance hall I have killed, evening after evening, 25 or 30 of them with a fly swatter as they would fly about or crawl over hats and coats hanging on the hat rack.

I went to the expense of having a large cedar chest built and installed in an upstairs bedroom for my own rather extensive wardrobe, and have been very careful at all times to keep this tightly closed. I was alarmed recently to find that a number of these millers had gained entrance and were crawling over several hundred dollars' worth of suits and overcoats with no regard whatever for the supposed repulsive properties of the cedar.

I have three oriental rugs that at a fair appraisal are worth

close on to a thousand dollars. These are all employed in rooms where there is a flood of daylight on them at all times, and I have gone on the theory that the moth will not eat fabrics which are exposed to strong light. However, during the recent absence of Mrs. P. and myself, an employee ran a vacuum cleaner over these carpets after the house had been closed up for two or three days with the shades drawn, and said that he got an astonishing number of the moth in the vacuum cleaner; so many that he dumped the bag from the vacuum cleaner on to an open fire and burned them."

Further observation, at our suggestion, on the part of our correspondent disclosed the undoubted fact that the moths were entering the house from the outside particularly through the screen doors both at the front and at the back of the house. It also developed that the neighbors in the same block were suffering from a similar invasion of the moths. The whole situation appeared so unusual that a personal investigation seemed worth while.

It developed in our investigation that a large warehouse which stood in this block about 150 feet back from the street and about the same distance from the back door of our correspondent's home was rumored to have some stored wool in one of the rooms. When the Superintendent of the warehouse had been found and consulted he confirmed the rumor and very courteously allowed us to make an examination of the wool. In one of the rooms 30 feet square and 9½ feet high some 20 tons of raw wool, between 5000 and 6000 fleeces, were stored. The Superintendent assured us that some of the wool, probably the larger part of it, had been in the warehouse for at least two years. Each fleece was simply rolled up and tied tightly with a string and then tossed into the pile. Here was raw, greasy unwashed wool heavily infested with the larvae of the common clothes moth, *Tinecola bisselliella*. The extent of the infestation of the wool was almost unbelievable. Living moths were crawling over the floors, dozens of them were at the two or three windows and scores were crawling and flying about the wool while everywhere were hundreds of dead ones. Many of the fleeces were practically destroyed, the outer layers of wool, at least, being reduced to a mass of brownish frass, webs and fragments of wool fibers. Those fleeces deep within the pile of wool were less injured apparently than those

nearer the surface. No adequate estimate of the damage to the wool could be made without an examination of each fleece. The loss to the Produce Company can well be several hundred dollars.

The interesting feature of the situation was the fact that the clothes moths, apparently overcrowded in their original breeding place, had begun to migrate outward to establish themselves in less crowded situations. The moths had flown in large numbers to dwelling houses from 150 to 300 feet from the warehouse. At the same time, of course, they had become a serious menace to the households within the range of their dispersal.

## Note on Anopheles of the Nyssorhynchus Group (Diptera: Culicidae).

By Charles H. T. Townsend, Boa Vista (Rio Tapajós) Pará, Brasil.

While conducting a mosquito survey of Fordlandia, on the Rio Tapajós, it became necessary to distinguish the species of *Anopheles* in collected adult females. The key given by Dyar on page 427 of Mosquitoes of the Americas proved unsatisfactory when applied to hundreds of females of the six species of the Nyssorhynchus group abundant in individuals in and around the main settlement of Bôa Vista. The following key was then devised and found to work quite satisfactorily in nearly every case for separation of females in absence of the males.

1. Fifth hind tarsal with black ring at base..... 2
   Fifth hind tarsal lacking black ring..... 4
2. Fourth fore tarsal lacking white ring at tip, second hind tarsal at most scarcely over 1/3 and usually not over 1/4 black.....*gorgasi* D. & K.
   Fourth fore tarsal tipped with white ring, second hind tarsal at least well over 1/3 black.....3
3. Two largest costal black spots well separated, *albimanus* Wd.
   Two largest costal black spots subconfluent, *bachmanni* Petr.
4. Fourth fore tarsal tipped with white ring, second hind tarsal at least well over 1/3 black.....*albitarsis* La.
   Fourth fore tarsal lacking white ring at tip.....5

5. Second hind tarsal much less than 1/2 black, two largest costal black spots well separated.....*argyritarsis* R. D.
Second hind tarsal at least nearly 1/2 black, two largest costal black spots separated to subconfluent..*darlingi* Root

The employment in the above key of the character of the presence or absence of a terminal white ring on the fourth fore tarsal joint led at once to the discovery that *tarsimaculatus* Goeldi is a synonym of *albimanus* Wd. The *tarsimaculatus* of Howard, Dyar & Knab and subsequent authors is a distinct species without white ring on the fourth fore tarsal and the name *gorgasi* D. & K. is available for it.

Goeldi's var. *albipes*, for which he proposed the name *tarsimaculata*, thus equals *albimanus* Wd. His var. *albitarsis* equals *albitarsis* La. Dr. G. Hagmann, of Santarem, who did the work on Os Mosquitos no Pará under Goeldi's direction, confirms my findings in the premises.

## Agonoderus pallipes Lec. (Coleop.: Carabidae).

By H. C. Fall, Tyngsboro, Massachusetts.

In a review of Robert A. Staig's book on the Fabrician Types of Coleoptera in the Hunterian Collection at Glasgow University (Ent. News, Nov. 1931), the writer called attention to an obvious ambiguity or uncertainty as to the identity of *Agonoderus pallipes*. According to Staig this species is represented by two specimens in the Hunterian Collection under the label "*Carabus pallipes* Fabr. MSS," the label as usual not being attached to the pin of either specimen, but gummed or pinned to the bottom of the box. The author says further—"The smaller specimen has one elytron wanting, the larger is without antennae. They correspond with Olivier's figure, but the larger one answers most nearly the description given by Fabricius and Olivier." He accordingly selects the larger specimen as the type and describes it as such. He then gives a separate description of the smaller specimen, but if I remember rightly ventures no opinion as to the significance of the differences that appear in the two descriptions.

The important differences are as follows. In the larger specimen (selected as the type) there are two supra-orbital

setae, the thorax is said to be orbicular with the sides very strongly rounded and with two marginal setae, the elytra are strongly striate punctate and the short scutellar stria is between the suture and the first long stria. In the smaller specimen there is only one supra-orbital seta, the thorax is roughly squarish with rounded hind angles, the sides less strongly rounded and with a single marginal seta, and on inquiry I learn from Mr. Staig that the elytral striae are impunctate and the scutellar stria lies between the first and second long striae.

It is obvious from the above and other considerations that the smaller specimen is truly an *Agonoderus,* but that the larger one is widely separated generically therefrom because of the two supra-orbital setae, while the two lateral pronotal setae, the punctate elytral striae and the position of the scutellar stria would be quite anomalous in *Agonoderus.*

In casting about for something answering to Staig's description of the larger Fabrician specimen I hit upon *Platynus limbatus* Say as a likely candidate. I accordingly sent Mr. Staig examples of this species together with *Agonoderus pallipes* and *A. comma* as they have been interpreted by American students. As a further test for *P. limbatus* I called attention to the presence of a mentum tooth and the tripunctate third elytral interspace in this species; points not mentioned in the Staig description.

After making careful comparisons Mr. Staig replied that in these latter respects as well as in all other essentials the larger Fabrician type agrees with the examples of *P. limbatus* sent and he has no doubt of their specific identity. He further concludes that the smaller Fabrician specimen is with reasonable certainty the same as *Agonoderus comma* as we understand it.

If, as I suppose, the pronouncement of Staig constitutes type fixation, then our familiar *Platynus limbatus* Say becomes *Platynus pallipes* Fab. It would now be of much interest to compare the smaller *A. pallipes* of the Hunter Collection with the actual Fabrician type of *A. comma* as a test of the accuracy of our interpretation of the latter. Just where the type of *comma* is located is unknown to me, but I have urged Mr. Staig, as being more nearly on the ground, to have this comparison made if possible. As yet I have no word from him on the matter.

Having determined that the *Agonoderus pallipes* of Fabricius is really Say's *Platynus* (*Agonum*) *limbatus*, it becomes necessary to decide what name must now be used for our hitherto supposed *pallipes*.

In 1848 LeConte described his *Agonoderus dorsalis* as distinct from *pallipes* as understood by him, his belief at that time being that *comma* Fab. was not different from *lineola* of the same author. Chaudoir, in May, 1868, (Rev. & Mag. de Zool., p. 164), declared that LeConte's *pallipes* was not the *pallipes* of Dejean (which he assumed to be that of Fabricius) and that the latter was the same as LeConte's *dorsalis*. For this reason he proposed the name *leconteí* for the *pallipes* of LeConte. In Dec., 1868 (Proc. Phila. Acad.) LeConte, reviewing our species of *Agonoderus*, separates *comma* and *pallipes* as follows:

Hind angles of thorax rounded, scutellar stria long...*comma*.
Hind angles of thorax scarcely rounded, scutellar stria short, *pallipes*.

He suppresses his own *dorsalis* as a synonym of *comma* and writes *leconteí* Chaud. as a synonym of *pallipes* Fab., thus adhering to his previous interpretation of *pallipes*. From the above considerations it seems obvious that we must now substitute Chaudoir's name *leconteí* for the species we have called *pallipes* Fab. It should be stated that the name label *"dorsalis"* is at present attached to a Southern states specimen of *leconteí* (*pallipes* sens Lec.) in the LeConte collection. LeConte's description and remarks however better fit the more northern *comma*, and it would seem certain that the name label has either been misplaced or was carelessly attached to the present specimen by LeConte himself.

## Correction (Hymen.: Sphecidae).

In my recent article "Disturbances in the domestic tranquility of *Chalybion caeruleum* (Hymen.: Sphecidae)" Ent. News, Vol. XLIV: 51, 1933, I confused the maker of the nest under observation. *Sceliphron caementarium* was apparently the builder, not *Chalybion caeruleum* as stated. Phil Rau, Ann. Ent. Soc. Amer., Vol. XXI, No. 1:25, 1928, points out that *Chalybion caeruleum* does not build its own nest, but opens the nest of *Sceliphron caementarium* and substitutes its own prey and egg.—S. W. Frost, Arendtsville, Penna.

## Several Species of Oak Aphids from Massachusetts (Homop.: Aphiidae).

By Forrest W. Miller, Department of Zoology, University of Pittsburgh.

Tuberculatus punctatella (Fitch)

*Aphis punctatella* Fitch, Trans. N. Y. St. Agr. Soc. 14, p. 869. 1855.

*Color:*—Apterous vivipara.—Entire body light yellow in color. Cauda, anal plate, antenna and legs concolorous with body. Alate vivipara.—Same color as aptera except tips of antennal segments III, IV, V and base of VI and the tarsi are dark brown. Veins of primary wings bordered with light fuscus; veins of secondary wings dark only at tips. Nymphs.—Same as the alate forms.

*Measurements:*—Alate vivipara.—Body 1.84-2.00 mm.; width through eyes .41 mm.; hind tibia .85-.97 mm.; hind tarsus .11-.13 mm.; antennal segment III-.57-.59 mm.; IV-.39-41 mm.; V-.36-.42 mm.; VI-.16 plus .76-.79 mm.; cornicles .046 mm.; cauda .09-.10 mm. Apterous female.—Body 1.23-1.41 mm.; hind tibia .43-.51 mm.; hind tarsus .09-.12 mm.; antennal segments III-.20-.24 mm.; IV-.18-.20 mm.; V-.19-.22 mm; VI-.11-.13 plus .23-.27 mm.; cornicle .03 mm.; cauda .09-.10 mm. Rostrum extending just beyond prothoracic legs.

*Structural details:*—Secondary sensoria round, flat numbering 4-6 on III, none on other segments of alate viviparae; absent in the apterous viviparae. Hairs blunt or slightly capitate .10-.12 mm. long on the body and .02-.04 mm. long on the legs and antennae of the apterous forms; much shorter and not modified at the tip in the alate forms. Cornicles smooth, concave at the center. Cauda short, slightly knobbed at the center and the anal plate indented in the apterous forms. In the alate, cauda knobbed, hairy; anal plate divided and hairy. In the alatae there are six pairs of tubercles on the dorsal part of the abdomen; the first are united at base, 1-3 have a single sensory hair on the apex, 4-6 smaller and with two hairs on apex. Two additional pairs of tubercles are located just anterior to the cornicles about half way between the cornicle and the median dorsal row of tubercles. Both have sensory hairs on apex. There are no lateral tubercles. Mediae of fore wing with 2nd fork .5 distance from the 1st fork to margin of wing.

Collection:—On *Quercus macrocarpa*, August 22, 1932, at Woods Hole, Massachusetts. Scattered over most of the under surface of the leaf, seldom found in groups. Quite common

in this region. For further description of the alate female see Baker (1917).[1]

NEOSYMYDOBIUS ALBASIPHUS (Davis)

*Symydobius albasiphus* Davis, Canadian Ent. 46:7, p. 226. 1914.

This species of aphid was collected upon *Quercus palustris* and *Q. Macrocarpa* in the region of Woods Hole, Massachusetts on July 23, 1932. Most of the trees were heavily infested; feeding taking place mostly upon the young stems and the petiole. All forms of this species have been described by Davis. The form collected in Massachusetts agrees in all cases with these accounts with the exception of segments V and VI of the antenna and the number of sensoria on III.

Lengths of antennal segments as given by Davis are as follows:

Alate female.—V-.182-.20 mm.; VI-.122 plus .078-.096 mm.

Number of sensoria on III, 7-8.

Comparative lengths of form collected in Massachusetts:

Alate female.—V-.158-.161 mm.; VI-.105-.115 mm., plus .065-.069 mm.

Number of sensoria on III, 8-10.

MYZOCALLIS ALNI (DeGeer)

*Aphis alni* DeGeer, Memoirs pour servir a l'histoire des Insectes, Tome 3, p. 74. 1773.

This species was first reported from the United States by Davis (1910) as occurring in Illinois, on the under sides of Alnus leaves. Granovsky (1928) describes all the various forms of the species and states that it is to be found only in Illinois, Oregon and British Columbia. Several specimens were collected upon *Quercus macrocarpa* at Woods Hole, Massachusetts, on August 20, 1932.

MYZOCALLIS DISCOLOR (Monell).

*Callipterous discolor* Monell, Bull. Geol. and Geog. Surv. U. S. v:1, p. 30, 1879.

This aphid, with smoky wings, occurs rather commonly in the region of Woods Hole, Massachusetts where it was collected

[1] Baker, A. C., Eastern Aphids. New or little known. Part II. Jour. Econ. Ent., 10:4, fig. 21.

upon oak, *Quercus macrocarpa,* from July 16, to September 1, 1932. The terminal filament of the sixth antennal segment of the forms collected is slightly longer (.27-.30 mm.) than given for the species by Knowlton (1929).[1] Also the number of sensoria on the third antennal segment is from 9-11 rather than from 2-6 as figured by Knowlton. This larger number of sensoria agrees well with Davidson (1920)[2] who says that discolor has eight sensoria along the entire length of the segment.

MYZOCALLIS BELLA (Walsh).
*Aphis bella* Walsh, Proc. Ent. Soc. Phila., p. 299, Dec. 1862.

Collections of this aphid were made upon *Quercus macrocarpa* and *Q. ilicifolia.* Feeding on both hosts takes place on the under side of the leaf along the veins.

MYZOCALLIS PUNCTATA (Monell).
*Callipterus punctata* Monell, U. S. Bull. Geol. and Geog. Surv. Terr. 5:1, page 30, 1879.

This species was collected on various species of *Quercus* from June 28 to September 1, 1932, in the region of Woods Hole, Massachusetts.

## Request for Bibliographies.

We note in *The Entomologist's Record* of February, 1933, that Dr. Walther Horn has a "Request addressed to all entomologists of the world to help the Deutsche Entomologische Institut build up a bibliographical card index for international reference." The card index is to contain all titles which have been published in all branches of entomology in the world since 1864.

1. All entomologists are requested to publish or to compile lists of all their own entomological publications and to present or to lend one copy of such lists to the Deutsche Entomologische Institut, Berlin-Dahlem, Germany.

2. The attention of all younger entomologists is drawn to the fact that it would be very useful to number their entomological publications consecutively.

[1] Knowlton, G. F. 1929. Aphid notes from Utah. Pan-Pacific Entomologist 6:1, p. 39, fig. 5.
[2] Davidson, W. M. 1920. A new *Myzocallis* (Aphididae) Canad. Entomologist 52:6, pp. 176-177.

# Entomological Literature

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

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

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The appearance of three numbers of Ward's Entomological Bulletin impels attention to this new publication of Ward's Natural Science Establishment, Inc., of Rochester, New York. The purpose of this monthly bulletin, as the publisher says, "is to inform entomologists regarding the services which Ward's Department of Entomology is prepared to offer. No matter what your interest, whether that of the teacher, the economic

worker, or the amateur collector, we believe you will want to know more about Ward's division of Entomology." The Bulletins are interesting to read and are full of information relative to the recent advances made in entomological collecting and preparation equipment, technic and the like. We hope the Bulletin will continue and increase in size, and that all "next issues" will be eagerly awaited by all entomologists. The Ward's Natural Sciences Establishment, Inc., P. O. Box 24, Beechwood Sta., Rochester, N. Y., will be glad to receive names and addresses of those desiring this publication.

Another publication, now in its eleventh volume, published monthly by The General Biological Supply House, Chicago, entitled "Turtox News" is of a similar nature, but covers the natural sciences in general, serving the same purpose to experimental student in biology. May it also have a prosperous existence. E. T. Cresson, Jr.

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What Butterfly is That? A guide to the Butterflies of Australia by G. A. Waterhouse, D.Sc., etc. Illustrations by Neville W. Cayley, F.R.Z.S. Angus & Robertson, Ltd., Sidney, Australia. 1932. 291 pp., 34 plates. In 1914 Dr. Waterhouse, with Mr. G. Lyell, issued through the same publishers a scientific treatise on the Butterflies of Australia. This rather expensive book was illustrated with photographic reproductions and a few color plates of the butterflies then known to inhabit Australia. The present volume is illustrated with 25 most excellent colored plates of the butterflies, by Mr. Cayley, and 9 plates showing life histories. While the title of the book and its comparatively low cost will make it a popular reference volume, it is nevertheless, a valuable scientific contribution to the literature. There are included all the butterflies that have been added to the Australian fauna since the original work, and with the excellent descriptions and accurate figures, will enable students and collectors to name their insects and also learn many interesting facts about their life histories and habits contained in its pages.

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# EXCHANGES

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

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

**Wanted for Cash or Exchange**—Entomological News, Vol. XXXIII, Nos. 9 and 10; Vol. XXXIV complete; Vol. XXXV, Nos. 1, 2, 3, 4, 5, 6, 7, 9. Have for exchange Canadian Entomologist, Vols. 56, 57 and 58. Robt. W. Glenn, 509 Orchard Avenue, Avalon, Pittsburgh, Pa.

**Wanted**—The first thirteen volumes of Entomological News, 1890 to 1902 inclusive. Preferably in original monthly parts, unbound. Write John M. Geddes, 331 High St., Williamsport, Pa.

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Vol. XLIV No. 5

SMITHSONIAN INSTITUTION
MAY 5 1933
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CHARLES WILLISON JOHNSON
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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows:

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| United States and possessions, Central and South America | $3.00 |
| Canada | 3.15 |
| Foreign | 3.25 |

Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance.
One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 7.00
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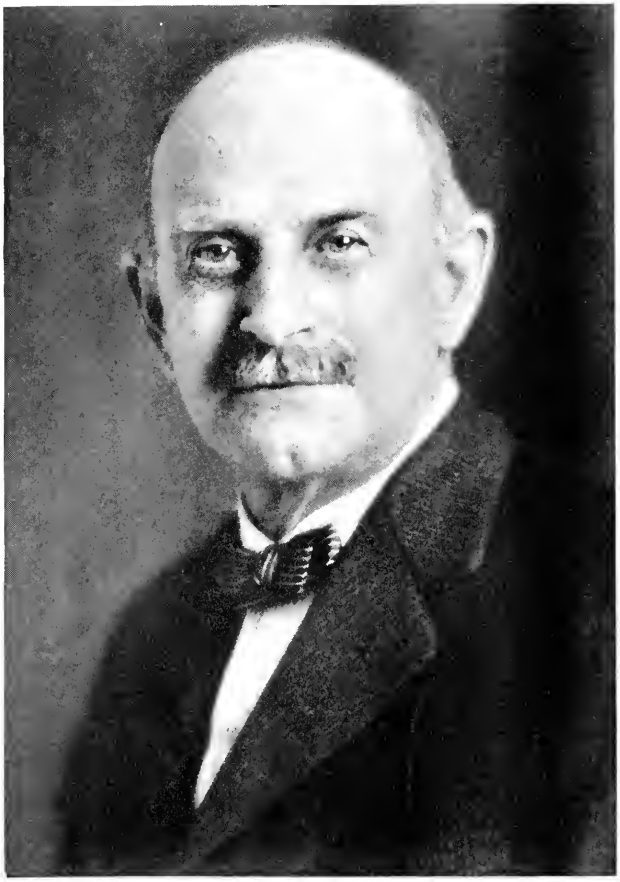

*CHARLES W. JOHNSON*

ENT. NEWS. VOL. XLIV. PL. IV.

*Courtesy of the Boston Society of Natural History*

# ENTOMOLOGICAL NEWS

VOL. XLIV. MAY, 1933 No. 5

## Charles Willison Johnson, 1863–1932.

By CHARLES T. BRUES.

(Portrait, Plate IV.)

By the death of Charles Willison Johnson on July 19, 1932, entomology suffered the loss of one of its most accomplished devotees. His death, after a brief illness, at the age of not quite seventy years, came as a wholly unexpected blow to his many friends and associates. Many students who know him through correspondence and the whole entomological world familiar with his extensive writings will mourn his loss for many years to come. Native to and reared as a boy in New Jersey, he moved to St. Augustine, Florida, at the age of eighteen. Here he spent eight years of his early life and first became seriously interested in insects and molluscs. He then removed to Philadelphia where he served as curator of the Wagner Free Institute of Science for fifteen years (1888-1903) and later to the Boston Society of Natural History where he also filled the post of curator. At the time of his death he had completed thirty years (1903-1932) of active and highly productive work at that institution.

He was an active member of several entomological and conchological societies and has served as president of the Entomological Society of America and the Cambridge Entomological Club. Since 1917 he was a fellow of the American Academy of Arts and Sciences.

Practically all of Johnson's entomological publications are primarily taxonomic, and deal with Diptera. He possessed a wonderfully wide acquaintance with the North American members of this order, involving a critical knowledge of the majority of the numerous families. Combined with his indefatigable energy and great perseverance as a collector, this led him to prepare several faunal lists as "The Diptera of Jamaica" (1894 and 1919), "Diptera of Florida" (1895 and 1913), "Diptera of New Jersey" (1900 and 1910) and finally a marvelously complete book of 326 pages on the Diptera of New England



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(1925). An elaborate account of the Insect Fauna of the Mount Desert Region appeared just two years later. All of these are based in great part on material originally obtained by himself. A complete list of Johnson's entomological publications, recently published in *Psyche* (December, 1932) by Dr. A. L. Melander, includes about 180 titles. This does not include a considerable number of papers on Mollusca published over the course of many years, culminating in a large manuscript on New England, practically completed at the time of his death and now being prepared for early publication by W. J. Clench. He also served as associate editor and manager of the *Nautilus*, a malacological magazine, from 1890 till his death, a period of forty-two years.

During the full three decades spent at the Boston Society of Natural History, Johnson devoted an immense amount of time to building up the New England Collection of insects now preserved in that institution. During each summer season he made frequent short collecting trips to particularly favorable points or to localities not previously visited throughout this area. The material obtained on these excursions was gradually identified and incorporated into the collection which thus grew to be very complete and highly comprehensive from the standpoint of geographic distribution. Other collectors, fired by his enthusiasm, contributed much additional material, so that the collection enjoyed a rapid increase in size and value. A census made in 1930 showed more than 10,000 species and over 60,000 specimens from New England, the collection having grown from about 3,000 species and 8,000 specimens as a result of Johnson's unremitting efforts. Naturally the Diptera received a full share of attention, but no group was neglected as the aid of many specialists in other groups was eagerly sought, and usually secured, for his interest and pride in the collection were highly contagious. He enjoyed a wide familiarity with the entire insect fauna of New England and in conversation was able to pour out, without the slightest hesitation, information of the most surprisingly detailed nature relating to the most diverse groups.

As the result of his life-long special interest in North American Diptera, Johnson amassed a very large and complete col-

lection of specimens in this order. This received continuous and painstaking attention, almost entirely during the evening hours, as he kept it at his home until recently, when it was transferred to the Museum of Comparative Zoology at Harvard, where it now remains. Anyone who consults this collection cannot fail to sense the meticulous, almost loving care which was bestowed upon it during the course of many years.

Johnson was a very regular attendant at the monthly meetings of the Cambridge Entomological Club and furthered its interests in many ways. He served as its president during 1908 and 1915, for many years as a member of the editorial board of *Psyche* and was always ready to serve on committees. His willingness in the latter respect led the Club to avail themselves of his advice and counsel at very frequent intervals. When he was present, interest in the Club meetings never lagged, as he was always ready with a small box of flies about which an interesting discourse could be woven. On such occasions his marvelous memory and ever vigorous youthful enthusiasm were displayed to best advantage. He very rarely presented prepared papers at such meetings and relied but little on notes to guide his remarks. He nearly always joined in the discussion of subjects presented by other members or would ask questions that showed his deep interest in all aspects of entomology however foreign to his own special field.

As a fellow of the American Academy of Arts and Sciences he was also nearly always to be seen at the meetings. Some of my most vivid and pleasant impressions of him as a fellow-entomologist and personal friend were acquired at one of the little refreshment tables in the library of the Academy. Here he often joined a group of biologists after the formal session to discuss various topics. He could not forget entomology for long, however, and it was a rare occasion indeed that failed to include some reference to flies or other insects. Had it not been for such opportunities to meet with him, one might have regarded him as of rather unsociable temperament. This was by no means true, however, and was due in great measure to his desire to devote all his spare time to entomological study. Johnson was an ardent prohibitionist and the only occasion in which I have known his ever-present good humor to fail him resulted from a mention of opposing views on this question.

Ordinarily he was so engrossed in his own work that he was bothered little by the troubles of the world in general and disregarded them whenever possible.

One of Johnson's greatest contributions to entomology is not very widely known. In his position as curator, first at the Wagner Institute and later at the Museum of the Boston Society of Natural History, he came into contact with many amateurs and young people interested in entomology. The keen interest which he displayed in budding naturalists, encouraged many young men to enter this field with serious interests.*

Johnson was married at the age of thirty-four, while living in Philadelphia, to Miss Carrie W. Ford, daughter of the conchologist, John Ford. They had no children. The death of his wife in 1931 was a severe blow, from which he never recovered and was coincident with the first striking change in his demeanor which I had noticed during over twenty years' association with him.

The passing of Johnson leaves a gap in the already greatly depleted ranks of naturalists in America and one which may not be filled for many years to come.

## Observations concerning Hyloicus eremitodes Stkr. in the Vicinity of Scott City, Kansas (Lepid.: Sphingidae).

By VIRGIL F. CALKINS, Scott City, Kansas.

For the past three or four years, occasional specimens of this rare Sphingid species have been taken by me in more or less faded and worn condition. Having had numerous requests for this moth from this locality which may be regarded as in the heart of its classic range, I tried each year without success to locate the food-plant of the species and to learn something of its early stages.

During the spring of 1932 Mr. John M. Geddes, of Williamsport, Penna., with whom I was in correspondence, informed me that Prof. Snow had stated in some of his writings that the larvae of *H. eremitoides* fed on wild sage (*Salvia*). This plant occurs quite abundantly in many parts of the state of Kansas and is regarded as a weed. A search of my immediate neigh-

[* In Philadelphia, H. L. Viereck, C. T. Greene and J. A. G. Rehn, as the last has told in the NEWS for June, 1932, page 141.—EDITOR.]

borhood failed to locate any plant belonging to the genus *Salvia;* however, inasmuch as I usually took a few *H. eremitoides* specimens each year, I knew their food-plant must be somewhere near at hand.

Some days after when on an excursion into the countryside, I found a large patch of *Salvia,* presumably the species *S. lanceolata.* An examination of the plants failed to reveal any Sphingid larvae, however. Wishing to have some of the plants growing near at hand for observation, I dug up several of them and transplanted them into my garden. I felt sure the plants on my premises would be singled out by any moths occurring in the vicinity and I would eventually obtain a few eggs. Daily inspection of them failed to reveal anything and I gave the idea up as hopeless.

About a month afterward, arising very early one morning, I went into the garden and glancing at the sage plants, I was rewarded by noticing a few small greenish-purple caterpillars which undoubtedly were Sphinx-moth larvae. I immediately dug up one of the plants, put the caterpillars with it and removed it to my study where I was sure they could not get away and I could observe them at my leisure.

Business took me away from home that evening, and the next morning when I thought about looking at the caterpillars, they were gone to my surprise. After searching for them, I finally found them in the corners on the floor they having apparently become dissatisfied with their changed quarters and crawled away. From then on, they refused to remain on the bucketed plant and as I wished to observe them to the final stages, I removed them to their accustomed place in the open, putting a fine screen wire cage over them and the plants. Here they were reasonably satisfied and took to eating.

The next morning when I went to look at them they had completely vanished and I was very disappointed in having to face the possibility of losing my prizes without an opportunity to observe their habits. I surmised that the things had become dissatisfied again with their surroundings and had fled. The wire cage was only placed loosely over the plants and they could have crawled under the edge with very little effort.

An evening or two later when out collecting moths, I was dumfounded to find my caterpillars in the top of the sage

plants eating away, but by this time, grown much larger in size. I knew positively that they had not been on the plants that day; I was beginning to suspect something—that these peculiar caterpillars had a hide-away some place during the day, coming out at night to do their feeding. Subsequent observations revealed that the large caterpillars burrowed down into the ground, coming out at dusk and climbing the food-plant for a night of eating. At the approach of day-light they again resorted to their underground abode. Later on, I found that only caterpillars half-grown, or larger, had this very unusual characteristic of going underground, the smaller ones remaining on the under side of the leaf of the food-plant where they were almost entirely inconspicuous. My caterpillars at this time were attaining full growth, for they were three or more inches long. Two days after, they failed to appear above the surface of the ground and I knew they were undergoing a change preparatory to the pupal state. Eighteen days later, I was rewarded with two fine *Hyloicus eremitoides* moths which I found resting on the top of the screened-in wire cage. The few remaining moths came forth within two or three days following. I had reared the larvae to maturity and found the species to be *eremitoides*.

Meanwhile, I had been searching my plants daily for eggs and I had also located a fine patch of the sage plants growing close to home. I was successful in finding a number of the eggs which I reared to maturity thus observing the complete life-history of the moth.

An interesting thing concerning the caterpillar of *Hyloicus eremitoides* is that it may be either pale green, green flecked with purple, or almost entirely a dark purplish-green, caterpillars of this color being very beautiful and the most common. In this respect, the larvae apparently exist in different colors and maculations the same as *Pholus satellitia* and *Celerio lineata*, the color having nothing to do with the adult moth. Prof. Snow was said to have described the caterpillar as being pale green with seven white stripes. It may be the larvae that he had under observance were all green, the color being dependent somewhat on different localities, or environment.

The following data may be of interest to the entomologist wishing to know more about *Hyloicus eremitoides* Stkr.

*Egg*: Pale green, semi-globular, smooth, slightly depressed on top. Laid preferably on the underside of the leaf of a species of *Salvia,* presumably *lanccolata.* Incubation, about 10 days.

*Larvae*: When first hatched, the caterpillar measures 4 mm. in length, the color being pale yellowish-green with a very prominent black caudal horn half as long as the newly hatched caterpillar itself. It moults at the end of 3, 5, 7 days and goes into the ground 10 days later. Full grown larvae measure 3 or 3½ inches being some shade of green variously flecked with minute purple specks of varying intensity, some being entirely pale green; crossed diagonally by seven white stripes which are flanked by purple, some having a distinctly purple patch around the head; 8 purple dots along the side at the base of each white stripe. Legs, pro-legs and anal prolegs, or claspers, deep purple. Horn, purple, or purplish-black. The head is very peculiar, having a pronounced protuberance almost suggestive of another horn in front, but rather blunt. Immediately in front, and behind, this pointed protuberance is a concentrated splotch of purple margined on each side by a white longitudinal stripe coming together at the top of the protuberance, or top-knot.

The larvae when half grown have the peculiar habit of burrowing into the ground during the day, coming out at night to feed. Young larvae remain on the plant, concealed lengthwise on the under surface of a leaf. Period of inactivity is about 18 days, or less, or in the case of the second brood, over winter.

*Pupa*: Brown, 1¾ inches in length, with a free tongue case about ⅜ of an inch long. Very similar to the pupa of *Hyloicus eremitus* Hbn.

The moth is aptly named the Hermit-like Sphinx being very hermit-like in its existence. When found in the open, it is usually resting on the sides of buildings about a foot from the ground, or on fence posts close to the ground surface. It is seldom met with on flowers. The insect may be classed as double brooded, although the broods overlap. The first appears in May and June, the second in August, continuing into the month of September. I have also taken specimens in July.

My observations of the larval stages of *H. eremitoides* were not as extensive, or complete, as I had wished for; hence, my description is only general in character. I hope to write a more detailed description of the larval stages of *eremitoides* next year, when I have had an opportunity to observe them more closely.

## Notes on Two So-called Species of Eurema (Lepid. Asciidae).

By J. R. Haskin, Auburndale, Florida.

These notes are offered as evidence that *Eurema demoditas* Hubner, (commonly known as *E. delia*, Cramer), and *E. jucunda* B. & LeC. are conspecific, representing seasonal but over-lapping forms. One color variety is described as a new spring form. Another inter-connecting fall form corresponds to the description of form *cepio*, G. & S.

Eurema demoditas Hübner, 1818.

*delia*, Cramer, 1780 (nec D. & S. 1776).
*daria* Godart, 1819.
*form jucunda* B. & LeC., 1830.
*form cepio* G. & S., 1889.
*form delioides*, new, Haskin, 1932.

At Auburndale, Florida, *demoditas* flies during the fall and winter while *jucunda* flourishes during the summer. There is a marked difference on the upper side of these, particularly as to the females. The *demoditas* is clear lemon yellow, and the female has no bar across the primary. The *jucunda* is a paler yellow, some of the females even showing a touch of albinism. Both sexes have the bar across primary the female however not being as strongly marked as the male. Also, both sexes have the secondary bordered with black.

Suspecting that these might be conspecific, I obtained eggs from a typical female of *demoditas*, which was caught ovipositing upon Joint Vetch, *Aeschymomene viscidula*, September 29th. The eggs hatched in from three to four days, and within twenty-four days after hatching the pupae were formed. One female emerged seven days later; two males took nine and ten days respectively the last emerging November 6th.

On September 24th I caught a typical female of *jucunda* which was depositing eggs on *Stylosanthus biflora*. The eggs hatched in three days. The larvae were fed on *Stylosanthus* for eight days but on account of its scarcity were subsequently fed on Joint Vetch. In twenty-three days from date of hatching the pupae were formed. Nine days later, October 29th, a male and a female emerged.

The progeny of the *demoditas* mother and the *jucunda* mother were practically identical. None resembled *jucunda*. On the upper side they resembled *demoditas*, but the under side of the hind wings had only a trace of the red powdering typical of *demoditas* the coloration in general being yellowish with a few brown and red scales. This form, for which the name *cepio* G. & S. is available, I have found during the fall months from September to November. It varies more or less as to the amount of brown and rufous powdering. The palest specimens approach the darkest of an intermediate spring form which I will now describe. One feature that remains constant in all the forms is the hairy coal black bar on the primary of the male, separated from the inner margin by a narrow yellow space distinctly tinged with orange.

EUREMA DEMODITAS, form **delioides**, new form.

Upper side identical in coloration and markings with typical *demoditas*. Under side with the hind wing white, or white flecked with gray, as in *jucunda*.

Type locality: Auburndale, FLORIDA. Number and sexes of types: *Holotype*, ♂ March 26, 1932. *Allotype*, ♀ March 28, 1932. *Paratypes*, 10, ♂ ♂, April, 1932. Types in U. S. National Museum; paratypes in U. S. National Museum and in my possession.

Note:—A total of 30 males and a single female were captured during the period of March into May, some individuals with the under side of the hind wing pale yellowish or tinted with buff, thus paralleling the fall *cepio*.

Although the four forms which I have outlined overlap as to seasons I believe it wise to differentiate them in order to emphasize an unusual and well marked change for each of the four seasons.

An entire set of the specimens discussed in this paper has been presented to the U. S. National Museum.

I have to thank Mr. Foster H. Benjamin who very kindly worked out the synonomy of this group for me and helped to condense my notes for publication.

## Records of Tachinidae from Illinois with Description of One New Species (Diptera).

By J. A. Rowe, University of Utah.

The following paper is a list of *Tachinidae* represented in the Illinois State Natural History Survey Collection. It was prepared to give the distributional records of the members of this family and any other information regarding the species taken at the time of collection. Forty-three genera and seventy species are listed and one member of the genus *Belvosia* described as new.

All localities cited are in the state of Illinois, except where some other state or province is specified.

I wish to thank Mr. H. H. Ross of the Illinois State Natural History Survey for the privilege of working on this material.

Cistogaster immaculata Macq. Urbana, Sept. 20, 1923, sweeping; Vandalia, June 13, 1909, clover.

Gymnosoma fuliginosa Desv. Ware, Sept. 20, 1931 (Mohr); Urbana, April 4, 1931 (H. H. Ross).

Phorantha calyptrata Coq. Urbana, Sept. 26, 1931 (H. H. Ross); Meredosia, May 29, 1917.

P. occidentis Walk. Dubois, Aug. 9, 1917.

Trichopoda formosa Wied. Oakwood, June 2, 1927 (F. H. Frison); Jordan, Ont., Sept. 10, 1915 (H. Curran).

Cryptomeigenia theutis Walk. Gimlii July 15, 1909.

Paradmontia brevis ? Coq. Urbana, June 20, 1915.

Plectops melissopodis Coq. Dubois, May 23, 1917.

Clatoria spinosa ? Coq. Dubois, July 5, 1909.

Hypostena aenea Coq. Urbana, Sept. 26, 1931 (H. H. Ross).

H. barbata Coq. Dubois, May 10, 1917.

Didyma exigua V. D. W. Urbana, June 10, 1920, parasite of Pipausta ainslei, in corn and smart-weed (C. S. Spooner).

Polidea areos Walk. Urbana, Apr. 27, 1931 (A. R. Park).

Racodineura americana Coq. Dubois, Aug. 8, 1917.

Leucostoma senilis Tns. Bondville, Oct. 1, 1909.

L. sp ? Dubois, Aug. 9, 1917.

Eutrixa masuria Walk. Savanna, July 9, 1917.

Siphona geniculata DeGr. Urbana, Apr. 22, 1917, in cottonwood. White Heath, Apr. 22, 1917.

Plagia americana V. D. W. Urbana, June 27, 1931 (A. R. Park); Bushnell, clover, June 18, 1909.

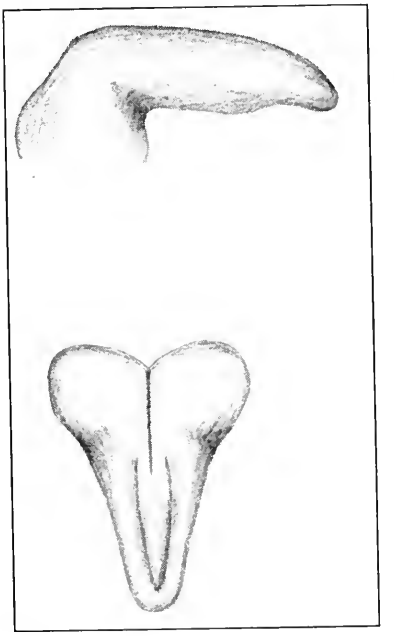
Biomyia aurigera Coq. Cypress Sept. 2, 1931 (Mohr).

B. GEORGIAE B-B. Dubois, Aug. 10, 1917; White Heath, May 22, 1915; Carbondale, May 27, 1910; Elgin, rye grass and clover, June 25, 1909.

ATACTA APICALIS Coq. Paris, on Protoparce, 1904 (A. A. Garault); Havana, roadside, Sept. 8, 1910.

**Belvosia pollinosa** n. sp.

Male. Length 15 mm. Front at the vertex slightly longer than the combined length of the second and third antennal joints. Frontals arranged in three indistinct rows. Antennae black. Cheeks thinly pollinose the brown background color showing through in spots. Facial depression and parafrontals white pollinose throughout. Palpi brown, lighter at the tips.



Belvosia pollinosa.

Thorax shining black except in front where it is thinly white pollinose. Sternopleurals eight. Dorso-centrals five. Scutellum black, thinly golden pollinose on the posterior ventral margin, bearing thirteen marginals and numerous submarginals.

First and second abdominal segments shining black. Third and fourth golden pollinose throughout except on the apical

fourth. First abdominal segment with five marginals, second with seven, third and fourth with marginal rows.

Legs black. Coxae with tufts of very large spiny bristles projecting backward. Pulvilli as long as the last tarsal joint. Wings and both calypters brown.

Forceps of the genitalia black, hairy except on the extreme tip, shaped as in figure.

Described from a single male collected at Alto Pass, ILLINOIS, June 5-6, 1919.

*Holotype* in the collection of the university of Utah.

This species comes out in the key with *B. splendens* Curran, but differs in having the para-frontals pollinose throughout.

LINNAEMYIA COMTA Fall. Urbana, new clover, May 21, 1909.
GYMNOCHAETA ALCEDO Loew. Urbana, June 1, 1929 (Mohr); Vancouver, B. C., Mar. 13, 1912 (H. H. Ross).
EXORISTA DORSALIS Coq. Oregon, June 19, 1917.
E. EUDRYADIS Tns. Chicago, May 30, 1909 (Davis).
E. ORDINARIA V. D. W. Alto Pass, May 7, 1917.
EUPHOROCERA CLARIPENNIS Macq. Vandalia, Sept. 16, 1931 (Mohr).
PHOROCERA LEUCANIAE Coq. Urbana, in woods, April 22, 1926 (T. H. Frison); Carbondale, reared from cocoon, April 16, 1928 (T. H. F.); Muncie, May 3, 1920; Horner, Apr. 26, 1909.
P. RUFILABRUM V. D. W. Oregon, June 19, 1917; Lilly, at Mackinaw River, June 11, 1914; Peoria, on maple, July 23, 1898 (McElfresh); Angerville, June 6, 1915.
P. SAUNDERSII Will. Dubois, May 22, 1917.
FRONTINA ALETIAE Riley. Champaign, Aug. 14, 1915 (Frison).
F. ARCHIPPIVORA Will. Champaign, July 24, 1885.
F. FRENCHII Will. Urbana, June 9, 1903 (Titus); Centralia, June 16, 1909 (Girault); Metropolis, Sept. 19, 1931 (Mohr).
STURMIA DISTINCTA Wied. Kernak, Sept. 2, 1924 (T. H. F.); Metropolis, Sept. 3, 1924 (T. H. F.); Brownsville, Texas, Nov. 26, 1910 (T. Garden); Hayworth, July 24, 1878.
S. FRAUDULENTA V. D. W. Algonquin, June 23, 1896; Aurora, Aug. 15, 1908 (Girault).
S. INQUINATA V. D. W. Oregon, June 19, 1917; Algonquin, June 20, 1896; Fox Lake, Aug. 2, 1924 (T. H. F.); Tonti, May 24, 1912 (Titus); Urbana, July 25, 1848.
S. NIGRITA Tns. Lafayette, Ind., July 19, 1915; River Forest, July 11, 1913; Algonquin (Nason).
S. OCCIDENTALIS Coq. Odin, May 28, 1910, in pit cage; and on flowers of wild parsnip; Plainview, May 3, 1915.

S. PHYCIODIS Coq. Muncie, June 8, 1927 (T. Faud A. G.).
S. STRIGATA V. D. W. Odin, May 31, 1910, parsnip.
ACEMYIA TIBIALIS Coq. White Heath, May 18, 1839, in woods (Morten).
PSEUDOCHAETA ARGENTIFRONS Coq. Carbondale, July 31, 1909 (Hart-Wood); Pulaski, Aug. 3, 1908 (Gerault).
P. PYRALIDIS Coq. Cambridge, June 20, 1931, parasitic on thistle butterfly.
TACHINOMYIA ROBUSTA Tns. Algonquin (Nason), Odin, 1910, on parsnip; St. Paul, Minn., May 30, 1924; Algonquin, June 4, 1914.
BLEPHARIPEZA ADUSTA Loew. Algonquin (Nason); Forreston, June 11, 1892 (Marten).
B. INERMIS Bigot. Algonquin, Ill., June 10, 1915; Clay City, Aug. 22, 1905.
WINTHEMIA MILITARIS Walsh. Pleasent Plains, June 26, 1931 (Mohr).
W. QUADRIPUSTULATA Fab. Algonquin, June 23, 1896; Urbana, July 13, 1931 (Mohr); Agassiz, B. C., taken from the caterpillar of the "white wooly bear" on hops, Aug. 19, 1927 (H. H. Ross); Champaign, July 8, 1909 (Sanborn); Savanna, July 10, 1917; White Heath, May 15, 1915; River Forest, July 11, 1913; Dubois, May 28, 1917; Plainview, May 3, 1915; Alto Pass, June 5, 1919; Centralia, June 9, 1909 (Girault); Vandalia, June 4, 1914, clover; Elgin, June 25, 1909, rye, grass, clover; Virginia, June 17, 1909, red clover; Aurora, June 26, 1909, red clover partly in bloom; Sparta, June 11, 1909, ragged clover field; Prinston, June 21, 1909, weedy clover; Bushnell, June 18, 1909, clover; Oakwood, July 2, 1931 (H. H. Ross); Bluffs, Aug. 19, 1917; Normal, July 7, 1884, boxelder.
PARADIDYMA SINGULARIS Tns. Urbana, June 7, 1916; Odin, May 11, 1910; Normal, Aug. 18, 1887.
HILARELLA POLITA Tns. Havana, Geason's sand-dunes, April 30, 1914; Meredosia, sand pit, Aug. 22, 1917; Urbana, May 18, 1889, pond grove.
BRACHYCOMA SARCOPHAGINA Tns. Urbana, July 3, 1908, clover.
GONIA BREVIPULVILLI Tot. Normal; Ames, Ia., Apr. 22, 1896, Exp. Sta, Vancouver, B. C., March 19, 1926 (H. H. Ross); Urbana, Apr. 1, 1880 (Marten); Teulon, July 20, 1915.
G. FRONTOSA Say. Urbana, dredgeditch, Apr. 25, 1915; Danville, Apr. 5, 1929 (Frison & R. H.); Algonquin, March 20,

1905 (Nason); Seymour, Apr. 20, 1912; Vancouver, B. C. (H. H. Ross); Oakwood, middle fork, Apr. 26, 1911; Dongola, Mar. 9, 1916; Forest Glen; Chicago, Aug., 1878; Mahomet, Apr. 3, 1929 (Frison).

G. LONGIPULVILLI Tot. Olympia, Wash. (T. Kincaid).

G. SAGAX Tns. Homar, Apr. 26, 1909; Urbana, Apr. 23, 1928 (Frison); Algonquin, May 3, 1896.

SPALLANZANIA HESPERIDARUM Will. Sparta, June 10, 1909, weedy clover; Champaign, July 7, 1885, swept from weeds; Urbana, Sept. 25, 1923.

CHAETOGAEDIA ANALIS V. D. W. Urbana, Oct. 6, 1901; Crystal Lake (Titus).

CUPHOCERA FUCATA ? V. D. W. Odin, in pit cage, May 28, 1910; Urbana, Sept., 1931 (Mohr); Makanda, on goldenrod, Oct. 16, 1902 (Titus).

ARCHYTAS ANALIS Fab. Urbana, July 17, 1908, clover; Oakwood, June 2, 1927 (T. H. Fuson); Havana, Devil's Hole, June 23, 1928 (Frison and Hayes).

A. ATERRIMA Desv. Alto Pass, Aug. 11, 1891 (Hart and Shiga); Savanna, July 21, 1892, sweet clover (McElfresh); Odin, Aug. 23, 1909; Milo, Bureau Co., July 15, 1879; Phila., Pa.; Metropolis, on *Xanthium spinosum*, Aug. 15, 1891 (Hart-Shiga); Dubois, June 22, 1905; Aldridge, Aug. 11, 1891 (Hart-Shiga); Urbana, July 3, 1908, clover; Sparta, patchy clover, June 9, 1909.

A. PILOSA Drury. Robertson (Willisten); Normal, July 26, 1883, in and about corn roots.

The material also contained the following genera and species not listed in the Aldrich catalogue of 1905.

ARRHINOMYIA sp ? Dongola, May 11, 1917; Sioux City, Ia., Aug. 29, 1916, swept from bluegrass (A. W. Lindsey).

CYLINDROMYIA ARGENTIA Tns. Freeport, July 4, 1917; Evanston, Apr. 7, 1931 (A. R. Park); Urbana, June 16, 1931 (H. H. Ross).

C. EUCHENOR Walk. Urbana, Aug. 17, 1908, clover; Sparta, June 11, 1909, ragged clover field; Agassiz, B. C., July 22 1926 (R. Glendenning).

LIXOPHAGA sp ? Dubois, Aug. 9, 1917.

PHYLLOMYA sp ? Urbana, Oct. 18, 1914; Muncie, June 10, 1919; Sparta, June 9, 1909, patchy clover field; Ashley, Aug. 7, 1917.

ZENILLIA sp ? Urbana, May 18, 1909; Freeport, July 2, 1917.

## G. W. Belfrage's Texas Localities.

By S. W. Geiser, Southern Methodist University, Dallas.

In an obituary notice published in the year 1883,[1] Professor A. S. Packard has the following to say of one of the most elusive students and collectors of the insects that ever worked in the Southwest:

"If the insect fauna of Texas is, at the present time, better known than that of most of the Western States of this continent, it is largely due to the skill and industry of Mr. [G. W.] Belfrage and the late Mr. Jacob Boll, who were the foremost among the few really careful and conscientious collectors in the country. The number of new and interesting species discovered by Mr. Belfrage is really astonishing, considering that they were collected in a very limited area of the State, and several of his discoveries were named after him by our most prominent entomologists. The care and neatness he exhibited in preserving and preparing his specimens, as well as the honesty with which he filled the orders of his numerous correspondents, deservedly procured him a reputation as a collector which extended far beyond the limits of this country."

With this as the sum-total of our knowledge of Gustaf Wilhelm Belfrage, as it had gotten into the history of American entomology, the present writer some few years ago made long-continued investigations of the life of this naturalist, and published in 1929[2] an account of the antecedents and the career of Belfrage. The investigation extended from a county-wide interviewing of Belfrage's contemporaries still living in Bosque County, Texas; and correspondence with most of the world-entomologists, still living, who might have corresponded, as young students of the insects, with Belfrage in the closing days of his career. In Sweden, Belfrage's native country, the help of many members of Belfrage's family was enlisted, and the cordial co-operation secured of Professor Dr. Yngve Sjöstedt, of the Natural History Museum in Stockholm.[3] As a result

[1] [Packard], in *American Naturalist*, 17: 424 1883.
[2] Geiser, in *Southwest Review*, 14: 381-98, 1929.
[3] I am especially indebted to Docent Dr. Sixten Belfrage (Lund), Prof. Dr. Sjöstedt, and Captain Lennart Belfrage, chairman of the Belfragian Society, Stockholm; as well as to Jenny Belfrage's *Bidrag till Släkten Belfrages Historia*, Göteborg, 1916.

of these researches it was found that Belfrage was descended from a long line of Swedish nobles (three of his four grandparents were barons or baronesses in their own right) and that he had enjoyed excellent training in entomology in his youth. It was found that he was on terms of intimate friendship with the Swedish entomologists, Professors Boheman and Zetterstedt, (the former the first curator of entomology in the Natural History Museum in Stockholm), and with Carl Stål, with whom for many years he conducted a long correspondence on familiar and equal terms. Belfrage's father, it was found, was a Court Chamberlain in the royal palace at Stockholm, and his mother was the Baroness Leijonhufvud, of one of the noblest families of the Swedish noblesse. After a checkered experience in Sweden, young Belfrage was encouraged to come to America; and after an eventful career as an entomological collector in New York, Illinois, and Texas, died in Bosque County, Texas, on December 7, 1882.

In my biographical sketch above referred to, but scanty information could be given relative to Belfrage's career as an entomological collector. In the last three years, however, thanks to the kindness of Professor Sjöstedt (who caused the archives of the Natural History Museum and the Swedish Academy of Sciences to be searched, with most satisfying results); and the directors of several museums and academies of science in America, an extensive Belfrage correspondence has been unearthed, by which it is possible to trace the movements in Illinois and Texas of G. W. Belfrage. The following notes are presented in extension and correction of the former biography.

Belfrage journeyed to America sometime in 1860 or '61. At the time of his coming he was about twenty-six years old. The real reasons for his leaving the homeland are not clear. One thing is certain, however, that "in some way he made it impossible for himself to remain in Sweden and [he] therefore emigrated.[4] Belfrage, in a letter of date 18 March, 1859, to the great Swedish entomologist, Prof. C. J. Boheman, speaks of his prospective departure as final: "I am going to leave my

[4] *S. Belfrage to S. W. Geiser,* 12 Apr., 1929.

country forever, and depart for the land of the Yankees." His letters to Professor Boheman and Dr. Carl Stål, members of the Swedish Academy of Sciences and the *Naturhistoriska Riksmuseum,* reveal that for some time he had contemplated leaving Sweden, and that he looked to his family for an annual subvention. . . .

From a very careful study of the extant Belfrage letters, the following, at least, may be said of his early life. Belfrage had long before 1857 come into terms of almost filial intimacy with Professor Boheman. It is possible that the contact was through Belfrage's father, who may have been a companion-in-arms with Boheman.[5] Passages in the very intimate letters from G. W. Belfrage to Carl Stål raise the question in one's mind as to whether the two had not at some time studied together at Uppsala. Unfortunately, we do not have any of the letters that Belfrage received from Swedish correspondents; for at his death, these were burned, together with a "bale of manuscript," listed by the appraisers of his estate as "of no value," although it appears, from his letters to Stål, to have been a work on the insects of Bosque County, Texas.

In October, 1859, Belfrage finally made up his mind to leave Sweden for America. The approximate date of his departure may be set as late in 1859 or early in 1860. During his last few months in Sweden he rusticated at Köping, a small town at the head of Lake Mälar, west of Stockholm.

Belfrage's first letter from America (one written in response to one several months old, from Boheman) is dated 8 August, 1861. From this letter it appears that Belfrage has been in America for some time; that he has already sent a collection of insects to Boheman; that he is "suffering from that common disease, called a lack of money." The war-excitement is on in America, and his pecuniary embarrassment offers Belfrage the hard alternatives of selling his insect collections at great sacrifice, enlisting in the Federal army, or starving. These months are obscure ones sprinkled but sparsely with missives

[5] Professor Carl Johan Boheman (1796-1868) was a retired army captain; in 1841 he was appointed curator of Entomology at the Natural History Museum in Stockholm. Gustaf Belfrage's father, Axel Ake Belfrage (1796-1885) advanced to a captaincy in the Swedish army in 1820, and quitted the army in 1844, with the brevet-rank of major.

that give fleeting glimpses of want and mental and physical distress. During the last half of 1861 his want was so great that for two days and nights he was without food and shelter, and was obliged to sell valuable insect-collections at a ruinously low figure.[6] After a year's silence Belfrage emerges again in the correspondence, this time in Chicago. Here he remains until the end of 1866, with occasional collecting trips along Lake Michigan and Lake Superior, and to the Swedish colony at Altona, Knox County, Illinois. His life during 1864 and 1865 is reflected in single letters for each of those years. One common theme runs through these letters: the need for insect needles in quantity for use in mounting his collections, and money, money.

During 1866, Belfrage entered into correspondence with all of the leading American entomologists: Cresson, Ulke, Packard, Uhler, Henshaw, Hagen, Scudder and the rest. They encouraged him to carry out a long-cherished plan of his to go to Texas on an insect-collecting trip; and armed with letters from the American Consul at Stockholm, and the Swedish Academy of Science, stating that he was a Swedish subject collecting for the Academy, he set out. "If I go South without such letters," said Belfrage in a message to Boheman asking that they be sent, "you will understand what kind of brotherly love I can expect from the Southerners after having lived among the 'damned Yankees'." He arrived in Houston from New Orleans, on the fourth day of January, 1867. On his arrival, he was penniless, or nearly so; but soon sales of insects (particularly to American and British students, who paid much better than Continental workers) lifted him from poverty. . . .

Belfrage was a prodigious collector. As early as 1869 he advertised an exchange-collection of 25,000 Texan insects, and had won the cordial approval of naturalists as "an active and zealous collector: his mounting of specimens is the very perfection of neatness."[7] He sold continually and extensively during the thirteen subsequent years, both to amateurs and serious students. During many of his collecting-years he collected and sold from ten to fifteen thousand insects: and the total of his collections must have been very great. At the time of his death his collection comprised "36,881 pinned specimens in

good order, in addition to beetles in paper, sawdust, and alcohol, and butterflies in papers"—in itself a great collection, but at that, only a fraction of his life's collections. After Belfrage's death this collection, now the "Belfrage Collection" in the United States National Museum, was purchased by C. V. Riley. In this collection are most of the types of the new species of Hymenoptera described by Cresson in his "Hymenoptera Texana" (1872).

Belfrage long had in mind plans for an extensive trip to collect insects in West Texas and New Mexico; in fact, his hopes and plans recur periodically, like a fixed idea, in his correspondence. In 1867,[8] he voices the hope that he may get a mule and wagon and travel into West Texas, and "collect 100,000 insects per annum." In March, 1868, he was still avowing the same purpose. Belfrage, it appears, collected in several parts of Texas, and not merely in Bosque and McLennan Counties, as Cresson and others have thought. He lived at Houston during all of 1867 and the first half of 1868, when he moved to Bosque County, Texas. He made a fruitless exploring and collecting trip to Quintana, at the mouth of the Brazos River, in April, 1867; in the late fall of 1868, he collected insects in the pine woods of Eastern Texas. A fire in his lodgings at Houston, in February, 1868, destroyed all his books, and many of his early collections. After Belfrage came to Bosque County, he made (April, 1869) a month-long trip to the Border (probably at Laredo, southwest of San Antonio); and in the following year, he made a two-months' trip to West Texas. After each of these trips, he was for a long time afflicted with malarial fever. The great trip that was planned to New Mexico never materialized, as far as I can discover. In 1869 Belfrage issued a prospectus of this in the *Canadian Entomologist*,[9] but advertisements issued as late as 1877 indicate that his wishes were still unfulfilled.

From 1870 to about 1879 Belfrage made his home in Bosque County near the hamlet of Norse; and it was here that he made his magnificent collections of insects from Bosque County.

[6] *G. W. B. to C. J. Boheman*, 28 February, 1862.
[7] *Canadian Naturalist*, 2: 160, 1869.
[8] *G. W. B. to C. J. Boheman*, 31 January, 1867.
[9] *Op. cit.* 2: 159-60; 179-80, 1869.

In 1879 he built for himself a small hut on Meridian Creek, on the "Chris Pederson farm," about three miles from his former home on the "Carl Questad place." Here he was found dead on the morning of December 7, 1882.

Viewing Belfrage through the letters preserved in the archives of the Academy of Sciences at Stockholm, one sees a brilliant, well-read, social and all-too-convivial, companionable man, deeply interested in the work to which he gave his life; deeply loved by those to whom he gave his confidences. He was admired at a distance by the simple country people, his neighbors, who were without the circle of his close acquaintance. He died at the early age of forty-eight, a broken man, but one who has placed students of the entomology of Texas and the Southwest under an obligation that can hardly be overstated.

## Bothynotus Fieber: Descriptions of Two New Species from North America (Hemip., Miridae).

By HARRY H. KNIGHT, Iowa State College, Ames.

The genus *Bothynotus* Fieber was erected in 1864 to include the single European species described as *Phytocoris pilosus* Boheman (1852). The genus was not recognized from North America until Wirtner (1917) described *Neobothynotus modestus* from Pennsylvania. At that time the writer (1917) pointed out that he was "unable to find generic points of difference between *Neobothynotus* Wirtner and *Bothynotus* Fieber." We also suggested that *modestus* Wirtner might be an importation of *pilosus* Bohe, but in this we were mistaken as later examination of European specimens of *pilosus* proved the species to be distinct, although members of the same genus. Since that time we have examined specimens of *Bothynotus modestus* Wirtner from Maryland, near Plummer Island (J. D. Hood) and from Wilmington, Ohio (S. A. Watson). The history of this species indicates that it may be widely distributed but specmens are very scarce. Until the present time only two species of *Bothynotus* have been described, hence it is of considerable interest to add two new ones from the Nearctic fauna, indicating that North America may have been the center of origin for species of this genus.

In our list of "Family Miridae of the District of Columbia and vicinity" the writer placed *Bothynotus modestus* Wirtner in subfamily Clivineminae without word of explanation, thus I will review the reasons at this time. Reuter (1910) in his great work "Neue Beiträge zur Phylogenie und Systematik der Miriden" erected the subfamily "Bothynotina" to include *Bothynotus* Fieb. and a new genus *Dashymenia* Popp. In the same publication Reuter employed the subfamily name "Ambraciina" and included therein his "Division Clivinemaria" of 1876. Van Duzee (1916) in his "Check List of Hemiptera" employed the principle of priority to subfamily names and raised Reuter's group name, Clivinemaria of 1876, to the status of subfamily and included the American genera, *Clivinema* Reut. and *Largidea* Van D.

The writer finds that *Bothynotus* Fieber is closely allied to *Clivinema* Reuter as shown by structure of the genitalia, form of toothed claws and bristle-like arolia, also in the peculiar modifications of the prothorax, especially involving the collar and calli. Examination of the genital claspers of the various species of *Clivinema*, *Largidea* and *Bothynotus*, show a surprising amount of similarity, in fact the form of left clasper appears to be characteristic of these genera and therefore of the subfamily Clivineminae. Apparently no generic distinctions can be based upon the claspers, but slight modifications may in some cases be useful for specific determinations. From these observations it is evident that Bothynotina Reuter (1910) must be merged with the older subfamily group Clivineminae Reuter (1876).

**Bothynotus barberi** n. sp.

Differs from *modestus* Wirtner in the smaller size, also in the shorter second antennal segment which in length is just equal to width of head across eyes; anterior angles of pronotum somewhat inflated, arising distinctly above the smooth impressed calli.

♂. Length 3.5 mm., width 1.7 mm. Head: width .75 mm., vertex .47 mm.; frons more distinctly convex and tylus less prominent than in *modestus;* color uniformly pale red, tylus

Proc. U. S. Nat. Museum, vol. 75, art. 13, p. 8, 1929.

more brownish, clothed with prominent pale pubescence. Rostrum fuscous (broken). Antennae: segment I, length .346 mm.; II, .78 mm., cylindrical, about equal to segment I in thickness; III, .346 mm., slender; IV, .30 mm., slender; fuscous to blackish, segment I paler at base; clothed with prominent pale yellowish pubescence, interspersed with a few longer hairs, especially on the last three segments.

Pronotum: length .78 mm., width at base 1.34 mm.; disk coarsely, uniformly punctate, pleura more finely punctate; calli deeply impressed, shining, impunctate except for a single deep puncture at each inner angle; collar nearly flat, separated from calli by impressed line; lateral margin of disk slightly concave, anterior angles rather distinctly inflated, rising well above the level of the calli and collar, projecting laterally above the coxal cleft, the latter very deep at dorsal extremity; color uniformly brownish black, collar and calli reddish to brownish. Disk as well as the whole dorsum clothed with prominent, erect pale hairs, the tip of each hair decurved; membrane more finely but distinctly pubescent. Scutellum moderately convex, pubescent but impunctate.

Hemelytra: embolar margins slightly sinuate, not arcuate; embolium flat, prominent, lateral edge sharp, slightly reflexed; finely punctate, color brownish black, slightly translucent; cuneus slightly concave but lateral margins not distinctly reflexed; membrane uniformly dusky, veins darker, finely wrinkled, finely but distinctly pubescent. Body beneath reddish brown to blackish; ostiolar peritreme pale fuscous, surface alutaceous, central lobe projecting strongly laterally.

Legs uniformly pale fuscous brown, tips of hind femora reddish; strongly pubescent, hind femora with two or three long hairs on posterior margin, tibiae not distinctly spinulose; claws toothed at base, arolia bristle-like, and in this respect very similar to species of *Clivinema* Reuter. Genital claspers apparently generic in character, their form very similar to that observed in *Clivinema* Reut. and *Largidea* Van D.

*Holotype:* ♂ July 20, 1905, Huachuca Mts., ARIZONA (H. G. Barber); author's collection. Named in honor of the collector, Mr. H. G. Barber, to whom the writer is indebted for several new or interesting Miridae.

**Bothynotus johnstoni** n. sp.

Distinguished from *barberi* by the smaller size and reflexed outer margin of the cuneus; anterior angles of pronotum not inflated, pubescence erect, not decurved.

♂. Length 2.7 mm., width 1.17 mm. Head: width .57 mm., vertex .32 mm.; color red, shining, tylus and buccula fuscous, a pair of small spots on vertex and a mark each side on frons, fuscous. Rostrum, length .78 mm., reaching upon base of intermediate coxae, fuscous. Antennae: segment I, length .25 mm., reddish brown to black; II, .60 mm., cylindrical, equal in thickness to segment I but more slender at base, dark brownish black, clothed with prominent pale pubescence, length of longest hairs about equal to thickness of segment; III, broken.

Pronotum: length .62 mm.; width at base .99 mm.; disk moderately convex, more finely punctate than *barberi* and the anterior angles are not inflated; collar convex, distinctly constricted and separated from calli, the latter smooth, impressed on posterior margins, but very little below level of disk. Scutellum moderately convex, apex slightly more prominent, impunctate, finely rugulose on disk.

General coloration uniformly brownish black, shining, hemelytra semi-translucent; head red, ventral surface reddish brown to blackish, legs pale fusco-brownish, femora becoming reddish on apical half. Clothed with prominent, erect pale yellowish to dusky pubescence, hairs of dorsum not decurved at tips.

Hemelytra: embolar margins nearly straight, curved in at base; embolium with outer edge sharp, narrowly reflexed; clavus with inner half more coarsely and strongly punctate than elsewhere; cuneus with outer margin reflexed to form a right angle with disk, impunctate but strongly pubescent. Membrane uniformly dark fuscous, finely wrinkled, finely but distinctly pubescent. Genital claspers of the same general form as in *barberi* but the left clasper with distal one-third thicker.

*Holotype:* ♂ June 3, 1926, Carthage, Mississippi (H. G. Johnston); author's collection. Named in honor of the collector, Mr. Horace G. Johnston, who is doing some good work with Miridae.

## Swarming of Scatopse atrata Say (Diptera: Scatopsidae)

On May 3, 1932, I sent the following notes to Dr. J. M. Aldrich, of the United States National Museum. At this place, Lyerly, Georgia, Chattooga Co., about 55 miles south of Chattanooga, Tennessee, on April 22, 1932, the insects herewith were taken where they were swarming as they had been swarming for several days prior thereto. Their issuance was from a vertical "joint" between corner boards of a dwelling house wall at northwest corner of building. The joint was finished by means of a quarter round moulding and numerous nail *holes* together with a poor fit had enabled them to seek out a home within.

These insects were swarming and were conducting propagative congress at once. Many dozens in pairs were observed hurriedly running over the wall boards, meanwhile having union and each being of apparently the same size, I could not decide which sex was being towed backward. There were no reversals of direction in the towing. There was no tandem processioning commonly observed in termite swarms. There was some interference from third parties as the towing was being done.

These insects are *strong* and capable *fliers;* they had a dabbing motion in flight when coming back to vicinity of their issuance point as if seeking to alight, or as if seeking to choose something. Many hundreds issued and few departed at once. Most of them tarried and moved incessantly about in copulation or interfering with copulating pairs. There was not observed any pairing outside; all seemed to issue singly or one towing another per genitalia. More than half of them took to the air and remained near place of issuance. I think none cast any wings. They kept up their swarming for a week but now are not visible.

The house-corner is beneath a good porch roof, *i. e.*, good for 6 years past. The house is on brick piers 2 feet high. The wood is all dry. Much elm tree shade is near by. I do not know what they are and ask you to have them named and described as to significance, etc.

Dr. Aldrich replied: "The fly is *Scatopse atrata* Say; it is a very common insect, found on the inside of windows, especially in basements. I see by my index it has been reared from decaying lemons, onions, plums, butternut hulls, and also from animal excrement. It appears to be a general scavenger in decomposing vegetable matter.

"I have never heard of the issuance of the insect in the way you describe, but the flies are so small that they no doubt have been overlooked hundreds of times."

JOHN G. FOSTER, Lyerly, Georgia.

# Entomological Literature

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

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.—Burr, M.**—Orthoptera and spiders. [21] 45: 38-40. **Finkenbrink, W.**—Experimentelle untersuchungen zur dewitzschen hypothese des apterismus bei insekten. [46] 26: 385-426, ill. **Gaines, J. C.**—Trap collections of insects in cotton in 1932. [19] 28: 47-53, ill. **Holland, W. J.**—Obituary. By G. P. Engelhardt. [19] 28: 79. **Janisch & Maercks.**—Licht und insektenentwicklung. [46] 26: 372-384, ill. **Schulze, P.**—Ueber zeckengynander. [46] 26: 427-436, ill. **Williamson, E. B.**—Obituary. By F. Payne. [68] 77: 344.

**ANATOMY, PHYSIOLOGY, ETC.—Avel, M. M.**—Sur le fonctionnement possible par prise automatique de la ventouse des larves de Blépharocérides (Torrenticoles). [Bull. Soc. Zool. France] 57: 140-142. **Balduf, W. V.**—The morphology of the ovipositor of Draeculacephala (Cicadellidae). [7] 26: 64-75, ill. **Bledowski u. Krainska.**—Die entwicklung von Banchus femoralis. (Bibl. Univ. Lib. Polonae, 1925, Fasc. 16, 50 pp., ill.) **Bondroit, J.**—Origine de l'ouvrière des fourmis. [Ann. Soc. R. Zool. Belgique] 62: 13-24. **Brandt, H. A.**—Histology of the silk glands of certain Avicularüidae. [13] 25: 1-6, ill. **Chickering & Bacorn.**—Spermatogenesis in the Belostomatidae. Multiple chromosomes in Lethocerus. [Pap. Michigan Acad. Sci. Arts & Let.] 17: 529-534, ill. **Cvetkov & Ephroimson.**—La cinétique de la photo réaction chez Drosophila melanogaster. [Bull. Acad. Sci. U. R. S. S.] 1932: 1151-1153 [in Russian]. **Fisher, R. A.**—On the evidence against the chemical induc-

tion of melanism in lepidoptera. [Pro. R. Soc., Lond.] (B) 112: 407-416. **Fletcher & Haub.**—Digestion in blowfly larvae, Phormia regina, used in the treatment of osteomyelitis. [43] 33: 101-109, ill. **Hedenius, A.**—Molecular weights of the blood pigments of the invertebrates. [31] 131: 325. **Heymons & Lühmann.**—Die vasa malpighi von Galerucella viburni. [34] 102: 78-86, ill. **Hilton, W. A.**—Nervous system and sense organs. Acarina [13] 25: 8-12, ill. **Hinman, E. H.**—Enzymes in the digestive tract of mosquito larvae. [7] 26: 45-52. **Hüsing, H.**—Wieviel nektar fasst die honigblase der Honigbiene? [17] 50: 80-82, cont. **Leeson & Mellanby.**—Insects and micro-climates. [31] 131: 363. **Munscheid, L.**—Die metamorphose des labiums der Odonaten. [94] 143: 201-240, ill. **Pflugfelder, O.**—Ueber den feineren bau der schläfenorgane der Myriapoden. [94] 143: 127-155, ill. **Rabaud, E.**—L'instinct maternel des Araignées. Le rapt du sac ovigère. [Bull. Soc. Zool. France] 57: 258-262. **Stammer, H. J.**—Die metamorphose der syrphide Temnostoma vespiforme und die eigenartigen anpassungen der larve dieses tieres an das bohren im holz. [46] 26: 437-446, ill. **Thomas, M.**—L'instinct chez les Araignées. [33] 72: 273-280, ill. **Thomas, M.**—L'instinct et la psychologie des Hyménopterès. Le déterminisme des moeurs des guêpes et des abeilles sociales. [33] 72: 177-198. **Vance & Smith.**—The larval head of parasitic hymenoptera and nomenclature of its parts. [7] 26: 86-94, ill. **Wotzel, F.**—Zur kenntnis der tympanalorgane der Hydrocores. [94] 143: 241-262, ill.

**ARACHNIDA AND MYRIOPODA.—Chickering, A. M.**—Araneae from the Douglas Lake Region, Michigan. Additions to the list of Araneae from Michigan. [Pap. Michigan Acad. Sci. Arts & Let.] 17: 515-520, 521-528. ***Crosby & Bishop.**—American spiders: Erigoneae, males with cephalic pits. [7] 26: 105-182, ill. ***Grandjean, F.**—La famille des Protoplophoridae (Acariens). [Bull. Soc. Zool. France] 57: 10-36, ill. (S). ***Jacot, A. P.**—Phthiracarid mites of Florida. [Jour. E. Mitchell Sc. Soc.] 48: 232-267, ill.

**THE SMALLER ORDERS OF INSECTS.—Bird, R. D.**—Dragonfly hunting in Oklahoma. [76] 1933: 371-377, ill. **Edinger, O. H.**—Family Sminthuridae of Southern California. [13] 25: 7. **Geijskes, D. C.**—The dragonfly-fauna of Trinidad in the British West Indies. [Zool. Meded. Mus. Nat. Hist. Leiden] 15: 96-128, ill. ***Sámal, J.**—Beiträge zur kenntnis der Plecopteren-fauna Südlabradors. [34] 102: 95-100, ill. **Stanford, J. S.**—A preliminary list of Utah Siphonaptera. [Pro. Utah Acad. Sci.] 8: 153-154. ***Traver, J. R.**—Mayflies of North Carolina. [Jour. E. Mitchell Sc. Soc.]

48: 141-206, ill. *Watson, J. R.—Two new species of Plectrothrips. [39] 17: 16-18, ill.

**ORTHOPTERA.—Hebard, M.**—The orthoptera of Minnesota. [Univ. Minn. Agric. Exp. Sta.] Tech. Bull. 85: 61 pp. ***Hebard, M.**—Studies in the Dermaptera and Orthoptera of Colombia. [1] 59: 13-67, ill. **Rehn, J. A. G.**—Some Dermaptera from Angola, northern Rhodesia and the Belgian Congo, with the description of a new species of Karschiella. [1] 59: 1-10.

**HEMIPTERA.—Abbott, C. E.**—Notes on the lift history of Jalysus spinosus. [19] 28: 43-44, ill. **Cummings & Austen.**—The bed-bug. Its habits and life history and how to deal with it. [Brit. Mus.] Econ. Ser. No. 5: 27 pp., ill. **Drake & Harris.**—New American Veliidae. [Pro. Biol. Soc. Washington] 46: 45-53. ***Granovsky, A. A.**—Two new genera and species of Aphiidae. [10] 35: 29-43, ill. ***Green, E. E.**—Notes on some Coccidae from Surinam, Dutch Guiana, with descriptions of new species. [Stylops] 2: 49-58, ill. **Lerch, E. C.**—A list of Homoptera from Ontario [19] 28: 76-78. **Wilson, J. W.**—(See under Lepidoptera.)

**LEPIDOPTERA.—Comstock & Dammers.**—Notes on the life histories of two California lepidopterous insects. [38] 32: 27-37, ill. **Comstock & Henne.**—A new Lycaenid from southern California. [38] 32: 23-26. **Schüssler, H.**—Lepidopterorum Catalogus. Pars 55. Saturniidae: 1. Subfam. Attacinae. 81 pp. **Stichel, H.**—Lepidopterorum Catalogus. Pars. 54. Amathusiidae. 171 pp. ***Williams, R. C.**—A new hesperid from Mexico (Hesperiidae). [1] 59: 11-12, ill. **Wilson, J. W.**—The biology of parasites and predators of Laphygma exigua reared during the season of 1932. [39] 17: 1-15, ill.

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**JUNE, 1933**

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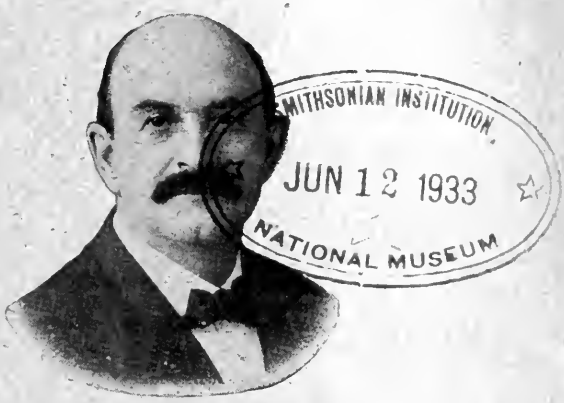


CHARLES WILLISON JOHNSON
1863-1932.

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows:

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Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance.
One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 7.00
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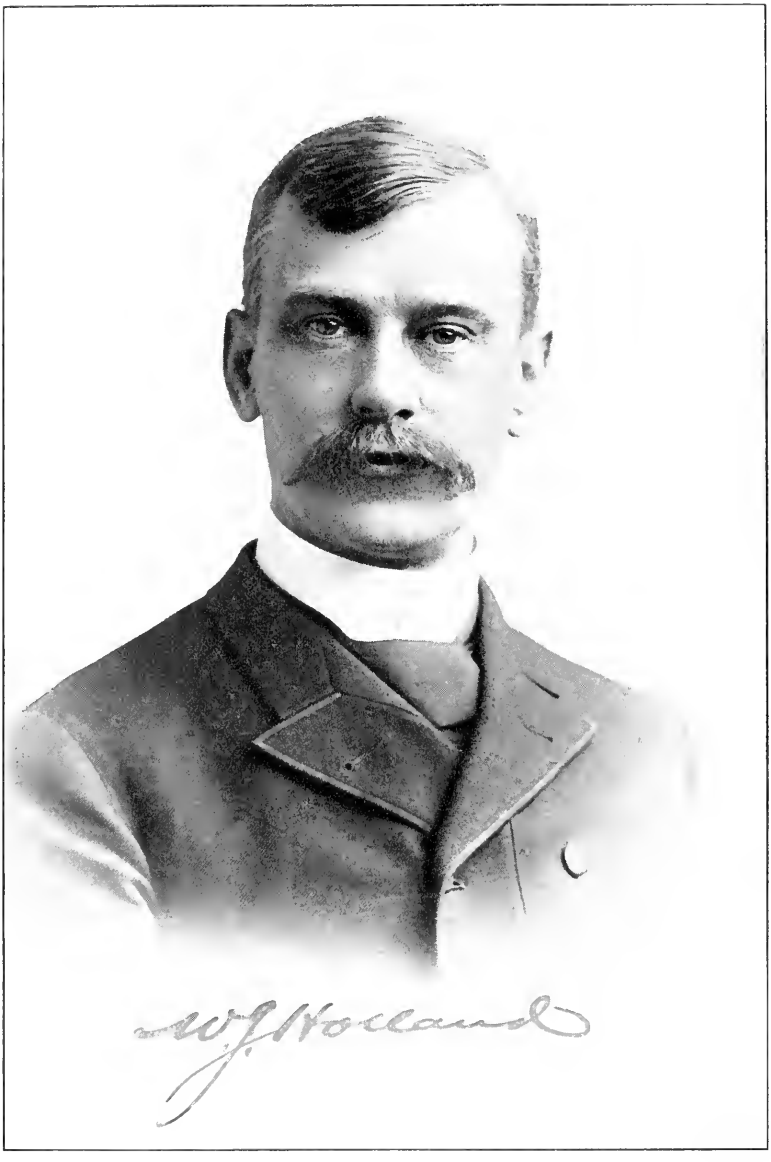


ENT. NEWS, VOL. XLIV, PLATE V.
(PHOTOGRAPH OF ABOUT 1892.)

# ENTOMOLOGICAL NEWS

VOL. XLIV. JUNE, 1933 No. 6

## William Jacob Holland.

(Portrait, Plate V.)

With the death of Dr. William Jacob Holland, which occurred on December 13, 1932, an eminent figure in the world of science passed away. He was the dean of American entomologists, the author of innumerable publications in this field. But Dr. Holland was far more than an eminent entomologist of world-wide reputation—he was a naturalist of a universality of erudition which is but rarely found among scientific men of the present day. With a prodigious memory, a keen understanding of the diversity of scientific problems, he was at home in the manifold domains of learning. Above all, he was a man of outstanding intellectual and spiritual culture, and that is why his loss has created an irreparable void in the community with which he has been associated for nearly three score of years and within the ranks of his fellow workers in the scientific field.

William Jacob Holland was born in Bethany, on the island of Jamaica, on August 16, 1848. His family was of Moravian extraction, residing for a long time in Salem, North Carolina. From there his father was sent as a missionary to the West Indies.

From early boyhood Dr. Holland was trained in studies of natural history. Upon graduation from the Moravian College and Theological Seminary at Bethlehem, Pennsylvania, in 1867, he received the degree of bachelor of arts from Amherst College in 1869. For a year after graduation he served as principal of a high school in Amherst, and the following year occupied the same position at Westboro, Massachusetts. Having been ordained into the Moravian ministry, he entered Princeton Theological Seminary and concluded the course in 1874. Subsequently he joined the Presbytery of Monmouth and came to Pittsburgh as pastor of the Bellefield Presbyterian Church, which position he held until 1891. In the course of



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his pastorate Dr. Holland devoted much time to scientific studies. He went to Japan as a member of the United States Eclipse Expedition in 1887 and used this opportunity in a very profitable way for various biological investigations. In 1891 he was made chancellor of the Western University of Pennsylvania, now the University of Pittsburgh. In 1898 his friend, Andrew Carnegie, invited him to assume the responsibilities as director of the museum founded by this steel magnate. This office was held by Dr. Holland with signal success until 1922, when he became director emeritus of the Carnegie Museum. Under the administration of Dr. Holland the museum attained the rank of one of the most important scientific institutions of its kind on the continent. It would be scarcely possible to describe in a brief sketch all the outstanding services of Dr. Holland to this institution. Any attempt to enumerate his major accomplishments in this respect would be futile since it would necessitate a recital of the whole history of the growth of the Carnegie Museum since its inception. Dr. Holland performed the duties as vice-president of the Carnegie Hero Fund from 1904 to 1922, and upon his election as president of that body became a member of the Carnegie Corporation. In this latter capacity, Dr. Holland had an opportunity to devote his efforts in a most indefatigable way toward the promotion of the manifold courses within the competence of that body.

Dr. Holland was an active member of the board of trustees of several institutions of higher learning, and carried on the duties of Belgian Consul for some years after the world war. He had the distinction of becoming the founder of the American Association of Museums in 1907, and remained president of the association until 1909. He was a member of scores of scientific societies, among them the Zoological and Entomological Societies of London, the Entomological Societies of America, Washington, New York, Cambridge, Germany, France, Russia and Brazil; the American Zoological Society, Royal Society of Edinburgh, American Philosophical Society, and several foreign scientific academies. He was a councilor for the Association for International Conciliation, a member of the Academy of Natural Sciences, Philadelphia, [since Janu-

ary 31, 1882], the Pennsylvania Historical Society, Historical Society of Western Pennsylvania, and Moravian Historical Society, and corresponding member of the American Entomological Society.

Dr. Holland was the author of numerous scientific treatises and books, notably of "The Butterfly Book" and "The Moth Book," which became sources of reference for specialists and were chiefly instrumental in stimulating a widespread interest in lepidopterology among amateurs in this country. He also wrote many scientific papers issued by the United States Government and by various learned societies in America and abroad. The list of his contributions reaches about five hundred bibliographical items and covers an extraordinary variety of topics. The entomological papers alone approach one hundred and twenty titles from the year 1886 to the last years of his life. A large proportion of his papers on Lepidoptera deal with forms of Rhopalocera and Heterocera from West Africa. The lepidopterous fauna of Congo was thoroughly studied by Dr. Holland who also contributed to the knowledge of the butterflies of Somaliland, Sierra Leone, Kamerun, and the Seychelles. Other articles deal with the Lepidoptera of the Bahamas, the Isle of Pines, Hainan, Celebes, and Buru. Several articles written at various times of his long entomological career were devoted to the fauna of different portions of North America. In recent years Dr. Holland paid much attention to certain taxonomic problems and discussed on several occasions the significance of Hübner's "Tentamen" as a basis for nomenclatorial changes proposed by some modern authors. The Encyclopaedia Britannica applied to him as to a leading specialist in the museum field for the preparation of a survey of the history of scientific museums. For the last thirty-four years he edited the *Annals* and *Memoirs* of the Carnegie Museum. Numerous seats of higher learning honored themselves by bestowing degrees of honorary doctorate upon this distinguished scientist in recognition of his eminence in learning. Among such universities were Washington and Jefferson College, Amherst College, Dickinson College, New York University, Bethany College, St. Andrew's in Scotland, and the University of Pittsburgh.

Dr. Holland owned an extensive entomological collection which was particularly rich in Lepidoptera from North America, Africa, and certain regions of Asia. It contained representative series of Rhopalocera and Heterocera from various countries in different parts of the world. Especially valuable portions of the collection of Dr. Holland were the Pyralids collected by Pryer in Japan and the well-known collection of North American Rhopalocera assembled by Edwards, with all the types described by these noted entomologists. Dr. Holland's collection included types of many hundreds of new species which were described by him during his life time.

One of the most significant scientific achievements of Dr. Holland was connected with the paleontological exploration of the Carnegie Museum which were directed by him in Utah, Wyoming, Montana, and North Dakota. The finds of these expeditions resulted in many discoveries, including the celebrated *Diplodocus carnegiei*, the original skeleton of which is adorning the gallery of fossils in the Carnegie Museum, whereas nine replicas were presented to the leading scientific institutions in Europe and both Americas. In recognition of his contributions to science Dr. Holland received decorations from Belgium, Austria-Hungary, Italy, Russia, and Spain.

Dr. Holland passed away amid his favorite labors, lending his concentrated attention, as throughout his life, to current problems of natural history advanced by contemporary investigations. Until the end he remained absorbed by the adventurous spirit of scientific research, responsive to the lure of exploring some new avenue of the ever-widening horizons of knowledge. He lived a life of exceptional usefulness. Endowed with a profusion of gifts, among which his linguistic abilities were by far not the least, he cultivated his native talents and molded them into a personality of unique qualities and values. A churchman, a leader in education, the father of the Carnegie Museum in Pittsburgh, a man of learning honored far and wide by academies, international congresses and universities, Dr. Holland will not only be mourned sincerely, but his achievements will also not fail to remain an inspiration challenging the best within us.* A. AVINOFF.

* [An autobiographical sketch of Dr. Holland and a more recent portrait than that here published are in the NEWS for July, 1929. —EDITOR.]

## The Click Beetle's Click (Coleop.: Elateridae).

By H. Elliot McClure, Urbana, Illinois.

Click beetles with their startling saltatorial abilities have always been fascinating to the author, so that during the past two years a desultory study of the resilience of these insects has been carried on.

Individuals of the three species of elaterids, *Aeolus dorsalis*, *Melanotus difficilis* Blatch. and *Alaus oculatus*, Linn., were jumped in an effort to determine the average heights they achieved and *Melanotus* was studied for effects of fatigue and age upon the heighths of the leap.

Two methods of recording the height of the jump were used, the latter proving the more efficient. At first the insects were allowed to spring in a glass cylinder with a rule secured to it by rubber bands. The beetle was placed on its back on a glass plate under this and, as quickly as it regained its feet, was turned over. By watching the apex of the jump on the rule the height could be recorded. As the ascent was not perpendicular, the friction with the sides of the cylinder reduced the height. The second method gave the insect more freedom and obtained better results. A rule was supported at the back of a glass plate and the peak of the insect's spring recorded approximately from it. The tests were made of evenings in a warm room with the light directly above the specimen. The insects performed equally well under red or white light. They were weighed and measured for comparisons between the species.

The tiny *Aeolus*, seven millimeters long, was the aeronaut of the group. It jumped completely out of the experimental set up. The insect averaged 36.2 centimeters in its jumps and, being only seven millimeters long, leaped 51 times its own length.

*Melanotus* is a jumper of medium ability. It throws itself an average of 17.6 centimeters or eleven times its length. One specimen was made to jump 465 times in two hours before it refused to spring.

*Alaus*, though of imposing proportions, jumps barely twice its own length. It averaged 7 centimeters and was very active,

springing the instant it was on its back. This was also true of *Aeolus*, but *Melanotus* needed considerable teasing after a few jumps. It is interesting to note that, though *Alaus* jumped only one-fifth the heighth attained by *Aeolus*, it did twelve times as much work.

Of the species studied, the height of the jump was inversely proportional to the size of the insect, the ratio being *Aeolus* 5, *Melanotus* 2, and *Alaus* 1. Subsequent work may show species with average heighths between those studied.

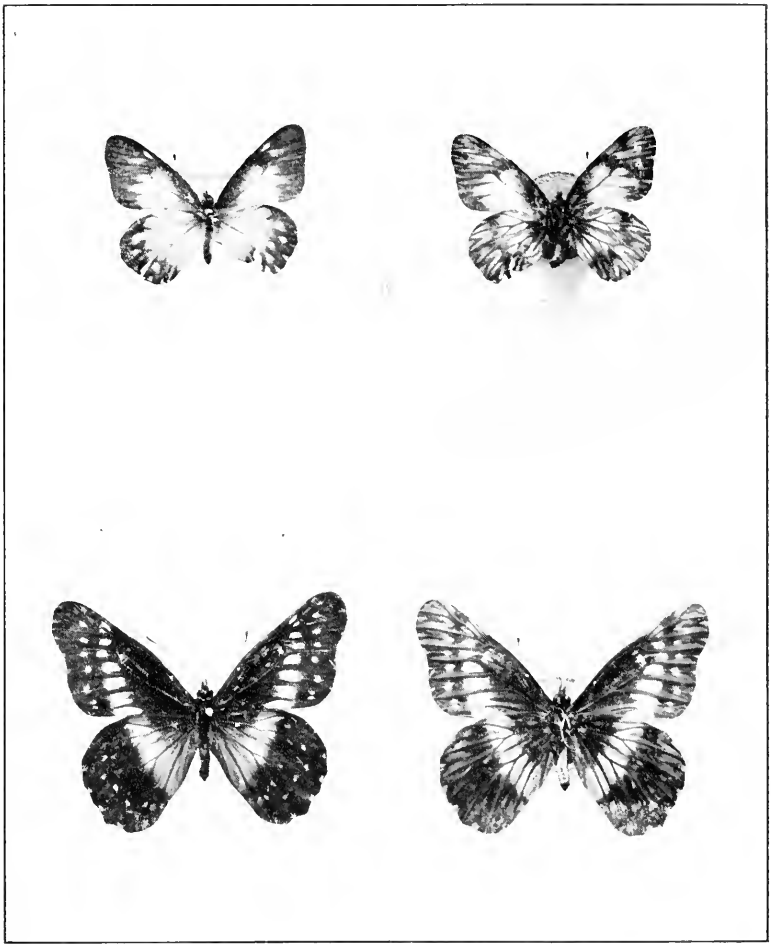
TABLE I.

Comparison of Jumping abilities of Three Species of Elaterids.

| Species | *Aeolus dorsalia* | *Melanotus difficilis* | *Alaus oculatus* |
|---|---|---|---|
| Length | 7 millimeter | 15 mm. | 34 mm. |
| Weight | 18 milligram | 50 mg. | 1200 mg. |
| Maximum Height of Jump | 49 centimeter | 21 cm. | 10 cm. |
| Average Jump | 36.2cm. | 17.6 cm. | 7.0 cm. |
| Ratio | 5 | 2 | 1 |
| Work done per Jump | .65 gm. cm. | .88 gm. cm. | 8 40 gm. cm. |
| No. Jumps | 120 | 986 | 295 |
| Jumps per Minute | 6.6 | 3.0 | 7.3 |

As is known, the mechanism which hurls the insect into the air consists of a prothoracic spine which fits into a mesosternal groove. The spine is pulled out of the groove by throwing the prothorax back so that it catches on a small ridge when fully out of the groove. By the contraction of muscles attached in the pro- and meso-thorax, the spine is plunged into the groove so that the force of its blow and that of the insect's body against the substratum throws the insect spinning upward.

A *Melanotus*, weighing 52 milligrams and jumped at 24 hour periods so as to show the effects of age and fatigue on the



Upper Figures: CATASTICTA FORBESIA.
Lower Figures: C. FLIZA POSTAUREA.-BROWN

heighth of the jump, gave the following results. The first evening the leaps were made in the glass cylinder while the rest were made with the insect free.

| Days | No. of Jumps | Ave. Height | Days | No. of Jumps | Ave. Height |
|---|---|---|---|---|---|
| 1 | 200 | 11.2 cm. | 6 | 20 | 19.0 " |
| 2 | 75 | 18.3 " | 7 | 30 | 19.0 " |
| 3 | 61 | 19.0 " | 8 | 50 | 18.8 " |
| 4 | 50 | 18.7 " | 9 | 15 | 16.6 " |
| 5 | 51 | 19.3 " | 10 | Dead | 0.0 " |

During these ten days the insect was kept in a small container with moist earth and some bits of grass. On the ninth day the insect was almost too weak to pull the spine into place, but, though the average was slightly lower, several of the jumps were 19 centimeters high or equal to the previous attainments. When the insect was too fatigued to cock the spring it was possible to cock it with one's fingers and then allow the insect to jump. The heighths under such conditions were approximately the same, 16 to 18 centimeters. When fatigue, age, and starvation have no appreciable effect upon the heighths attainable by this species it would seem that the spring must be partly mechanical. That is, not only is the action muscular, but some sort of physical strain exists between the pro- and mesothorax when the spine is pulled back.

## Two New Catasticta (Lepid.: Pieridae).

By F. Martin Brown, Fountain Valley School, Colorado Springs, Colorado.

(Plate VI.)

While examining the specimens of the genus *Catasticta* in the museums in America preparatory to a general revision of the genus, I have found several undescribed forms worthy of names. The present paper deals with two such forms. One is in the collections of the Philadelphia Academy of Natural Sciences, the other in the collections at Cornell University.

Catasticta fliza **postaurea** new subspecies.

Upper surfaces: As in *C. flize* H.-S., but with the light median band of the secondaries a rich golden yellow instead of white. In addition, in the paratype, the small white spots in the broad black-brown margin of the secondaries are obsolete.

The specimens differ from *C. noakesi* Joicey and Rosenberg in having a white median band on the primaries.

Under surfaces: as in *C. fliza*, but with the yellow internerval dashes on the disc so broadened as to make practically a continuous yellow band on the secondaries. The specimens differ from *C. noakesi* in having a white median band on the primaries and much more extended yellow markings on the secondaries.

Length of the costal margin of the forewing: Type 29 mm. Paratype 27.5 mm.

*Holotype:* a female from Vista Nieve, COLOMBIA. XII. 22. 1922. Coll. by H. L. Viereck. *Paratype:* possibly a male (no abdomen on specimen) from Hacienda Cincinnati, Sierra San Lorenzo, Magdalena, Colombia, 4200 feet, VII. 21. 1920. The types are in the collections of the Philadelphia Academy of Natural Sciences, Philadelphia, Pennsylvania.

**Catasticta forbesia** new species.

Probably allied to *C. straminae*.

Upper surfaces: resembling to some degree *C. pitana*. The specimen differs on this surface from *C. pitana* in the following respects: The primaries lack the submarginal row of white dots and the subapical dots are reduced in size; the black-brown marginal band of the secondaries contains a series of large white spots, some of which run into the white discal area; the internerval spaces on the margin contain more or less triangular white spots. On the whole, the upper surfaces present the appearance of a slightly aberrant specimen of *pitana*, with the inner margins of the dark marginal band rather irregular.

Under surfaces: It is on these surfaces that the alliance with *straminae* is discernible, the two being identical in shape and position of the maculation. They differ in the base color; it is white in *forbesia* and buff in *straminae*.

Length of the costal margin of the primary: Type 19.2 mm. For a series of *straminae* the average is 20.4 mm. and for a long series of *pitana* it is 27.6 mm.

*Holotype:* a male from Tambo Eneñas, Camino del Pichis, PERU, VII. 4. 1920. Cornell University Expedition, Lot No. 607, Sub 125. The type is in the collections of the Department of Entomology, Cornell University, Ithaca, New York. The species is named in honor of Dr. William T. Forbes of that institution.

## The Food and Habits of Temesiphorus costalis Lec. (Coleop.: Pselaphidae).

By Orlando Park, Department of Zoology, University of Illinois.

The large pselaphid, *Tmesiphorus costalis* Lec., is relatively so abundant in central Illinois that I was led to inquire into its ecology and have accumulated data accordingly since 1926, some of which are given in this short study.

In the last year alone forty-four specimens have been taken from a single sugar maple-bur oak forest near Urbana. Here as elsewhere in ecologically equivalent forests studied, the species is found most commonly on the lower, protected surfaces of moderately moist bark strips which have fallen from logs and come to rest near the latter upon the forest floor. More rarely is it taken under the loose bark of such decayed logs, or within the galleries of ants in the wood, as noted by Blatchley (1910). With careful search it can be obtained throughout the year. My experience has been that the species tends to be locally abundant, and that within a favorable habitat is more often gregarious than solitary. Thus it is common to find three to six beetles under one bark strip, often within several square inches of space, and none or a few widely scattered over the rest of the same log debris. As stated by Blatchley, this gregarious tendency is apparently stronger in winter, the pselaphids hibernating in a loose aggregation in their habitat niches. The Urbana specimens show a greater preponderance of females (28 ♀ ♀, 16 ♂ ♂) collected.

Both sexes usually letisimulate when handled. In this reaction the legs are folded closely to the sides of the body, the head is flexed ventrally and the antennae are folded over and pressed along the mid-ventral area of the body. This response endures for from fifteen to two hundred seconds, depending upon the strength of the original stimulus and the number of letisimulations, since too many induced rapidly may shorten the time of feigning.

It is of interest to note that this species, while commonly taken away from ants, was taken from the nest galleries of large colonies of *Aphaenogaster fulva* Roger*. To better understand

this relationship hosts and beetles were brought to the laboratory and studied in petri dish nests as described previously (Park, 1929).

In these nests the host workers and queens were not seen to molest the beetles, although they may do so. In view of this, and also that the beetles are not confined to the ant nests in nature, but probably visit them irregularly from their adjacent habitat niches in the log mold, *Tmesiphorus costalis* may be considered as a facultative synoekete.

The facultative habit brings up a number of interesting questions, one of which is the food of such a species, e. g. do the beetles lead a normal predaceous life, eating what they can capture in the log mold or are they specialized feeders? The question cannot be answered definitely at present, but the beetles were not seen feeding upon the small arthropods which coinhabited the mold. They were found to feed however, upon the brood of their occasional host, *Aphaenogaster fulva*. This is in agreement with similar findings for other ant-nest pselaphids and clavigerids (Park, 1932 a, b), and tends to the conclusion that the species may live apart from the ants, but, unmolested, may raid the brood chamber of the host living within the same log.

*Tmesiphorus costalis* apparently does not feed every day. When four or five beetles were placed in a laboratory nest with a cluster of host eggs and larvae they did not feed upon the brood sometimes for three days as subsequent counting of the latter proved. Irregularly, however, one of the beetles would be seen investigating the clustered brood and carrying away an egg or larva. The beetle would then usually retire to a crevice and devour them. One female was seen to completely chew up and eat one young larva and one egg in just an hour, the sharp, curved mandibles working steadily, while the forelegs held the booty in place and the antennae and palpi kept up a continuous movement. Two hours later the same beetle had carried off and eaten a second larva. During this time the other beetles were spending the day with legs and antennae retracted, beneath bits of moist bark in the nest.

* I am indebted to Dr. M. R. Smith and Dr. Thomas Park for the identification of the host ants mentioned.

LITERATURE CITED.

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PARK, ORLANDO. 1929. Ecological observations upon the myrmecocoles of *Formica ulkei* Emery, especially *Leptinus testaceus* Mueller. Psyche, 36: 195-215.

———— 1932a. The myrmecocoles of *Lasius umbratus mixtus aphidicola* Walsh. Ann. Ent. Soc. Am., 25: 77-88.

———— 1932b. The food of *Batrisodes globosus* (Lec.). Jour. N. Y. Ent. Soc., 40: 377-378.

## Preoccupied Names of Dolichopodid Flies and the New Names Proposed for the Species (Diptera).

By M. C. Van Duzee, Buffalo, New York.

Having known for some time that some of these names were preoccupied, and my attention having been called to others by Abbe O. Parent, I am giving new names to these species, together with the name, author and time of the first description of the species first described under the name.

**Sciapus parvus,** new name for *Psilopus pectoralis* Van Duzee, Panama, American Museum Bulletin, Vol. lxi, Article v, p. 168, April 11, 1931.

A *Psilopus pectoralis* was described by Meij. in 1913 and has since been placed in *Sciapus*.

**Sciapus tenuis,** new name for Sciapus tenuitarsis Van Duzee, Brazil, American Museum Novitates, No. 483, p. 12, August 7, 1931.

A *Psilopus tenuitarsis* Meij. was proposed for a species from New Guinea, in 1913.

**Argyra splendens,** new name for *Argyra splendida* Van Duzee, California, Proc. U. S. National Museum, Vol. lxvi, Art. 23, p. 21, 1925.

An *Argyra splendidus* Meij. was described from Sumatra, in 1916.

**Sympycnus bullacki,** new name, after Mr. Bullock who took the specimens, for *Sympycnus imperfectus* Van Duzee, Guatemala, Proc. U. S. National Museum, Vol. lxxiv, Art. 10, p. 25, February 9, 1929.

A *Sympycnus imperfectus* Becker was described from Europe in 1918.

**Medetera univittata,** new name for *Medetera obesa* Van Duzee, New York State, Proc. Calif. Acad. Sci., fourth series, Vol. ix, p. 264, 1919.

A *Medetera obesa* Kow. was described from Central Europe in 1877.

**Medetera arctica,** new name for *Medetera bicolor* Van Duzee, Alaska, Ohio Journal of Science, Vol. xxii, p. 249, 1923.

A *Medetera bicolor* Meig, was described from Central Europe in 1838.

**Medetera aeneiventris,** new name for *Medetera aeneus* Van Duzee, California, California Academy of Sciences, fourth series, Vol. ix, p. 263, August 26, 1919.

A *Medetera aenea* Meigen was described from Central Europe, in 1838.

**Medetera viridiventris,** new name for *Medetera currani* Van Duzee, Panama, Bulletin American Museum, Vol. lx, Art. v, p. 182, April 11, 1932.

A *Medetera currani* Parent, was described from Africa, January, 1932.

## Water-boatmen Try To Land On Auto Top (Hemipt.: Corixidae).

While collecting insects on September 8, 1932, we drove off the main highway near Atlanta, down a narrow road through a rather sparse thicket, and parked our auto. It was about four P. M., and the sun was shining very brightly. While we were yet in the auto, we noticed what appeared to be many drops of rain striking the top of the auto. Then we noticed that there were a great number of bugs striking the bright radiator hood.

When we got out to catch the bugs we saw hundreds of them striking the bright top of the new auto. We caught several hundred in a few minutes. There must have been several thousand of the corixids that struck the top and radiator hood during the fifteen minutes that we remained there. Mr. H. G. Barber, of the U. S. Bureau of Entomology, identified the water-boatmen as *Arctocorixa nitida* Fieber.

The next afternoon we drove our old auto to the same spot, but none of the corixids struck the car. Then the next afternoon we again drove our new auto to the same spot, and the bugs again struck the top and radiator hood in great numbers.

The sun shining upon the top and radiator hood gave the appearance of water. It was very interesting to watch them as they struck the auto top, a great many of them struck it upside down, then they would use their legs as they would, if they had struck water.

We made a survey of the country near the place, and found a small stream a short distance away. This was only a few feet wide and was overhung with small trees.—P. W. Fattig, Emory University, Emory University, Georgia.

## The Life Histories of Eurema demoditas, Lycaena theonus and L. hanno (Lepid.: Pieridae, Lycaenidae).

By J. R. Haskin, Auburndale, Florida.

The year 1932 was very favorable for the study of butterflies in central Florida. Among the life histories worked out by me were three concerning which little has hitherto been published.

Eurema demoditas Hübner. This has been listed in American catalogues as *E. delia*. For a corrective synonomy please refer to the May number of Entomological News, 1933.

*Eurema demoditas* and its forms deposit eggs on *Aeschynomene viscidula*, *Stylosanthus biflora* and probably other plants of this type when available. The eggs are scattered singly, generally upon upper side of leaves. The egg is irregularly spindle shaped, opaque white, resembling the egg of *E. euterpe* (*lisa*) in size and general appearance. Incubation is three days in warm weather, sometimes four in cooler weather.

The newly hatched larva is about 2 mm. long, head brownish black, body slightly tapered, smooth with a few white hairs, pale yellow-green. In two days it changes, becoming all green including head with a faint light stripe on the sides and with more fine hairs. They camouflage well with the fine stem of food plant and at times are hard to locate. Under favourable conditions they grow to about 8 mm. in about five days. Then growing more rapidly they become 16 mm. in eight days by 2 mm. thickness, tapering to the rear. In 11 to 12 days a well developed larva will reach 20 to 22 mm. in length by about 2.5 mm. in thickness. During the greater part of growth they look as if the waxy semi-transparent green body seen on the lower half was covered by a close fitting blanket over upper half. This is a lighter dull green, cross corrugated, dotted with tiny white spots and sparsely haired. There is a trace of a darker green line on back. The edge of this "blanket" is greenish-white appearing as a pale stripe along the sides. The head is also light green with fine hairs.

After hanging up with button and girdle on a stem of the food plant they remain dormant about a day and then form pupae. A well-developed pupa is 15 mm. in length. In shape it resembles the illustration of *E. lisa* in Holland's book, Plate V, no. 56. It has a waxy semi-transparent appearance, pale

green in color with a few dark markings on wing case and abdomen. Some of the females are very heavily marked with brown coloring. A trace of a dark line along sides is continued as a row of dots on abdomen. In three or four days the yellow and black of the wings shows plainly and in five days the butterfly emerges.

The periods as given above, 20 days in all, cover the warm weather conditions. In the fall months when the weather is distinctly more unfavorable the larval and pupal stages not only lengthen but vary greatly. Eggs taken October 29, hatched in three days, but the larval stage varied from 16 to 42 days and the pupal stage varied from 12 to 16 days. When the temperature becomes lower than 50 degrees F. the larvae lie dormant. Low temperature retards the development of the pupae also.

LYCAENA THEONUS Lucas. This butterfly oviposits in the half-developed flower heads of such plants as the cultivated *Plumbago*. The eggs are rather flattened turban-shaped, micropyle very slightly depressed, surface finely pebbled, color a pale tint of Plumbago blue, cross section about ½ mm. and depth ¼ mm. They hatch in three to four days.

Larvae are flesh colored, hairy, tapering slightly to the rear. Head is small, dark brown, tucked under a cowl-like projection. Length about 1 mm. These larvae at once eat little holes in the side of tender partly developed buds. In four days they increase from two to 3½ mms. and are big enough to eat the entire flower buds. By the eighth day they are 6 to 7 mm. in length. The skin is curiously roughened, joints strongly articulated, traces of pale lines showing along the sides. In 10 to 12 days they become 8 to 9 mm. in length by 2 mm. in breadth. The color is green with an over tone of russet red, skin rough, head and legs concealed by overlapping fringe. The cross section of the body is roughly triangular with the apex depressed.

In about 15 days the chrysalids are formed on the under side of leaves. In constructing the girdles some fail to make a single girdle but support themselves by a number of single strands most of which however unite over the back. They are about 6.5 mm. long by 3 mm. wide and 2 mm. deep. Thorax is flesh-colored and abdomen a pale tan. A few dark gray

specks are scattered over the surface with an irregular dark line along the sides. Abdomen is slightly haired. Under side is not flattened but rounded. In a general way it resembles the pupa of *comyntas*. In four days the butterfly colors show and in six to seven days the butterflies emerge.

This study was made during the first half of the warm and dry month of September.

In April, 1933, I found *theonus* ovipositing on *Galactia pilosa*, on Lower Matecumba Key in Florida.

LYCAENA HANNO Stoll. This common butterfly oviposits abundantly on *Chamaecrista brachiata* and *aspera*. Fine large specimens also develop from eggs laid in the partly developed heads of the Crab's-eye vine, *Abrus precatorius*.

I watched a female laying eggs on the Partridge Pea (*brachiata*). The leaf of this plant is made up of 20 to 30 leaflets. Hanno would light on the upper side of a leaf near the main stem and crawl slowly across the branching leaflets dragging its tail along the surfaces. When it came to a fair opening between two leaflets it stuck its tail through and by curling it under would deposit an egg on the under side of the leaf. The dwarf or hairy Partridge Pea (*aspera*) has a leaf composed of 40 to 50 small leaflets set closely together. When laying eggs on this plant Hanno does not attempt the same tactics but oviposits either on the upper side of a leaflet or on the very hairy stem of the new fresh growth. On the Crab's-eye vine the eggs are tucked in between the half-developed buds.

In this district, Hanno's number is kept low by a minute parasite wasp which deposits its egg in the butterfly's egg. This parasite has been identified by Mr. Gahan, of the U. S. National Museum, as "*Trichogramma* sp., probably *minutum*, Riley." Added to this many eggs seem to be infertile. Less than 10% developed larvae out of a large number gathered.

The egg of *hanno* is a dainty light plumbago blue the shade varying slightly on different eggs. It is turban-shaped, rather flat, with a depressed top and a tiny green center. Width is a shade over ½ mm. and depth ¼ mm. Surface is roughend with a finely pebbled pattern. Incubation is three days.

The larvae on emerging are about 1 mm., black head, flesh-colored body with a few long, scanty, upstanding hairs. They immediately seek young partly-developed flower buds and feed on the sides of the buds. In a day or so the color becomes clear amber. In three days the larva changes, the skin roughens and becomes more hairy, head black, body flesh-colored, length about 2 mm. In 5 or 6 days some become green and others rufous in color, length about 4 mm. In 11 days the green and rufous colors are strongly marked, the tiny black head on a transparent neck is hidden along with its legs by folds that over-lie them. Segments are well-articulated, cross-section of body triangular with raised apex. There is a curious green raised dot on either side of the 11th segment. The larvae attain full growth of about 8 mm. in 14 to 18 days. The green larvae have a reddish stripe along the back while the rufous-colored ones have a greenish under-shade. They now retire to the dead leaves on the floor of the breeding cage and after lying quietly one or two days the pupae are formed.

The pupae are waxy pale green with a trace of a line along the center of abdomen. In shape they somewhat resemble *L. scudderi* and are 9 mm. in length, the abdomen much larger than the thorax. As pupation progresses the wings show whitish, then blue and white, the abdomen waxy green. In five to eight days the butterflies emerge.

This study was made during the period from September 25 to October 27, 1932, with eggs gathered in five separate lots.

## Personals.

We learn through *The Naturalist* that Mr. Herman J. Erb is now employed by the Standard Scientific Supply Corp., New York, cataloging, indexing and organizing the entomological department of that company. Their publication, *The Naturalist* is devoted to the interest of the naturalist, scientist and collector and the first issue contains many little newsy articles of interest. It may be secured by addressing the publishers, 34 West 4th Street, New York.

We note in *The Pan Pacific Entomologist* that Dr. E. C. Van Dyke is having an interesting and profitable trip thru Europe studying at the large museums and plans to do some collecting in Egypt.

## Change of Address.

(Miss) Harriet A. Wickwire, Camp Wyoda, Little York, New York, formerly 55 Tomkins Street, Cortland, N. Y.

## Additional Notes on Myiasis in Rabbits (Dipt.: Calliphoridae, Sarcophagidae).

By R. A. Roberts, Division of Insects Affecting Man and Animals, Bureau of Entomology, U. S. Department of Agriculture.

The frequency of screw worm infestations in *Lepus californicus texianus* Waterhouse, the common Texas jack rabbit, at Uvalde, Texas, has led to the conclusion that myiasis in rabbits is not uncommon in nature.

Johannsen, in 1926, wrote of the occurrence of larvae of *Wohlfahrtia vigil* Walk. in young rabbits reared in the open at Ithaca, N. Y. He has continued to observe attacks by this species on rabbits.

In 1931 the author reported several cases in which blowfly attacks on jack rabbits followed either gunshot wounds or lesions caused by the larvae of *Cuterebra*. These instances occurred in 1930, and since then two additional cases of infestations of gunshot wounds have been observed. These are here described in detail, the *Sarcophaga* being determined by David G. Hall.

As soon as the rabbits in the two cases were killed collections of larvae from the wounds, together with the flesh surrounding the affected area, were immediately removed from the animal and placed in quart Mason jars containing sifted sand. These jars were capped with lids of 60-mesh wire cloth and placed in fly-proof cages in a fly-proof insectary. No subsequent fly infestation was therefore possible.

*Case 1.* On July 24, 1931, an adult jack rabbit weighing 6½ pounds was killed in dense mesquite brush. An infested wound 30 by 50 mm. was found on the left rump at the base of the tail, extending through the fleshy portion to the inside of the leg where it again opened. It was apparently caused by a small-caliber rifle. Some of the fly larvae present were mature, and it appeared that others had migrated. This suggested an old wound. A seropurulent discharge was occurring, and the wound had an extremely foul odor. The larvae had worked entirely through the leg, and additional fly eggs had been de-

posited recently on the side of the wound. It was apparent that the rabbit would have died. The following adult specimens were reared from the larvae which remained in the wound: August 5 to 7, 35 *Cochliomyia macellaria* Fab.; August 15, 1 *Sarcophaga plinthopyga* Wied.

*Case 2.* On May 20, 1932, an adult jack rabbit was killed in a dense growth of mesquite and cactus. An injury in the head, another on a rear leg, and roughened spots on other parts of the body indicated that the rabbit had been previously wounded with a shotgun. The rabbit was greatly emaciated. The wound, 45 mm. in diameter, in the lower right side of the face, penetrated through skin and flesh into the interior of the mouth, extending up to about 25 mm. below the eye, and included the right nostril. There was no discharge or pus although the wound appeared old. There were many small maggots and some larger ones; a fresh lot of eggs had been deposited on the margin of the wound. The rabbit apparently would have died. The emergence from the larvae collected was as follows: May 31 to June 1, 16 *C. macellaria;* June 6 to 15, 583 *S. plinthopyga;* and June 13-14, 2 *Brachymeria fonscolombei* (Dufour). The last mentioned insect is a hymenopterous parasite of blowflies, and this is the first record of its being reared from blowfly larvae removed from a wound. However, this parasite has been observed upon wounds in living cattle.

In each of these cases, and in those previously recorded by the author, the screw worm fly, *C. macellaria,* was reared. In all instances of gunshot wounds, larvae of *S. plinthopyga* were present. *S. plinthopyga* did not accompany any infestations of screw worms in *Cuterebra* lesions in rabbits, but in one instance *Sarcophaga sulcata* Ald. was found.

Blowfly attacks in rabbits probably follow many gunshot wounds, and it is probable that during the seasons with weather favorable for fly attacks such infestations result fatally. An infestation of a body wound is almost certain to result in the penetration of the intestine, and a head wound permits early penetration of the mouth and nostrils. Infestations occasionally occur within *Cuterebra* lesions, which are usually on the rump, if favorable conditions of temperature and humidity exist.

In most cases noted, additional masses of eggs, probably of *C. macellaria* but possibly of *Lucilia*, had been deposited on the wound margins. From the second case noted in this paper, the 583 *S. plinthopyga* larvae would be sufficient to consume the soft tissues of the entire head of the rabbit.

On October 16, 1931, a matured *Cuterebra* larva was removed from the back of a jack rabbit. The larva was placed in a pint Mason jar containing 2 inches of dry sand, where it overwintered as a pupa. At no time was moisture added. Four and a half months (136 days) later, on February 29, 1932, an adult male *Cuterebra scudderi* Tns. emerged. This is a rather rare species. It was determined by J. M. Aldrich.

LITERATURE CITED.

JOHANNSEN, O. A. 1926. *Wohlfahrtia vigil*, a parasite upon rabbits. Jour. Parasit. 13: 156.

ROBERTS, R. A. 1931. Myiasis in Jack Rabbits, *Lepus californicus texianus*. Jour. Parasit. 18: 102-104.

# Entomological Literature

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

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. — Bergmann, A.** — Professor Dr. Otto Schmiedeknecht. Ein lebensbild eines grossen deutschen entomologen. [18] 27: 25-33, ill. **Campos, F.**—Estudio sobre una Pequena Coleccion de Insectos de Puna Vieja y Archipielago de Galapagos. [108] 14: 9-14. **Deville, J.**

**St. C.**—La vie et les travaux de. Par P. de Peyerimhoff. [24] 102: 1-8, ill. **Dodge, E. A.**—Obituary. By E. P. Van Duzee. [55] 9: 52. **Holford, H. O.**—Greasy insects. [9] 66: 92. **Keifer, H. H.**—Insect notes on Paraneura sp., Homaeosoma sp., Andrena sp. [55] 9:62. **Phillips, M. E.**—Insect photography. [Nat. Mag.] 21: 210-211, ill. **Ramme, W.**—Mimes of the insect drama. [Nat. Mag.] 21: 235-237, ill. **Straubel, H.**—Entomologie, schule und sammeltätigkeit. [17] 50: 89-91. **The Naturalist.**—A good method outlined for preserving live pupae through winter months. [Stand. Sci. Sup. Corp. N.Y.C.] 1: 1. **Van Duzee, E P.**—Insects at the California Academy of Sciences. [55] 9: 72. **Zikán, J. F.**—"Doppelgänger" der neotropischen insekten-fauna. [105] 3: 38-45.

**ANATOMY, PHYSIOLOGY, ETC.—Abbott, R. L.**—Instinct or intelligence in the great golden digger. [Pro. Iowa Acad. Sci.] 38: 255-258. **Baumann, C.**—Zur kenntnis der metamorphose von Ephialtes manifestator, Coleocentrus excitator und Echthrus reluctator (Ichn.). [34] 102: 143-155, ill. **Bodenheimer, F. S.**—Ueber die aktivität von Vespa orientalis im jahresverlauf in Palästina. Ein beitrag zur ökologischen methodik. [34] 102: 135-140, ill. **Richards, A. G.**—Comparative skeletal morphology of the noctuid Tympanum. [70] 13: 43pp., ill. **Tan & Li.**—Variations in the color patterns in the lady-bird beetles, Ptychanatis axyridis. [Peking Nat. Hist. Bull.] 7: 175-193, ill.

**ARACHNIDA AND MYRIOPODA.—*Gertsch, W. J.**—Notes on American spiders of the family Thomisidae. [40] 593: 22 pp. ***Hilton, W. A.**—A new whip-scorpion from Cuba. [55] 9: 91-92. **Petrunkevitch, A.**—An inquiry into the natural classification of spiders, based on a study of their internal anatomy. [Trans. Connecticut Acad. Arts & Sci.] 31: 303-389, ill.

**THE SMALLER ORDERS OF INSECTS.—Bartenef, A.**—Uebsicht der Leucorrhinia-Arten-und-Varietäten (Odonata, Libellulinae) unter geographischen, biologischen und morphologischen gesichtspunkten. [52] 2: 1-53, ill. ***Emerson, A. E.**—A revision of the genera of fossil and recent Termopsinae (Isoptera). [67] 6: 165-195, ill. **Goetsch, W.**—Die chilenischen termiten. [89] 64: 227-244, ill. ***Hood, J. D.**—Rhabdothrips albus, a new genus and species of Thysanoptera from Panama. [10] 35: 45-48, ill. **Mills & Rolfs.**—Collembola from the state of Washington. [55] 9: 77-83. ***Moulton, D.**—The Thysanoptera of South America. [105] 96-133, ill. **Navás, L.**—Insectos Suramericanos. [Rev. Acad. Cien. Madrid] 29: 191-198, ill. **Walker,**

## 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. Sborrnik 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., Acadêmie 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.
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista Entomologia, São Paulo, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Stylops: a Journal of Taxonomic Entomology, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.

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**COLEOPTERA.**—***Bierig, A.**—Especies nuevas o poco conocidas de Neobisnius (Staphylinidae) de la region neotrópica. [105] 3: 48-57, ill. ***Blair, K. G.**—Further Coleoptera from the Galapagos Archipelago. [75] 11: 471-487. ***Blaisdell, F. E.**—A new species of Helops from Guadalupe Island (Tenebrionidae). [55] 9: 88-90. **Böving, A. G.**—Description of the larva of Decadiomus pictus (Scymnini, Coccinellidae). [Pro. Biol. Soc. Washington] 46: 101-104, ill. ***Bruch, C.**—Coleópteros mirmecófilos de Misiones (Staph. Pselaph. Hister.). [105] 3: 12-37, ill. ***Bruck, C. R.**—Two new species of Phloeosinus Chapuis (Scolytidae). [4] 65: 54-56. **Campos, F.**—Anormalidades observadas en una pareja de Stenodontes villardi. Nueva anormalidad observada en el Coleoptera Euchroma gigantea. [108] 14: 15-16; 21-22, ill. ***Chapin, E. A.**—A new genus of West Indian Coccinellidae. [Pro. Biol. Soc. Washington] 46: 95-100, ill. ***Hopping, R.**—A new buprestid from British Columbia, with notes on the genus Buprestis. [55] 9: 84-88. **Linsley, E. G.**—Two interesting new records. [55] 9: 92. ***Linsley, E. G.**—A new species of Neoclytus from White Fir (Cerambycidae). [55] 9: 93-94. A new California clerid beetle. [55] 9: 95. **Metcalf, C. L.**—Thylodrias contractus. [12] 26: 509-510. ***Musgrave, P. N.**—New species of Helmidae. [10] 35: 54-57, ill. **Parkin, E. A.**—The larvae of some wood-boring Anobiidae. [22] 24: 33-68, ill. **de Peyerimhoff, P.**—Les larves des Coléoptères d'après A. G. Boving et F. C. Craighead et les grands critériums de l'ordre. [24] 102: 77-106. **Smith, O. J.**—A study of the Tenebrionidae of southeastern Iowa. [Pro. Iowa Acad. Sci.] 38: 259-265, ill.

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**SPECIAL NOTICES.**—Bibliography of Australian Entomology 1775-1930, with biographical notes on authors and collectors. By A. Musgrave. A 380 page publication of the Royal Zoological Society of New South Wales 1932, which students of other faunae may find useful.

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The first Lieferung of *Bibliographia Odonatologica*, compiled by Dr. Erich Schmidt, Berlin-Steglitz, and published by Fritz Wagner, Vienna, xviii, Haizingergasse 4, has appeared under date of April 15, 1933. Announcement of this project was made in the NEWS for November, 1931, page 246. This installment comprises one plate and 116 pages in large clear type. The text contains the titles and places of publication of all papers, in chronological order, on Odonata, under authors' names, arranged aphabetically, from Aaron to Dobson. In many cases the author's name is followed by the dates of his birth and death, the locality in which he chiefly lived or worked and references to biographies or obituary notices. Plate I is labeled "Amerikanische Autoren" and contains portraits of E. M. Walker, E. B. Williamson, P. P. Calvert, C. H. Kennedy and J. G. Needham. It is expected that 4 or 5 additional parts, each of 80-96 pages and a plate of portraits, will be required to complete the book. Until the publication of Lieferung 2, the price for the entire work is 1.20 Reichsmark for each "Bogen" (16 pages) and .80 RM. for each plate. Afterward the price will be 1.50 and 1.00 RM. respectively. The last part is to include subject, zoogeographical, anatomical, physiological, evolutionary, migrational and other indexes. The bibliography appears to be very complete and should be extremely useful. As the publication of the entire work awaits a sufficient number of subscribers, it is to be hoped that all students of this group of insects and all entomological laboratories and libraries will assist themselves by subscribing at once.

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Probably every student of Lepidoptera has seen or is aware of the magnificent work on that order entitled THE MACRO-LEPIDOPTERA OF THE WORLD by Dr. Adolf Seitz, now being published by Alfred Kernen of Stuttgart.

Without doubt it is, in this line, the greatest undertaking of recent years, and too much applause cannot be given Dr. Seitz for giving the entomological world such a splendid monument. Its conception was daring and its production, now in its twenty-sixth year, required courage, and faith in mankind. Its completion is essential and Dr. Seitz should have the support of all those able to give such, either financially by subscribing to it, or by collaborating in its production.

The plan of the author in this great work was to describe and figure all of the known species of butterflies and the larger moths of the world, giving their systematic arrangement based on the most recent revision by recognized authorities. This attempt to cite all the known species with their important synonyms, and to illustrate in color almost every species mentioned, is fairly well carried out, and this alone makes the work an absolutely necessary part of the library of every working macro-lepidopterist.

The work appears in two parts, (1) Palaearctic Fauna, consisting of four volumes completed, 1864 pp., 345 pls., and four supplementary volumes now printing. (2) Exotic Fauna, which is divided into three sections, Americana, Indo-Australiana and Africana, which will comprise sixteen volumes. The volumes on the butterflies 2956 pp., 460 pls., and some of those on the moths are completed. A seventeenth volumn will treat of the morphology, biology and geographical distribution. The work is published in quarto size, in German, French and English editions, and may be secured from the publishers in any desired combination of families. Information will be gladly supplied by addressing Alfred Kernen, Verlag, Poststrasse 7, Stuttgart, Germany.

However commendatory this work may be, there are, as is to be expected, some imperfections, especially errors in typography and in taxonymy, and others which are more or less pardonable. But we also find a few which are not excusable, and these latter should be called to the attention of those consulting the work. Not being a lepidopterist in the strictest sense of the word, I may possibly lay too much stress on what will be considered trivial, ignoring, for lack of knowledge more of the fundamental. But it is these trivial things that are annoying and quite numerous while the fundamental are probably few. It is by having had to consult this great work in attempting to determine species when rearranging collections of

American Heterocera, and by instances called to my attention by authoritative students of this order, that the following remarks are made.

The quality of the color work on the numerous plates is sometimes very poor, which when figuring species very similar in color and pattern, renders the illustrations practically worthless. We often find an entirely different color from that described, or the pattern too prominent, or rarely entirely incorrect. Of course the mechanical rendition of the correct colors and their tints and shades is extremely difficult, and one cannot expect to secure by this means an exact reproduction of the original colors without incurring prohibitory expense. On the other hand an incorrect color figure is very misleading and of possible value only if showing the pattern clearly enough to assist the description of the color. Better still in such cases would be references to good previous figures of the species, if such exist, and which would be well worth the extra line or two.

It was, of course, necessary to have different students work up the families or groups in which they are considered to be, and should be, authoritative, but the selection of these collaborators, in some cases was very unfortunate. This resulted in considerable difference in the quality of descriptions; indeed many are quite worthless. I have seen some inexcusable errors in giving references to the illustrations, errors in giving the name of the author of the species, sometimes omitting it entirely, evidence of poor proofreading. Sometimes a specific name will be changed in one place and not in another. Errors in giving the vein terminology correctly, often result in such glaring nonsense as "vein 2 midway between 2 and 4." These of course are readily caught by one familiar with the subject discussed. More serious it is that there is no uniformity in the vein terminology, which in some instances will no doubt lead the novice far astray. Some collaborators use the number system of Meyrick and Hampson; one uses median for the veins which another terms the radials, or radials of one are the subcostals of another. One often runs against "dead ends" where a comparison is made with a species not mentioned in the work, or with species which do not appear from the description or figure to be enough alike for comparison. This latter procedure is very common.

Inexcusable and much to be criticized is the trend, encountered now and then, of a collaborator discoloring his work with personalities, often going so far as to make bare misstatements of facts. As an example may be selected a part on the Rhopalocerous genus *Lycaena* where we find the following statement: "*pallidecramera* and *pallidecanaricusis* Verity are two names Dr. Verity has kindly provided for forms still to be discovered

which he presumes to occur in damp localities in Africa. . . . A kindlier provision for the future can scarcely be imagined." The fact is, as can be readily ascertained, Dr. Versity based these names on forms from Northern Africa elegantly figured by Oberthür in his magnificent "Études de Lépidoptérologie Comparée." One consulting this part of the work should be cautious in accepting statements made therein. Very annoying are the long delays in the appearance of a plate or two in a group where all the text and the other associated plates have been issued for some time. I note here one instance where the text was printed in 1928, and one of the associated plates has not yet appeared.

These remarks may seem to convey the idea that we here have a very imperfect and impractical work. I hope that no one will so understand my purpose. These volumes have a place on our work tables that cannot be taken by any other. They are of inestimable value and are constantly being used by many working macrolepidopterists. I have said above that errors cannot be eliminated in a work constructed as this one is, and my purpose here is to call the attention of lepidopterists to this grand work, and also prepare them for the nature of some of the errors contained therein. E. T. Cresson, Jr.

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Lehrbuch der Entomologie, by Professor Hermann Weber, of Danzig. 726 pages, 555 figures. Published by Gustav Fischer, Jena.

A first glance through the pages of this book, treating largely of insect structure, reveals at once that we have opened something *new* in entomological texts. The general appearance breaks with tradition, most of the old familiar illustrations are absent, and a multitude of new ones takes their places; entomology here asserts that it has passed its adolescent stage.

The book is not only predominantly morphological in the sense that it deals largely with structure and the homologies of structural parts, but it is morphological from the viewpoint that anatomical form is an adaptation to function. In other words, the morphology of insects becomes a part of the biology of insects, as it properly should be. The chapters do not follow the conventional classification of organs according to anatomical continuity of tissues; the subject of each section embraces the organs that are functionally associated in the maintenance of the physiological activities of the insect. Animal functions that maintain the individual consist of two principal groups of activities, namely, metabolism and movement; thereto, and utilizing each, is added the function of reproduction. For the first time in entomology we have a general text book in which

the subject of morphology is built up on this fundamental fact.

The first chapter gives a leading example of the naturalness and educational value of associating in a text the organs that work together in the economy of the animal. It deals with the skeleton and the musculature; that is, it presents as a unity the structural elements of insect mechanisms. In the older text books on entomology, the skeleton and the muscles had little to do with each other, except perhaps that a few diagrams showed something of the mechanism of a leg or the wings. If the muscles were given particular attention they were assigned to a special chapter on muscles. Here the student could leave them if he so chose, and he usually did so choose. As a consequence many entomologists have grown up with the idea that a work on insect anatomy is principally the making of a map of the skeletal sclerites. Far from being an exhausted subject, the study of the external structure of insects offers yet to the student its most interesting and instructive phase, which is that of understanding the relation of sclerites to muscles, and of following thus the evolution of insect mechanisms.

From the practical standpoint of determining the homologies of skeletal parts used in the description of insect species, a study of muscles will easily vindicate itself. Where endless series of comparative studies on sclerites have been made without leading to conclusive results, a reference to the muscles will in many cases show at once fundamental structural distinctions that were overlooked entirely in purely surface studies. However, it is the fate, or the natural course, of most sciences, and particularly of entomology, to progress backward. Hence, it is encouraging to feel that, with the arrival of a new guide, we are at last able to see where we are going.

The only faults that can be found in Dr. Weber's treatment of the skeletal parts are in places where he has not sufficiently based his scheme of skeletal homologies on the muscle relations. Thus his treatment of the labium is not entirely satisfactory or consistent, because the primary elements of the organ are not distinguished in all cases according to the evidence from muscle attachments. Also, it would appear, the homologies of the ingestive mechanism are not consistently followed through the various groups of insects, especially in the sucking orders. But the field is new, and further studies are certain to throw more light on structural relationships that are as yet imperfectly understood. On the other hand, the author gives us a wealth of anatomical details from his own wide knowledge of the feeding mechanism of insects.

*The Nervous System and the Sense Organs* furnish the sub-

ject matter for the second chapter. Much of the text on the nervous system deals with the finer structure of the nerve centers, such as the interrelation of the fibrous tracts in the brain and the ventral nerve cord. To the sense organs are devoted 67 pages, in which the author apparently has condensed and tabulated practically all that is known on the subject of sense receptors in insects, and what is not incorporated in the text is made available by the many bibliographical references.

The third chapter, entitled *The Interaction of the Sense Organs, the Nervous System, and the Effectors*, links up the chain of structural elements described in the two preceding chapters. It includes a discussion of the physiology of reflexes· coördination, orientation, and the usual tropisms.

The fourth chapter, on *The Organs of Metabolism*, is a natural assemblage of the structural parts of the insect's body that maintain the chemical life of its constituent cells. The chapter, therefore, treats of the organs of alimentation, the Malpighian tubules· the respiratory system, the blood, the organs of circulation, the oenocytes, and the fat body, and includes for good measure the ectodermal glands.

The subjects of the fifth chapter, *Reproduction and Development*, are associated with each other, as they are in many text books, though biologically they are quite distinct processes. The two may· and often are, put at opposite ends of a book, and, indeed, it is a perplexing problem to decide whether development should be used as a guide to adult structure, or given as the biological sequence of the reproductive function. Since a book must have a beginning and an end, the author must decide where to cut the life cycle. The text treats fully the organs of reproduction, the history of the germ cells, fertilization, egg-laying, nest building, care of the brood, and concludes with 58 pages devoted to ontogeny in its wider sense, including embryonic and postembryonic development.

The sixth chapter is a condensed survey of the principal fields of insect ecology. The seventh and final chapter presents a brief but comprehensive review of insect classification. The remainder of the book includes many pages of classified literature references, probably 2000 entries by author's name and place of publication, and concludes with an ample index.

The subject of insect morphology, as demonstrated by Dr. Weber's book, has now reached a stage in which it may rightly assert its ability to render the fundamental services that should be expected of it to the other branches of entomological science, particularly, in taxonomy and insect relationships, physiology, and ecology. R. E. Snodgrass.

# EXCHANGES

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

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

**Wanted**—The first thirteen volumes of Entomological News, 1890 to 1902 inclusive. Preferably in original monthly parts, unbound. Write John M. Geddes, 331 High St., Williamsport, Pa.

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**Wanted**—October, 1919, and December, 1919, copies of Bulletin of the Brooklyn Entomological Society. Cash. Harriet A. Wickwire, 55 Tompkins St., Cortland, N. Y.

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**JULY, 1933**

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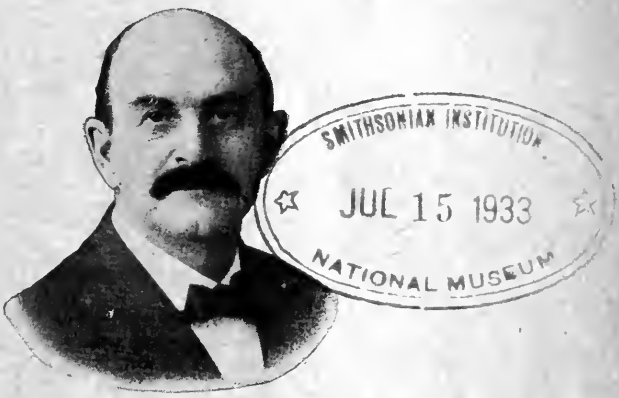


CHARLES WILLISON JOHNSON
1863-1932.

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows:

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| United States and possessions, Central and South America . . | $3.00 |
| Canada . . . . . | 3.15 |
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Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance.
One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 7.00
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# ENTOMOLOGICAL NEWS

VOL. XLIV. JULY, 1933 No. 7

## An Apparently Undescribed Hesperia (Lepid.: Hesperiidae).

By R. A. LEUSSLER, Omaha, Nebraska.

**Hesperia yosemite,** new species.

In December, 1930, I received from Mr. E. A. Dodge, the well-known Lepidopterist of Santa Cruz, Calif., a small series of a *Hesperia* species. These skippers had been collected near Yosemite, Calif., Sept. 2, 1929, by his friend and co-worker Mr. John Strohbeen, also of Santa Cruz. Both Dodge and Strohbeen recognized that the form was probably new. Mr. Strohbeen kindly sent me some additional specimens and reported that the skippers were taken on a big Oak Flat near Yosemite Valley, and that they were numerous there.

A careful study of the material suggested that the specimens were possibly *harpalus* or *cabelus*, but Dr. Holland, to whom specimens had been sent for comparison with the types, wrote, shortly before his death, that he had made a close and critical comparison and that they were neither *cabelus* nor *harpalus* but a small hitherto undescribed species, very near *cabelus* and *harpalus* but distinct. Ernest L. Bell, who also obtained specimens from Dodge, states that they are of quite different appearance than other members of the group and cannot be satisfactorily placed under any present name. A name therefore would seem to be in order, and following the practice of giving geographical names to species in this group, I propose the name *yosemite*. A description follows:

*Male,* upper side: Primaries bright yellow fulvous, dark border on outer margin, fulvous apical spots within the border well defined. Stigma clear cut and without shading. Secondaries same ground color as primaries; dark border very narrow on outer margin somewhat broader on costa. Underside: primaries paler than upper side, apical spots and outline



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of stigma reproduced, inner margin paler than remainder of wing. Secondaries beneath, yellow with a faint greenish-grey cast. Spots small and creamy white.

*Female*, upper side: ground color of both wings somewhat paler than male; dark borders darker, broader and more clearly defined. Apical spots on primaries quite distinct in this sex, and on the secondaries the spots of lower surface show through above. The underside in the female sex is paler, the secondaries being a peculiar grey, tinged with greenish-yellow, and the spots are a clearer white than in the males.

Expanse: Male 26 mm., female 26 mm.

The above is a description of the ♂ holotype and ♀ allotype which are in the collection of the writer. There were before me, at the time of describing, 25 additional males and 15 additional females, belonging in part to E. L. Bell and to E. A. Dodge. All of these are designated paratypes. There is as usual more or less variation in size and in the width and intensity of dark borders in the series. The types, however, were selected as representing a fair average in these characters. In two of the males the underside of secondaries is immaculate, while in several others the spots are yellowish.

This is decidedly the smallest of the known N. A. species of *Hesperia*. The smallest male measures 22 mm., while the largest measures but 28 mm. The smallest and largest females measure 24 and 28 mm., respectively.

Compared with *cabelus* and *harpalus* this insect, according to Dr. Holland, is:

1. Smaller than either of the foregoing.
2. The ground color is brighter on the upper side.
3. The terminal borders of the primaries are narrower.
4. The stigma on the primaries is more sharply defined and seems different in extent and outline.
5. The light spots on the underside of the secondaries, which are not visible in *cabelus*, are quite different from what appears in the female type of *harpalus*.

From *oregonia*, which it also somewhat resembles, it can be distinguished by its smaller size, brighter color of upper surface, different color of underside of secondaries and lighter spots thereon.

## List of Entomological Papers Written by Dr. W. J. Holland.

By A. Avinoff, Carnegie Museum, Pittsburgh, Pennsylvania

1. Contributions to a knowledge of the Lepidoptera of West Africa, I, *Trans. Amer. Ent. Soc.* XIII, 1886, pp. 323-332. 2 pls., 3 new sp.

2. The larva of *Liphyra brassolis*. Probably Aphidivorous. *Canadian Entomologist*, Vol. XIX, 1887, p. 61 *et seq.*

3. Correspondence. *Entomologica Americana*, 1888, p. 35 *et seq.* Contains an account of the entomological collections of the writer.

4. Notes upon a small collection of Rhopalocera made by the Rev. B. C. Henry in the Island of Hainan, together with descriptions of some apparently new species. *Trans. Amer. Ent. Soc.*, Vol. XIV, 1888, pp. 111-124 (1 new genus, 9 new sp.)

5. A New Work on Japanese butterflies: Review of "Rhopalocera Nihonica" by H. Pryer. *Canadian Entomologist*, Vol. XX, 1888, pp. 77-78.

6. Captures made while traveling from Winnipeg to Victoria, B. C. *Canadian Entomologist*, Vol. XX, 1888, p. 89 *et seq.*

7. Annotated catalogue of the Insects collected in 1887-88 by the U. S. Fish Commission Steamer "Albatross." Lepidoptera by W. J. Holland. *Proceedings U. S. N. M.*, Vol. XII, 1889, p. 201 *et seq.* (Protoparce galapagensis sp. nov.)

8. Contributions to a knowledge of the Lepidoptera of West Africa, II. List of African Sphingidæ received during the years 1887-1888. *Trans. Amer. Ent. Soc.*, Vol. XVI, pp. 55-70, 3 pls. (4 new gen., 12 new sp.). March 1888.

9. Description of New Species of Japanese Heterocera. *Trans. Amer. Ent. Soc.*, Vol. XVI, 1889, pp. 71-76 (9 new sp.). March.

10. List of the Diurnal Lepidoptera taken by William Doherty of Cincinnati in Celebes, June and July, 1887, with descriptions of some apparently new forms. *Proc. Boston Soc. Nat. Hist.*, Vol. XXV, 1890, p. 52-82, 3 pls. (11 sp. nov.).

11. Descriptions of three new species of African Hesperiidæ. *Entomological News*, 1890, pp. 155-6.

12. Descriptions of new species of African Hesperiidæ. *Entomological News*, 1891, pp. 3-5. (3 new species.).

13. New species of *Neptis* from Africa. *Entomological News*, 1891, pp. 248-9 (1 pl.).

14. Descriptions of New West African Lycænidæ. *Psyche*, Nov.-Dec., 1890, pp. 1-9 (1 new genus, 25 new species).

15. Descriptions of New West African Lycaenidæ. *Psyche,* March, 1891.

16. Collecting and Preserving Insects. In "Taxidermy and Zoological Collecting," by W. T. Hornaday. Scribners, 1891, pp. 305-338.

17. The Life-history of *Spalgis s-signata* Holland. *Psyche,* Jan. 1892, p. 201-3, 1 pl.

18. Notes upon the Transformation of Some African Lepidoptera. *Psyche,* Feb. 1892, pp. 213-16, 1 pl.

19. Report upon the Insects Collected by the U. S. Eclipse Expedition to West Africa, 1889-90. Lepidoptera by W. J. Holland. *Proc. U. S. N. M.,* Vol. XVI, 1892, pp. 568-572.

20. Descriptions of some new species of African Lepidoptera. *The Entomologist,* (London) Supplement to Vol. XXV, 1892, Sept. 1892, pp. 89-95 (1 new genus, 21 new sp.).

21. Descriptions of some new species of African Lepidoptera. *Ann. &Mag. Nat. Hist.,* Oct. 1892, pp. 284-295 (2 new gen., 17 new sp.).

22. Descriptions of four new West African Butterflies. *Canadian Entomologist,* Vol. XXV, 1893, pp. 1-3.

23. Some New and Little Known African Butterflies. *Entomological News,* 1893, pp. 22-27 (11 new species.).

24. New African Nyctemeridæ and Liparidæ *Entomological News,* 1893, p. 54-62, 1 pl. (17 new species.).

25. New Genera and Species of West African Limacodidæ. *Entomological News,* 1893, pp. 102-105, 1 pl. (4 new gen. and 19 new species ).

26. Three New West African Bombycids. *Entomological News,* 1893, pp. 136-7, 1 pl.

27. New Species of West African Drepanulidæ. *Entomological News.* 1893, pp. 171-180, 1 pl. (4 new gen., 22 new sp.).

28. New Exotic Lepidoptera. *Entomological News,* 1893, pp. 337-344, 1 pl. (13 new sp.).

29 Descriptions of New Species and Genera of West African Lepidoptera. *Psyche,* Jan. 1893, pp. 373-376 (16 new sp.).

30. (Continuation). *Psyche,* Feb. 1893, pp. 393-406 (1 new genus, 36 sp. nov.).

31. (Continuation). *Psyche,* March, 1893, pp. 411-418 (3 new genera, 33 sp. nov.).

32. (Continuation). *Psyche,* April, 1893, pp. 431-4 (1 new genus, 10 sp. nov.).

33. (Continuation). *Psyche,* May, 1893, pp. 451-4 (1 new genus and 10 sp. nov.).

34. (Continuation). *Psyche,* June, 1893, pp. 469-476 (1 new genus, 34 sp. nov.).

35. (Continuation). *Psyche*, July, 1893, pp. 487-90 (2 new genera, 15 sp. nov.).
36. (Continuation). *Psyche*, September, 1893, pp. 513-20 (2 new genera, 16 sp. nov.).
37. (Continuation). *Psyche*, October, 1893, pp. 531-8 (5 new genera, 16 sp. nov.).
38. (Continuation). *Psyche*, November, 1893, pp. 549-52 (3 new genera, 9 sp. nov.).
39. (Continuation). *Psyche*, December, 1893, pp. 565-8 (1 new genus, sp. nov.).
40. Butterflies of China, Japan and Corea. Book review of the great work by John Henry Leech. *Canadian Entomologist*, Vol. XXVI, pp. 113-4.
41. Four New Genera and Species of West African Sesiidæ. *Journal New York Entomological Society*, Vol. I, Dec., 1893. Illustrated, pp. 181-4.
42. African Hesperiidae. *Entomological News*, 1894, pp. 26-31, 1 pl. (9 sp. nov.).
43. Notes upon a Small Collection of Butterflies from Serra (Sjerra), Timor. Laut. *Entomological News*, 1894, p. 39.
44. New West African Dysgoniidæ. *Entomological News*, 1894, pp. 57-9, 1 pl. (5 new sp.).
45. Some New and Little Known African Hesperiidæ. *Entomological News*, 1894, pp. 89-95, 1 pl. (9 sp. nov.).
46. New and Undescribed Genera and Species of West African Noctuidæ. *Psyche*, January, 1894, pp. 7-10 (2 new genera, 10 sp. nov.).
47. (Continuation). *Psyche*, Febrauary, 1894, pp. 27-34 (5 new genera, 18 sp. nov.).
48. (Continuation). *Psyche*, March, 1894, pp. 47-50 (1 new genus; 9 new species.).
49. (Continuation). *Psyche*, April, 1894, pp. 67-70 (11 new species.).
50. (Continuation). *Psyche*, May, 1894, pp. 83-90 (26 new species.).
51. (Continuation). *Psyche*, June, 1894, pp. 109-114 (4 new genera, 49 sp. nov.).
52. Translation of article by Sandberg on the Metamorphoses of Arctic Butterflies. *Canadian Entomologist*, 1894, pp. 16 *et seq.*
53. Clerck's Icones. *Canadian Entomologist*, 1894, pp. 83, *et seq.*
54. Two New African Lycænidæ. *Entomological News*, 1895, pp. 166-8 (2 sp. nov.).

55. List of the Lepidoptera collected in eastern Africa by Dr. W. L. Abbott, with descriptions of some apparently new species. *Proceedings U. S. N. M.*, Vol. XVIII, 1895, pp. 229-58 (1 new genus, 22 new species.).

56. List of the Lepidoptera collected in Somali-land, East Africa, by Mr. William Astor Chanler and Lieut. von Höhnel. *Proceedings U. S. N. M.*, XVIII, pp. 259-64, May, 1896.

57. List of the Lepidoptera from Aldabra, Seychelles, and other East African Islands, collected by Dr. W. L. Abbott. *Proceedings U. S. N. M.*, XVIII, pp. 265-75, May, 1896.

58. List of the Lepidoptera collected in Kashmir by Dr. W. L. Abbott. *Proceedings U. S. N. M.*, Vol. XVIII, 1895, pp. 275-78.

59. Ravages of *Dermestes vulpinus* in Cork. *Entomological News*, 1896, pp. 68-9.

60. A New African Saturnid. *Entomological News*, 1896, pp. 133-5, 1 pl.

61. A preliminary Revision and Synomymic Catalogue of the Hesperiidæ of Africa and the adjacent islands, with descriptions of some apparently new species. *Proceedings Zool. Soc. London*, 1896, pp. 2-107, 5 pls. (11 new genera, 24 new species.).

62. Two New Species of the Genus *Xanthospilopteryx* Wallengren. *Annals and Mag. of Nat. Hist.*, London (6), XX, pp. 291-294 (2 cuts), 1897.

63. In "Through Unknown African Countries," by A. Donaldson Smith. Appendix D. List of the Lepidoptera Heterocera collected by A. Donaldson Smith, p. 408-422. Edward Arnold, Publisher to the Indian Office, London & New York, 1897.

64. Notes on Lepidoptera. *Journal New York Entom. Soc.*, 1898, pp. 57-59.

65. Descriptions of New West African Heterocera. *Entomological News*, 1898, pp. 11-13 (6 new species.).

66. "The Butterfly Book." 1898, pp. 1-382, 48 colored pls., 184 figs. Doubleday, McClure & Co., New York, N.Y. New and revised edition, 436 pp., 77 pls., 1931. Doubleday, Doran & Co., New York.

67. Concerning ticks. *Canadian Entomologist*, Vol. XXX, 1898, pp. 96-7.

68. Description of a Variety of *Argynnis nitocris* Edwards, from Chihuahua, Mexico, var. cærulescens Holland. *Entomological News*, January, 1900, p. 232.

69. The Lepidoptera of Buru. Pt. I, Rhopalocera. *Novitates Zoologicæ*, VII, March, 1900, pp. 54-86 (18 new species.).

70. "Rhopalocera Aethiopica," by Chr. Aurivillius, Book review, *Science*, New Series, Vol. XI, pp. 421-23, March 16, 1900.

71. "Everyday Butterflies," by S. H. Scudder, Book review, *Science*, N. S. XI, January 1900, pp. 67-8.

72. Alaskan Insects. *Entomological News*, March, 1900, pp. 381-388. (5 new species.).

73. Alaskan Insects. *Entomological News*, April, 1900, pp. 417-424 (1 new sp.).

74. Book review: "A Brief Guide to the Common Butterflies of the Northern United States and Canada," by S. H. Scudder. *Science*, N. S., Vol. XI, 1900, Aug. 17.

75. The Lepidoptera of Buru. Part II, Heterocera. *Novitates Zoologicæ*, VII, December, 1900, pp. 555-591 (2 new genera, 44 new species.).

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## Sex of Migrating Monarch Butterflies (Lepid.: Nymphalidae).

Dr. H. T. Fernald, 707 E. Concord Ave., Orlando, Florida, wishes information on the question whether both sexes, or only females, of the Monarch Butterfly, *Danaus archippus,* take part in the southward migration of this species in autumn.

## Notes on Some Longicorns from Subtropical Texas (Coleop.: Cerambycidae).

By E. G. Linsley and J. O. Martin, Oakland, California.

Since the subtropical insect fauna of Brownsville, Texas, was first made famous by Townsend, and later by Wickham, Schwarz, and Schaeffer, this interesting region has been sought by many collectors. During recent years the development of good roads and improved methods of transportation have eliminated the necessity for spending long periods of time in travelling to and from Southern Texas. Brownsville is on the direct air route to Central America and Mexico and may be reached by air from almost any point in Eastern United States. The path of the motorist is made easy by paved roads from California or New York. What a change from the days when Prof. Wickham first bumped and skidded his way to Brownsville in a stage coach!

During a short period in the summer of 1930, and again in the late spring of 1932, the writers had the privilege of collecting in Brownsville. The limited time on both occasions allowed us only a brief introduction to the fauna. We found it interesting, however, to compare notes with previous writers, and especially with Mr. Schaeffer who was the last to describe the region.

At the present time, the subtropical areas which Mr. Schaeffer refers to as "covered with a dense forest and thick undergrowth of varied shrubbery and a rich vegetation of lower plants," are greatly reduced both in size and number as a result of the encroachment of agriculture. Only half a dozen such thickets still exist and few of these are more than an acre or two in size. Most of these areas are on private property, and if the owner is unsuccessful in driving off the would-be collector, the ticks and "redbugs" usually achieve this purpose.

The Palmetto Grove, "consisting of *Sabal mexicana* of enormous size, and a variety of shrubs and trees densely overgrown or bound together by several species of vine," is now a picnic ground where one may collect upon payment of the twenty-five cent admission price. Much of the undergrowth has given way

to benches, tables, and paths, although there are still a few untouched spots where collecting is possible.

Most of the uncultivated land in Brownsville is forested with Mexican ebony, Huisache, Mimosa, and various related thorny trees. In these areas a continual process of clearing is taking place, and around freshly cut trees we found excellent collecting not only in the daytime, but at night with the lantern. Most of the longicorns collected in this manner were of the more widely distributed species, although subtropical forms were not uncommon.

The Cerambycidae of the Brownsville region are particularly interesting because they represent a greater proportion of subtropical species than may be found in any other family of the Coleoptera. The first list of Brownsville Cerambycidae was published by Prof. Townsend (1898) and included forty-three species. The second list was that of Mr. Schaeffer (1908) and comprised seventy-eight species.

It is interesting to note how few species have been added since Mr. Schaeffer's paper appeared. Col. Casey, (1912, 1913, 1924) has described several species from this locality, but most of these are species which appear in the list under other names and hence do not materially swell the total. Among the species included below are only eight which were not in Mr. Schaeffer's list. Of these eight species, *Neoclytus acuminatus* is widely distributed, *Anoplium moestum*, *Ataxia hubbardi*, and *Lepturges minutus* are found in other parts of the South, *Eburia haldemani* and *Hyperilis pallida* are typically Texan, and only *Ecyrus cornutus* and *Oncideres cornuticeps* appear to be truly subtropical. These and recently described species bring the Brownsville total to approximately eighty-eight, of which we collected sixty-five species during our ten-day visit (May 29-June 8, 1932). Since the host plants of few of these species have been recorded, the following notes are offered in the hope that they will prove of assistance to other collectors.

1. Archodontes melanopus var. ciliPES Say. Taken under loose bark of various trees and occasionally at light.

2. Smodicum cucujiforme Say. Small series under bark of dead *Salix*.

3. Achryson surinamum Say. This species was beaten in considerable numbers from Mexican ebony, *Pithecolobium flexicaulis*, and Huisache, *Acacia farnesiana*, and was taken commonly at light. Specimens vary from 9 to 18 mm. in length.

4. A. concolor LeConte. The larger specimens of this species are about the size of the smaller specimens of *A. surinamum*. *A. concolor* bores in small twigs of *Acacia* and *Pithecolobium* and is occasionally taken at light. Numerous examples were reared from branches which had been girdled by *Oncideres pustulatus* Lec.

5. Gnaphalodes trachyderoides Thomson. This species is most active at dusk and in the early evening, when it may be captured flying about freshly cut *Acacia*.

6. Eburia stigmatica Chevr. Under loose bark of *Salix* and *Acacia*.

7. E. mutica var. manca LeConte. A few examples taken at light.

8 E. haldemani LeConte. One example under bark of *Salix*.

9. Pantomallus ovicollis LeConte (*?Eburia densa* Casey). Taken occasionally on P. *flexicaulis* and at light.

10. Romaleum taeniatum LeConte. Taken under bark of *Salix* and at light.

11. Elaph dion mimecticum Schaeffer. This species hides beneath loose bark and around branch stubs on living trees, and was taken on *Salix*, *Acacia*, *Celtis* and *Fraxinus*. It is also common at light.

12. Hypermallus incertus Newman. Taken at light.

13. Anepsyra tenue LeConte. Taken on *Acacia farnesiana* and at light.

14. Anoplium inerme Newman. Occasionally taken at light.

15. A. moestum LeConte. A small series taken at light.

16. A. truncatum LeConte. Reared from girdled branches of *Acacia* and also taken at light.

17. A. niveivestitum Schaeffer. Beaten from *Fraxinus texensis* and other trees in the Palmetto Grove. The specimens lie very still on the beating sheet and are apt to be overlooked.

18. Psyrassa texana Schaeffer. Beaten from *A. farnesiana* and taken at light.

19. Ps. sallei Bates. This rare species was taken on *Acacia* and at light.

20. Compsa textilis var. alacris Bates. One example taken on *A. farnesiana*.

21. Ibidion exclamationis Linell. This species hides during the day around rotten branch stubs of *Acacia*, *Mimosa*, *Celtis*, and other trees and was reared from branches girdled by *Oncideres pustulatus* Lec.

22. I. townsendi Linell. Also reared from girdled branches and found under conditions similar to those of the preceding. Both species rest with their antennae placed straight forward giving them the appearance of a small twig.

23. Hypexilis pallida Horn. One example of this rare species was taken at light.

24. Obrium maculatum Oliv. Very common on *Acacia*, *Salix*, *Celtis*, *Fraxinus*, and other trees, as well as at light. A few specimens were reared from branches girdled by *Oncideres*.

25. O. mozinnae Linell. Beaten from *Acacia* and attracted to light.

26. Cyllene crinicornis Chevr. This species was taken running rapidly over freshly cut branches of *Acacia farnesiana* and *Pithecolobium flexicaulis*. During the day the beetles are very active and rather difficult to capture, but after dark they may be drawn from brush piles by means of a lantern.

27. Neoclytus acuminatus Fab. This species must be added to the two *Neoclytus* listed by Mr. Schaeffer (*N. mucronatus* and *N. abbreviatus*). The Brownsville form differs from the typical in being dark brown instead of reddish, the head, antennae, and legs rufous, and the elytral fascia white instead of yellow. Examples reared from branches of *Acacia* girdled by *Oncideres pustulatus* Lec.

28. Euderces exilis Casey. Beaten from *Acacia* and *Salix*. The adult beetles bear a striking resemblance to the ants which over-run every tree and shrub.

29. Tetranodes niveicollis Linell. Beaten from *Mimosa* and *Acacia*.

30. Rhopalophora laevicollis LeConte. This beautiful species was taken on *Sambucus* in the Palmetto Grove.

31. Rh. rugicollis LeConte. Taken on *Salix*.

32. Rh. angustata Schffr. Taken on *Celtis* in the Palmetto Grove.

33. Stenosphenus dolosus Horn. A small series taken on sunflower stems.

34. Sphaenothecus suturalis LeConte. Taken on *Acacia farnesiana*.

35. Dendrobius mandibularis *Serv.* One specimen taken in flight.

36. Thryallis undatus Lac. Beaten from *Celtis* and *Salix* in the Palmetto Grove. The Brownsville specimens are not quite typical, differing from the form figured by Lacordaire in

having the undulating lines of the elytra shattered and broken. This species at first glance looks like a small specimen of *Synaphacta gueri* Lec.

37. ASTYLIDIUS PARVUS LeConte. A small series taken on *Celtis*.

38. LEIOPUS WILTI Horn. This species was found only on *Acacia farnesiana*.

39. L. CRASSULUS LeConte. Taken on *Acacia* and related trees. Like Mr. Schaeffer, we did not find *Leptostylus biustus* Lec., and it seems quite likely that this is the form that was called *L. biustus* in previous Brownsville lists.

40, 41. L. SPP. Two undetermined species taken on *Fraxinus texensis* and jungle plants. Casey has described *L. texanus* and *L. houstoni* from Brownsville but we cannot identify these from the descriptions. This genus is in great need of revisional study.

42. LEPTURGES MINUTUS Champ. and Knull. One specimen taken in miscellaneous beating, and very kindly compared with the type by Mr. J. N. Knull. The Brownsville specimen is half again as large as the type and more plainly marked, but appears to be assignable to *L. minutus*.

43. L. CELTIS Schaeffer. Taken on *Celtis* in the Palmetto Grove.

44. L. ANGULATUS LeConte. Abundant on every type of tree and shrub. Several hundred specimens captured show little variation in maculation. This appears to be a valid species.

45. DECTES SPINOSUS Say (*?Dectes latitarsus* Casey). A few specimens taken on small annuals.

46. ECYRUS FASCIATUS Hamilton. This is one of the most beautiful of our longicorns and bears a striking resemblance to the lichen-covered branches on which it is found. Examples were taken on dead branches of *Salix* and other trees.

47. E. DASYCERUS var. TEXANUS Schaeffer. Beaten from dead branches of *Acacia farnesiana* and taken at light. In our series none show any intergradation with typical *E. dasycerus* Say.

48. E. CORNUTUS Linsley. A small series beaten from dead *Salix*.

49. EUPOGONIUS FULVOVESTITUS Schaeffer. Taken in the Palmetto Grove.

50. E. VESTITUS Say. Beaten from *Fraxinus texensis*.

51. PYGMAEOPSIS VITICOLA Schaeffer. This interesting little species was beaten from jungle vines in the Palmetto Grove. The female is 4.5 mm. long, with the pubescence of the elytra mottled brownish, black, and white. The white pubescence is arranged in longitudinal interrupted lines. The male is 3 mm.

long, the elytra uniformly cinereus, with darker areas in the basal and sub-apical region. The male does not have the mottled appearance of the female and lacks the interrupted white lines of the elytra.

52. Oncideres pustulatus LeConte. This species appears to be active in late summer and fall, and from the abundance of its work, examples must be rather numerous at that time of year. *O. pustulatus* girdles branches of both *Acacia farnesiana* and *Pithecollobium flexicaulis*, selecting branches an inch to an inch and one-half in diameter and six to twelve feet in length. The larvae are restricted to the main portion of the branches, leaving the outer twigs to smaller beetles which avail themselves of this specially prepared breeding place. Among the insects reared from these outer branches were eight species of longicorns.

53. O. texanus Horn (*?Oncideres subtropicus* Casey). This species was taken girdling small twigs of *Acacia farnesiana*.

54. O. cornuticeps Schaeffer. This fine species was described from Texas without definite locality and this appears to be the first record in regard to its distribution. One male and two females were captured on *Celtis* in the Palmetto Grove. Mr. Schaeffer has very kindly compared these specimens with his type, and found them to agree in all important respects. The coloration of this species suggests *O. sparsa* Bates.

55. Aportaxia lineata Hamilton. This species is beaten from dead branches of *Salix* and is usually taken with *Ecyrus cornutus* Linsley. Three examples taken from jungle vines appear to represent a new species of *Aporataxia*.

56. Ataxia crypta Say. Taken on *Salix*, *Acacia*, *Celtis*, and at light.

57. A. hubbardi Fisher. Numerous examples taken from the stems of sunflower.

58. A. tibialis Schaeffer. One example of this interesting species was taken in the Palmetto Grove. This is not a typical *Ataxia*.

59. Hippopsis lemniscata Fab. Taken commonly on jungle vines, sunflower, and small annual plants.

60. Dorcasta cinerea Horn. Taken on sunflower, small annuals, and at light.

61. Sicyobius brousi Horn. Miscellaneous beating in the Palmetto Grove.

62. Mecas inornata Say. On small composite plants.

63. M. pergrata Say. One example in Palmetto Grove.

64. Hemierana suturalis Linell. Miscellaneous beating.

65. Cathetopteron amoena Hamilton. A number of examples of this very pretty little species were taken on *Celtis*.

## How to Keep the Red Type Labels Red.

By HARRY H. KNIGHT, Iowa State College, Ames, Iowa.

For many years it has been customary for systematic entomologists to mark *the type* specimen of a new species with a red label. In more recent years this has meant selecting and marking a holotype and allotype with red labels. Paratypes and other types of special category have been marked with labels of various colors, but usually with a color less conspicuous than bright red. It has been my experience that non-fading red label material has been difficult to obtain since the war period. That veteran of pin labels, Mr. C V. Blackburn, of Stoneham, Mass., did for many years furnish the finest labels that could be obtained. After the war period he wrote me that it seemed impossible to obtain a good bright red stock for type labels. I have found that the best red labels he could supply in the period 1919 to 1928 have done more or less fading. Perhaps the economic depression, which has reduced many artificial values, will be responsible for bringing back an era in which quality will be stressed, and among other things let us hope this will result in the manufacturer placing more permanent colors in red paper stocks.

This brings us to the fact there are many type labels in collections throughout the country which show fading red colors. In fact there are rumored threats of some systematists going off the red label standard. In my own collection the fading colors reached the point where I resolved to do something about it. I finally hit upon the idea of recoloring the old labels with a good quality of waterproof scarlet ink. I found that "Higgins' Scarlet waterproof Ink" is very satisfactory for the purpose. Old labels can be colored without removing them from the pin. Using a camel's hair brush one can apply the ink in sufficient quantity to flow evenly over the label surface. The label will curl somewhat while damp but soon regains the original position when dry. Labels that have been written upon with waterproof black ink, and such ink should always be used, will not be affected by the addition of some scarlet ink. Label strips can be dipped or painted before using, and when dried out can be written upon with black ink just as

before. There may be other brands of waterproof scarlet ink which will do for coloring labels, but in any case the ink should be waterproof and non-fading. Experience has shown that an old type label can be colored in less than one minute of time. Remove the type specimen from the case or box and set it on a handling block for safety, then apply the red ink with a brush and replace in the collection.

## Synonymical Notes on Membracidae. III. (Homop.)*

By Frederic W. Goding.

Centrotinae.

*Centrotus bonasia* Fabr., a species unrecognized since it was described may now be placed in its modern genus. Dr. W. E. China, through the courtesy of Prof. R. A. Staig, of the Glasgow Museum, has compared a cotype of the species with Walker's type of *Callicentrus aurifascia* and states (*in litt.*) that they are the same species.

*Centrotus magellani* Fairm. from the Philippines, with its projecting forward suprahumerals and the posterior pronotal process distant from the body belongs in the genus *Arimanes* Dist. Possibly Dr. Funkhouser may be able to identify this species from examples in his extensive collection of forms from that locality.

Fairmaire's unknown species *Centrotus paria* is identified in error by Distant as a *Leptocentrus;* but its slender suprahumerals and attenuated posterior pronotal process being close to the scutellum excludes it from that genus and places it in the genus *Cebes* Dist. Distant gives the habitat as India whereas Fairmaire says East Indies. The Indian species figured by Distant should be cataloged as *Leptocentrus paria* Dist.

Darninae.

*Telamona spinigera* Haviland apparently belongs in Funkhouser's new genus *Spinodarnoides*, its characters agreeing with those of that genus the most closely.

[*Nos. I and II were published respectively in Jour. N. Y. Ent. Soc., xxxviii, pp. 39-42 (1930) and Ann. Ent. Soc. Amer., xxiv, pp. 935-936 (1931).—Eds.]

*Telamona ruficarinata* Fowler is described as rather narrow, pronotum testaceous brown variegated with black, rugose, laterally carinate, median carina red, with a large broad rounded protuberance a little before the middle, abruptly descending in front to dorsum leaving a flat level space before the metopidium; humerals broad, porrect, subauriculate; posterior process nearly long as tegmina which are piceous and testaceous variegated; legs testaceous partly infuscate. Long. 10; lat. 5 mm. Bogota.

This species has been cataloged as synonymous with *Telamona gibba* Buckt.; but a comparison of the two descriptions with an examination of Buckton's figure prove them to be distinct. *Gibba* is piceous or deep brown; pronotum rises above the almost vertical metopidium in a blunt short horn which projects forward as shown in the figure; behind this horn is a smaller dorsal eminence which gradually slopes into the posterior process whose apex reaches tips of tegmina; humerals very obtuse. Tegmina dark, almost black; legs brown. Long. 13; lat. 9 mm. Bogota.

Fowler's species is narrow, *gibba* robust, the dorsal crest of the former being near the middle leaving a flat level space in front, but no mention is made of an anterior projecting horn; whereas the crest of *gibba* rises almost vertically above the head with two elevations; the humerals are broad, porrect and subauriculate in *ruficarinata*, but obtuse in *gibba*, while the color patterns and sizes are totally different.

It is evident that the two forms are not only distinct species, but belong in different genera. Until an examination of the type is made it seems best to allow *ruficarinata* to remain in the genus *Telamona*. Laporte having used the name *gibba* for the type of his genus *Atypa*, Buckton's species has been renamed *Atypa bucktoni* Godg.

### Smiliinæ.

*Darnis triguttata* Burn. is doubtless a *Boethoos* (*Parmula*) where Stål placed it, and is one of the color varieties of *B. dispar* Fabr. It is not *Vanduzea vestita* Godg. which VanDuzee proves is a good species. McAtee states that the type label of *vestita* is on the pin of a male *arquata* Say in the National

Museum. The original description of *vestita* was made from a specimen from Arizona which had been submitted to Dr. Uhler, who informed me it was a new species and in his collection under the MS. name of *vestita* which I adopted, to which specimen the type label was attached. When and by whom the label was changed is not known.

In his carefully prepared monograph of the Telamonini Dr. Ball has placed *Telamona celsa* Godg., from Brazil, as a synonym of *Telamona quercı* Fitch, a form common in the eastern United States. In his introductory remarks, page 4, he says, "Specific characters are almost entirely based on size, shape and color pattern, and differences in shape of horn, crests and humeral angles within generic patterns." A comparison of *celsa* with *quercı* shows that they greatly differ in all of Ball's specific requirements. *Celsa* is strongly punctured, yellow anteriorly becoming darker towards apex of pronotum, with lateral margins narrowly black. *Quercı* is finely punctured, greenish brown irrorate with white dots. Pronotum of *celsa* is convex from the strongly sinuate basal margin to behind the humerals, then elevated in an erect crest whose front margin is vertical, hind angle obtuse, hind margin obliquely sinuate, a strong circular impression each side at posterior base; humerals large, auriculate, tips black; posterior process almost long as tegmina. Pronotum of *quercı* with basal margin weakly sinuate, lateral margins concolorous; crest subquadrangular, inclined backwards, front margin concavely sloping into the metopidium, hind margin upright, lateral circular impressions not mentioned in any published description; humerals short, not auriculate; posterior process shorter than tegmina. Basal third of tegmina of *celsa* black punctured, which is absent in *quercı*. Body of *celsa* yellow, of *quercı* brown. The above mentioned differences are much greater than in forms separated into species by Ball, and the habitats are very distant. *Quercı* feeds on oaks; but oaks are not a part of the Brazilian flora, while no records have been found of shipments of young oaks from the United States to Brazil. Judging from all the known data it is certain that *celsa* is a valid species.

## Hints for Collectors.

*Ward's Entomological Bulletin,* number five, May, 1933, has just come to hand. Special prices are given on collecting nets, entomological pins, spreading boards and breeding cages. The Establishment is experimenting on a new light trap. They advise that collectors keep records of the species of flowers on which specimens are taken. A small additional label placed below the usual data label is excellent. Far too little data of this sort are recorded. Even the time of day when the specimen was captured is also good information to preserve. A note is given of the adoption by some collectors of mounting their minute specimens on the side of a regular, large insect pin at the usual height, instead of pinning them to a "minuten" or sticking them to a point; using DuPont household cement or other good adhesive. [DuPont's is quick drying and should be used very thin (with banana oil or acetone) necessitating fast work, or the surface of the adhesive will become glazed and the specimen will not be thoroughly fastened.]

# Entomological Literature

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

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.—Balfour-Browne, F.**—The law of priority in nomenclature. [Pro. Ent. Soc. London] 7: 75-79. **Cockayne, E. A.**—The origin of castes in insects. [21] 45: 60-61. **Darby, H. H.**—Insects and micro-climates. [31] 131: 839. **Engelhardt, G. P.**—The cleaning of greasy in-

sects. [19] 28: 108. **F. A. D.**—The Royal Entomological Society of London. [31] 131: 678-679. **Forel, A.**—Auguste Forel 1848-1931. Souvenirs myrmécologiques recueillis. Par E. Bugnion. [41] 15: 156-180. **Guppy, P. L.**—The successful attack of a Trinidad wasp upon a Papilio larva. [Pro. Ent. Soc. London] 7: 67-68. **Jeannel, R.**—Seance du Centenaire de la Société Entomologique de France. [25] 37: i-lxxiv, ill. **Johnson, C. W.**—The entomological publications of. [5] 39: 87-99. **Lameere, A.**—Precis de Zoologie les Arthropodes, III. Chap. 8-9. [Rec. Ins. Z. Torley-Rousseau] 4, Suppl: 149-336, ill. **Needham, J. G.**—Co-operation among American zoologists toward a compendium of culture methods for invertebrate animals. [68] 77: 427-428. **Osborn, H.**—A specimen mount for insects and other objects of natural history, etc. [68] 77: 587. **Poulton, E. B. et al.**—Protective adaptations of animals, especially insects. [Pro. Ent. Soc. London] 7: 79-105, ill. **Testout, M. H.**—Compte rendu dés Fêtes du Centenaire de la Société Entomologique de France et du V Congrès international d'Entomologie. [Bull. Mens. Soc. Linné. Lyon] 1: 131-134.

**ANATOMY, PHYSIOLOGY, ETC.—Abbott, C. E.**—The effect of temperature and relative humidity upon the olfactory responses of blowflies. [5] 39: 145-149, ill. **Calhoun, M. L.**—The microscopic anatomy of the digestive tract of Gallus domesticus. [Iowa State Coll. Jour. Sci.] 7: 261-381, ill. **Chudoba, S.**—Sur le développement des chromosomes dans le noyau de la spermatide chez Tenebrio molitor. [69] 113: 195-196, ill. **Davidson, J.**—Effect of rainfall-evaporation ratio on insects inhabiting the soil surface. [31] 131: 837-838, ill. **Dobkiewicz, L.**—Morphologische studien zur metamorphologische studien zur metamorphose von Papilio podalirius. Die gestaltlichen veränderungen des darmkanals. [46] 26: 469-528, ill. **Elson, J. A.**—Protozoans and beetles. [90] 67: 283-286, ill. **Eltringham, H.**—"Senses of insects." [Pro. Ent. Soc. London] 7: 119-136. **Fage, L.**—A propos du parasitisme des Phorides. [Bull. Soc. Zool. France] 58: 90-92, ill. **Fattig, P. W.**—Food of the robber fly, Mallophora orcina. [4] 65: 119-120. **Hamm, A. H.**—The epigamic behaviour and courtship of three species of Empididae. [8] 69: 113-117, ill. **Loughnane, J. B.**—Insect transmission of virus A of potatoes. [31] 131: 838-839. **McKeown, K. C.**—The maternal instinct in insects.

[Australian Mus. Mag.] 5: 23-24. **Orska, J.**—Sur la syntopie de l'appareil de golgi et du vacuome dans les cellules sexuelles males chez Cetonia hirtella (Lamellicornia). [69] 113: 192-194, ill. **Paulian, R.**—Dimorphisme des caractères sexuels secondaires chez les males de quelques espèces d'onthophagus (Lamell.). [Bull. Soc. Zool. France] 58: 95-99, ill. **Pilawski, S.**—Le corps mitochondrial dans la spermatogenèse chez Cicindela hybrida. [69] 113: 189-191, ill. **Poll, M.**—Contribution a l'étude des tubes de Malpighi des Coléoptères leur utilité en phylogénèse. [Rec. Ins. Z. Torley-Rousseau] 4: 47-80, ill. **Raignier, A.**—Introduction critique à l'etude phonique et psychologique de la stridulation des fourmis. [Brotéria] 2: 51-82, ill. **Steiniger, F.**—Die erscheinungen der katalepsie bei stabheuschrecken und wasserläufern. [46] 26: 591-708, ill. **Varley & Butler.**—The acceleration of development of insects by parasitism. [Parasitology] 25: 263-268.

**ARACHNIDA AND MYRIOPODA.—Bristowe & Millot.**—The Liphistiid spiders. With an appendix on their internal anatomy. [93] 1932: 1015-1057, ill. ***Chamberlin & Ivie.**—Spiders of the Raft River Mountains of Utah. [Bull. Univ. Utah] 23: 79 pp., ill. ***Chamberlin, R. V.**—Four new spiders of the family Gnaphosidae. [40] 631: 8 pp., ill. ***Roewer, C. F.**—Araneen aus mexikanischen ameisenwohnpflanzen. [34] 102: 183-188, ill.

**THE SMALLER ORDERS OF INSECTS.—*Banks, N.**—Concerning the genus Notiobiella (Hemerobiidae). [5] 39: 103-106. **Carpenter, F. M.**—Note on Haplodictyus incertus. [5] 39: 144. ***Carpenter, F. M.**—A new Boreus from British Columbia [5] 65: 94-95, ill. ***Davis, W. T.**—Dragonflies of the genus Tetragoneuria. [19] 28: 87-104, ill. **Gordon, E. L.**—Notes on the Ephemerid genus Leptophlebia. (Key to species). [19] 28: 116-131, ill. **Issiki, S.**—Morphological studies on the Panorpidae of Japan and adjoining countries and comparison with American and European forms. [Japanese Jour. Zool.] 4: 315-416, ill. **Knowlton & Thomas.**—Food plants and distribution of some Utah Thysanoptera. [4] 65: 114-117. ***McDunnough, J.**—The nymph of Cinygma integrum and description of a new Heptagenine genus. [4] 65: 73-77, ill. ***Snyder, T. E.**—Calcaritermes in the United States. [10] 35: 67-69, ill. **Werneck, L.**—Sobre as especies de Anoplura parasitas da Ihama. [Mem. Inst. Oswaldo Cruz] 27: 21:32, ill. **Werneck, L.**—Considerações sobre o genero "Phthirpedicinus" e sua especie typo. [An. Acad. Brasileira

Sci.] 4: 161-164, ill. Sobre as especies do genero Pedicinus. [An. Acad. Brasileira Sci.] 4: 179-184, ill.

**ORTHOPTERA.**—***Arndt & Dozier.**—Le criquet Haïtien du caféier. [new species of Scelionidae]. [Sta. Exp. Dept. Agric. Haiti] Bull. No. 26: 7-16, ill. **Criddle, N.**—Notes on the habits of injurious grasshoppers in Manitoba. [4] 65: 97-102, ill.

**HEMIPTERA.**—***Blanchard, E. E.**—Aphid miscellanea. [Physis] 11: 19-36, ill. (S). ***Blöte, H. C.**—New Pyrrhocoridae in the collection of the British Museum. [75] 11: 588-602, ill. (S). **deLong & Davidson.**—The genus Agellus, (Cicadellidae) [43] 33: 210. ***Drake, C. J.**—Notes on some American Tingitidae. [5] 39: 100-102. ***Drake & Harris.**—Some miscellaneous Gerridae in the collection of the Museum of Comparative Zoology [5] 39: 107-112. **Hungerford, H. B.**—The male of Notonecta compacta. [19] 28: 135. ***Jaczewski, T.**—Notes on some South and Central American Corixidae. [Ann. Mus. Zool. Polonici] 9: 329-339, ill. **Lindinger, L.**—Beiträge zur kenntnis der Schildläuse (Coccid.). [26] 13: 77-78. **Pearson, E. O.**—Notes on the genus Dysdercus in Trinidad, B. W. I. [5] 39: 113-126, ill. **Poulton, E. B.**—The alligator-like head and thorax of the tropical American Laternaria laternaria (Fulgoridae). [Pro. Ent. Soc. London] 7: 68-70.

**LEPIDOPTERA.**—**Biederman, M. R.**—Variétés inédites ou peu connues des genres Agrias et Siderone. [Bull. Mus. Nat. Hist. Nat., Paris] 5: 114-121, ill. (S). **Britton & Harte.**—The recent north-eastward spread of the orange sulphur butterfly, Colias eurytheme. [19] 28: 109-115. ***Clarke, J. F. G.**—Notes and new species of Microlepidoptera from Washington state. [4] 65: 84-93, ill. **Forsyth, M. S.**—Variant of Agraulis vanillae discovered on Florida Keys. [Lepid. News] 1: 2. **Groves, E. O.**—Food and its relation to Lepidoptera [Lepid. News] 1: 1. **Gundlach, J.**—"Genero Erebus." (Reprinted from original.) [Lepid. News] 1: 3-4. **Handford, R. H.**—Note on the hibernation of Phyciodes gorgone (Nymphalidae). [4] 65: 95. **Huntington, E. I.**—Erycinidae and Lycaenidae from the regions of Mt. Roraima and Mt. Duida. [40] No. 611: 5 pp. ***Meyrick, E.**—Exotic Microlepidoptera. 4: 353-384. **Poulton, E. B.**—Wings of British, European and N. American butterflies bearing the marks of attack by enemies, chiefly birds. [Pro. Ent. Soc. London] 7: 71-73. **Poulton, E. B.**

et al.—The gregarious resting habits of Danaine butterflies in Australia; also of Heliconine and Ithomiine butterflies in tropical America. [Pro. Ent. Soc. London] 7: 64-67. **Satterthwait, A. F.**—Larval instars and feeding of the black cutworm, Agrotis ypsilon. [47] 46: 517-530, ill. ***Schaus, W.**—New species of Heterocera in the National Museum. [75] 11: 566-587, cont. (S). **Stempffer, H.**—Contribution à l'etude de quelques espèces du genre Lycaeides (Lycaenidae). [25] 38: 108-112, ill. **de la Torre, C.**—Notes on butterflies of Cuba. [Lepid. News] 1: 4-8.

**DIPTERA.**—***Bequaert, J.**—Description of a new North American species of Lasia (Cyrtidae). [40] No. 617: 2 pp., ill. **Bromley, S. W.**—Additions to the Ohio list of robber flies. [43] 33: 204. ***Brues, C. T.**—Phoridae associated with ants and termites in Trinidad. [5] 39: 134-138. Notes on some tropical Phoridae. [5] 39: 139-144. ***Curran, C. H.**—The North American species of Actia in the American Museum of Natural History. [40] No. 614: 7 pp. **Goffe, E. R.**—Synonymic notes on the dipterous family Syrphidae. [Trans. Ent. Soc. So. England] 8: 77-83. **Martini, E.**—The hypopygia of certain anophelines (Culicidae). [10] 35: 61-67, ill. ***Matheson, R.**—A new species of mosquito from Colorado (Culicidae). [10] 35: 69-71, ill. ***Prado, A.**—Notas sobre Mansonia albifera e sobre o macho de Mansonia albicosta. [Mem. Inst. Butantan] 6: 193-197. ***Stone, A.**—Two new species of Tabanus from North America. [10] 35: 75-77. **Wilson, G. E.**—Three prehistoric parasites. [68] 77: 560.

**COLEOPTERA.—Arrow, G. J.**—Further notes on the coleopterous genus Aserica (Melolonthinae). [10] 35: 71-73. **Berlioz, M. J.**—Note sur un Coléoptère-Cérambycide de l'Amerique du Nord, le Desmocerus piperi. [Bull. Mus. Nat. Hist. Nat., Paris] 5: 111-113. ***Bruch, C.**—Algunos estafilinidos de Misiones. [Physis] 11: 1-8, ill. (S). ***Bruck, C. R.**—New species of Carphoborus with key to species north of Mexico (Scolytidae). [4] 65: 103-106. **Chagnon, G.**—Contribution a l'etude des Coléoptères de la Province de Québec. [Le Nat. Canadien] 60: 166-178, ill. **Cooper, K. W.**—Xenorphipis brendeli from Long Island. (Buprestidae). [19] 28: 115. **Cooper, K. W.**—On the American species of Alobates. (Tenebrionidae). [19] 28: 105-107, ill. **Eggers, H.**—Zur synonymie der Borkenkäfer (Ipidae). [Ent. Nachrichtenb.] 7: 17-20. ***Linsley, E. G.**—A new

species of Monochamus from California (Cerambycidae). [4] 65: 118-119. **Maulik, S.**—On a structure in the antennae of beetles of the Chrysomelid genus Agetocera. [93] 1932: 943-956, ill. ***Maulik, S.**—New Argentine Hispinae. [75] 11: 605-609, ill. **Milne, L. J.**—Notes on Pseudolucanus placidus (Lucanidae). [4] 65: 106-114, ill.

**HYMENOPTERA.—Arndt & Dozier.**—(See Orthoptera.) **Crowell, M. F.**—Oviposition of the ichneumonid Itoplectis conquisitor in a larva of Pyrausta nubilalis. [5] 39: 102. **Cushman, R. A.**—The identity and synonymy of three Oriental species of Cremastus (Ichneumonidae). [10] 35: 73-75. **Dreyer & Park.**—Local distribution of Formica ulkei moundnests with reference to certain ecological factors. [5] 39: 127-133. ***Hicks, C. H.**—A new Herbstiella (Apoidea) from North America. [40] No. 616: 2 pp. **Hicks, C. H.**—Notes on the prey and inquilines of Podalonia violaceipennis form luctuosa. [5] 39: 150-154. ***Middleton, W.**—Five new sawflies of the genus Neodiprion. [5] 39: 77-84. **Rau, P.**—Jungle bees and wasps of Barro Colorado Island (Panama). 1933. 324 pp., ill. **Rayment, T.**—A remarkable leaf-cutter bee. [Victorian Nat.] 50: 9-11, ill. ***Sandhouse, G. A.**—Notes on some North American species of Halictus with the description of an apparently new species. (Apoidea). [10] 35: 78-83. ***Schwarz, H. F.**—Some neotropical Anthidiinae: Anthidium, Heteranthidium, and Dianthidium. [40] 624: 27 pp. Some neotropical Anthidiinae: Paranthidium, Anthidiellum, and Hypanthidium. [40] 625: 9 pp.

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A Naturalist in the Guiana Forest by Major R. W. G. Hingston. New York: Longmans, Green & Co., London: Edward Arnold & Co., 1932, pp. xiii, 384; 16 plates, 150 text illustrations. $5.00.—Major Hingston, author of *Problems of Instinct and Intelligence,* based largely on his own observations of insects and spiders in India, to whose natural history he has contributed many other volumes and papers, here describes some of the experiences of the Oxford University Expedition to British Guiana, of which he was leader. The expedition comprised twelve persons, of whom the entomologists were Major Hingston, O. W. Richards, of the Imperial College of Science, and J. E. Duffield, of Oxford, as well as a number of helpers recruited in Guiana. It established itself in a camp on Moraballi Creek, a tributary of the right bank of the Essequibo River, about 15 miles above Bartica and two miles from the creek's mouth. Here for four months, August to November,

inclusive, of 1929, it devoted itself to a study of the forest, especially its roof, and its fauna and flora. "We were not so much concerned with making large collections as with matters connected with field observation such as the habits, instincts, life-histories and behaviour of the various forms of tropical life." "We collected altogether 75 mammals, 166 birds, 207 reptiles, about 10,000 insects, about 5,000 sets of plants, and about 500 miscellaneous. The collection of animals has been deposited at the British Museum and plants at the Royal Botanic Gardens, Kew." Technical reports on these "will be published independently by specialists in suitable zoological and botanical journals."

An area of about 2000 square yards was divested of its vegetation to serve as a camp site. Here tents and shelters were erected. From this centre the surrounding forest was explored. Some tall trees were felled to examine the life of their crowns, but the chief studies of the forest canopy were made from arm-chair-like seats suspended from ropes or attached to high branches, or by climbing out such branches directly or on rope ladders. Two native rubber-balata men proved more efficacious in carrying the first ropes to elevations of 100 feet, more or less, than rocket-firing apparatus brought along for the purpose. Descriptions of the difficulties encountered and the ways in which they were met are given in some detail for the benefit of future investigators in these altitudes. Obviously strength, perseverance and a level head are necessary qualifications and much risk must have been run by those who ascended to the tree tops. Baited traps, illuminated at night, and hung at different elevations, furnished much material. Brief summaries of the insects and other animals of the roof and of other parts of the forest will be found in several places (pp. 56, 59-60, 75-80, 82-84, 353-359, 362). The final chapter (XVI) contrasts the differences between tree-roof and forest-floor. The author was strongly impressed with the horizontal stratification of the forest. Botanically he believes that there are at least four layers. To each of these he assigns characteristic mammals and birds and believes that the examination of the insect collections made will confirm this division.

A large part of the book (pp. 85-235) is devoted to the snares, traps, nests and protective devices of spiders, 27 new species of which are described in the appendix, pp. 363-377. Protective, intimidating and warning devices of insects occupy fewer pages (236-348). The book is highly interesting to all concerned with tropical forest conditions and life.

P. P. CALVERT.

A Text-book of Practical Entomology by Frank Balfour-Browne. New York Longmans Green & Co. London: Edward Arnold & Co., 1932. 10 x 7½ inches, pp. viii, 191, 116 figs. $5.00.

Methods for the Study of the Internal Anatomy of Insects by Clarence Hamilton Kennedy, Ohio State University. Mimeographed by H. L. Hedrick, Columbus, Ohio. 1932. 10¾ x 8½ inches, 103 pp. on both sides of each leaf, many illustrations. $2.00.

Here are two books very different in their immediate objects and in their contents, but both concerned with insect anatomy. The first is designed to meet requirements in subject matter and within time limits in English educational arrangements. It is divided into three parts, Elementary Course (28 pp.), Advanced Course (66 pp.) and the Principles of Systematic Entomology (94 pp.). It thus follows that the same group of insects may be treated three times, *i.e.*, from each of these points of view. The text consists largely of directions for laboratory work. The cockroach occupies 14 of the pages and all of the illustrations (limited to external anatomy) of Part I, while the remainder of this Part treats very briefly of the orders other than Orthoptera. In Part II, 23 pages and 24 figures are concerned with the external and internal anatomy of the adult *Dytiscus marginalis*, followed by 7 pages and 5 figures on its larva. The rest of Part II is arranged on the basis of organ systems, with a couple of pages each on embryology and on histology and another brief summary of the orders. Part III includes a study of a grasshopper (14 pp., 11 figs.), the wings of insects (7 pp., 5 figs.) and the external morphology of Rhynchota, Coleoptera, Lepidoptera, Diptera and Hymenoptera (68 pp., 54 figs.). The only keys for identification are one of families of larvae of Coleoptera (based on Macgillivray's of 1903) and one of families of larvae of Lepidoptera (based on Fracker's of 1915). There is a general index of 2 1/3 pages. This volume may, therefore, serve as a laboratory manual for three different courses in entomology of increasing length, as well as a reference book on those insects and topics which are dealt with at greater detail. It is well-printed and the illustraions are new.

Prof. Kennedy's book is a handbook of the technique of the collection, dissection, fixation, whole-mounting, embedding, sectioning and staining of insect material, the apparatus and tools to be used therewith, the making of drawings and their reproduction in publication. It too has been written for a course of instruction—at Ohio State University—wherein the problem

method of teaching is used, but its usefulness is world-wide, wherever entomology is pursued. The author has brought together from many sources a very large number of methods, suggestions, hints, cautions and bits of advice for the beginner and for the most advanced research worker as well. There is a bibliography of eleven titles on microscopical technique and an extensive alphabetical index of 12 pages.

P. P. CALVERT.

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INSECTS.—Man's Chief Competitors. By W. P. FLINT and C. L. METCALF. The Williams and Wilkins Co. in cooperation with the Century of Progress Exposition. Baltimore, 1932. 133 pp. 12 figs. $1.00.—With the public mind attuned to the reading of sparkling, wise-cracking columnists and adapted to the pap dispensed in a supercilious manner by our more prosperous group of writers, it is becoming more difficult for scientific workers to produce anything which can compete successfully for popular attention. And yet it is the scientific worker, the specialist, who should take time to give something of what is his to the public. Although it be difficult for him and although he may not quite master the perfection of style of the professional writer, it is he who should do it, for he alone possesses the proper background of knowledge from which to select what is best.

This little volume succeeds very well in maintaining an imaginative and popular style and in avoiding technical terminology, but presenting withal an informative and balanced account of its subject matter. The point of view is that of considering insects as man's competitors and enemies. The methods and equipment of both the enemy camps are described, including a comparison of the structure and functioning of the bodies of insects and man. Then follows an account of the ten principal orders of insects and finally a series of seven insect "biographies" including the Grape Phylloxera, Fleas and the Black Death, Ox Warbles, etc. In each case the historical side is not neglected, mention being made of the way in which the main facts were discovered. The book will interest both old and young, its style is very apt to arouse the imagination and interest of the latter, especially. R. G. SCHMIEDER.

## OBITUARY.

With great regret we announce the death of DR. FREDERIC W. GODING, well known for his work on the Membracidae, which occurred at Livermore Falls, Maine, on May 5, 1933.

# EXCHANGES

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

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

**Wanted for Cash or Exchange**—Uncommon species of North American Lepidoptera. Several of each kind. D. V. Brown, Pleasanton, California.

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**Exchange.**—Desire Lepidoptera, particularly specimens and data of Wisconsin and U. S. Catocala. Exchange for same. Wm. E. Sieker, 46 Breeze Terrace, Madison, Wisconsin.

**Will buy or exchange** — Pinned Microlepidoptera and papered Pieridae of North America. Full data with all specimens. Named material of all groups offered. Alexander B. Klots, University of Rochester, Rochester, N. Y.

**Wanted** — West Coast Geometrids for cash or in exchange for California Butterflies. Edward Guedet, P. O. Box 305, Napa, Calif.

**Wanted**—Western species of Bumblebees, all three castes; also Psithyrus and Catocala. A. P. Morse, Peabody Museum, Salem, Mass.

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**Wanted**—Names and addresses of those desiring Coleoptera, Lepidoptera and Hymenoptera of Pennsylvania and New Jersey. R. C. Casselberry, 71 E. Price Ave., Lansdowne, Pa.

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### DIPTERA.

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# ENTOMOLOGICAL NEWS


## OCTOBER, 1933

Vol. XLIV No. 8



SMITHSONIAN INSTITUTION
OCT 12 1933
NATIONAL MUSEUM

CHARLES WILLISON JOHNSON
1863-1932.

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows:

| | |
|---|---|
| United States and possessions, Central and South America | $3.00 |
| Canada | 3.15 |
| Foreign | 3.25 |

Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance.
One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 7.00
Ten issues " 11.00, " 20.00, " 35.00, " 60.00

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# ENTOMOLOGICAL NEWS

VOL. XLIV. OCTOBER, 1933 No. 8

## On the Nicolay and Weiss "Synopsis of the Cicindelidae" (Coleop.).

E. GRAYWOOD SMYTH, Hacienda Cartavio, Peru.

In supplying our present day systematic Coleopterists with an up-to-date synopsis of the very popular family Cicindelidae, the authors will meet unquestionably an urgent demand. But they are at the same time attempting a very difficult task, and one requiring exceptional judgment in the delineation of species and varieties; for in few other families is so much left to the individual discretion. In a group so very elastic from the multiplicity of highly developed sporadic forms, the taxonomist may easily run amuck.

The authors, while roundly condemning the "splitters and confusionists" and expressing their unwillingness to "condone" certain practices of other workers of established reputation, themselves display a rather empirical method of handling the subject. One surmises that a somewhat better knowledge of the literature on the family, whatever their own experience with the "tigers," would aid them in steering clear of some of the pitfalls. Few of their contemporaries, we fear, can agree with them in the view that the arrangement of a complex group can be simplified by using another's carefully worked out list, and from it "elevating his subspecies to specific rank and considering his varieties and phases as varieties." This is a weak palliative, for in no sense can subspecies within a species be properly considered as having specific identity (they are merely varieties), and few "phases" are deserving of varietal designation.

We are inclined to wonder why the authors have passed over the crepuscular genera in the family, and begun with the most difficult group in the genus *Cicindela*, that of *purpurea*. In studying their key to that group, one very much questions

* Journal N. Y. Ent. Society, Vol. XL, No. 3, Sept., 1932.

whether a student unfamiliar with the group could successfully place a variety by its use. On the other hand, the worker who knows the group will not agree with many of their arbitrary decisions in matters either of rank or position. They may be correct in censuring the making of many synonyms, but are scarcely convincing in their reasons (or lack of reasons) for sinking some names of accepted usage and retaining others.

In the humble opinion of one who has studied the Cicindelidae over thirty years, and who has collected and known intimately more than a hundred of the North American species and varieties, an identification table or key in this family, to be useful, should be planned in conformity with the natural lines of genetic development as indicated by stable taxonomic characters, placing color and maculation as secondary. Doctor Walther Horn, our highest authority on the Cicindelidae, is on record (1, p. 35) as stating, with regard to the family: " . . . Color and design have no specific value at all, and therefore may be entirely left out of the determination tables of the species." Yet we are presented here with a key based almost wholly upon color and maculation. Such a key must necessarily contain inconsistencies and fall subject to criticism, due in the present case to the use of very loosely applied terms to indicate color. A specific instance may be cited. One of the two groupings under (6) is: "Thorax and elytra greenish (rarely both a greenish blue)." This leads to the varieties *propinqua, denverensis* and *pugetana,* which, to call them "greenish," is like calling grass greenish or coal blackish, so very decided is their color. It also leads to *decemnotata,* which may be as correctly considered reddish or copperish as greenish. No two people could agree on such a color as "greenish." The variety *ludoviciana,* most intimately related to *denverensis,* is placed in another grouping under (6): "Thorax and elytra a different color." This is a misleading basis upon which to attempt to separate *ludoviciana* from *denverensis,* since the writer has collected, and has seen in other collections, frequent specimens of *denverensis* in which the elytra were of a different color than the head and thorax, and D. E. Lantz (3, p. 256)

has specifically mentioned having "a *denverensis* with a blue head and thorax." Forms intermediate between *denverensis* and *splendida* have, of necessity, the thorax and elytra of different color. Groupings based wholly upon color are not natural ones, and would lead to endless confusion in the hands of one unacquainted with the family.

We find *cimarrona* considered a valid species, separated, under (2), on the basis of "elytra with marginal line." Those acquainted with the *purpurea* group have decided years ago that *cimarrona* is not entitled to specific rank, and we have the statement of no less an authority than Doctor LeConte that it is not. Dr. F. H. Snow says (6, p. 16) regarding *auduboni* Lec. and *cimarrona* Lec.: "A large series of the last two forms was taken, convincing Dr. LeConte of what he had long suspected, that they should not be considered distinct species." (At the time this was written, in 1877, *auduboni* was considered as including both the green and black forms.) The writer has called attention (5, p. 183) to the same fact in the following words: "*C. cimarrona* has resulted from a fusion of *graminea* and *auduboni*, together with a change of markings, in the high table-lands east of the Rocky Mountains, as shown by a series taken by Doctor Snow in South Park, Colo., which exhibits every possible stage of transition from *graminea* and *auduboni* to *cimarrona*." It is understood, of course, that in this statement *graminea refers* to what is now called *auduboni*, and *auduboni* to what is now considered *nigerrima*. The same fusion of these three varieties may be found in Gallinas Canyon above Las Vegas, New Mexico, and in many other localities.

A definite change in coloration accompanies this fusion, the green and black forms showing a tendency to blend in most specimens into a somewhat browner tone, and to be overlaid with cupreous reflections, that become intensified with an increase of altitude. There is a simultaneous change in shape also, the mountain forms becoming somewhat more elongate, more robust, more convex. As would be expected in a transition, within a restricted territory, from feebly maculate forms

to those with complete markings and marginal band, there are intermediate forms in which the markings are quite complete (corresponding to those of *limbalis*) but are not connected by a marginal band. Some of these forms answer very well to the description of *auguralis* Casey, and may be identical with it. In which case it seems very plain that both *cimarrona* and *auguralis* are varieties of *purpurea,* so that Casey and Leng were both correct in placing *auguralis* as such, contrary to the views of the authors, whose key for the group would require some alteration to accommodate the correction. The proper inclusion of *cimarrona* with the *purpurea* subgroup was well understood by Lantz (3, p. 257), who said: "A study of the habits of the *purpurea* group leads me to recognize two series. The first is represented by *purpurea* and the varieties *graminea, audubani, cimarrona,* etc. The series has usually a detached, oblique middle band. . . . The other series has the middle band less oblique when complete, but often short and at right angles to the border of the elytron, or even lacking. . . . To it belongs *limbalis, splendida, denverensis,* etc." The writer made up a tabular arrangement of the *purpurea* group (5, p. 184) to show this same division into two subgroups, with eight varieties in each, that would require no correction at the present time except the exclusion of *plutonica.*

The use of the "marginal line" in erecting a species is of very doubtful value in the genus Cicindela, since one can mention other American species and varieties (*pulchra; lecontei; nigrocaerulea*) in which every type of variation from the immaculate to that with markings fused into a marginal vitta can be found, without these forms having received distinctive names that would stand. Furthermore, varieties showing the peculiarity of marginal band are to be found in both the *purpurea* and the *limbalis* subgroups, those in the former all coming under the name *cimarrona.* Those forms of the *limbalis* subgroup displaying the development of a marginal band are also found in Colorado, but they are much more brilliant in coloration and very different in habits from *cimarrona.* Placing importance, as they do, on the marginal line, it is hard to under-

stand how the authors could have overlooked this unusual variety in any study of the *purpurea* group. Doctor Horn (1, p. 31) especially refers to it: " . . . wonderful forms of *purpurea* from Sedalia (red, entire border white; green, the middle band broadly united with the humeral lunule)." And V. E. Shelford, in his brilliant work on Color and Color-Pattern Mechanism of Tiger Beetles, amply illustrates the maculation of the variety on Plate 25, Figs. p to s, and Plate 28, Figs. 508-509 and 516-518. As in *cimarrona*, this variety is exceedingly variable, both in color and markings, the color varying from bright red, or red with green reflections, to occasional brilliant green individuals. The markings are usually complete and rather broadened, often dilated at the margin and partly or entirely fused to form a marginl band, but occasionally are so restricted as to approximate those of *splendida*. The variety reaches its best development on the high table lands between Denver and Colorado Springs, fine series having been collected at Sedalia. Though exceedinly variable, its characteristics of color and markings are so distinctive from all other forms in the *limbalis* subgroup as to justify its proper characterization, both for reference purposes and for cabinet arrangements, and I suggest for it the name *Cicindela sedalia*.

One finds small reason for erecting *splendida* as a species distinct from *limbalis*, and for placing *transversa* under *limbalis*, and *cyanocephala* under *splendida*. This is an attempt to harness one horse of the team backward, and is astonishing in view of their statement (p. 349): "As might be imagined, intermediates are often encountered in Kansas (Argentine) which is apparenly one of the rare localities where both *limbalis* and var. *transversa* and *splendida* and var. *cyanocephala* occur together." It is new to our knowledge that distinct species can have intermediate forms mingling with them in the same locality and retain their specific identity. The writer has years ago (5, p. 180) recorded the occurrence of these four forms together at Topeka, Kansas, and has further shown *transversa* and *splendida* to be one species (5, p. 183): "Specimens of this last were frequently found in copula with typical *trans-*

*versa,* thus establishing *splendida* as a variety of *transversa,* and so of *purpurea.*" This was at Fern Glen, near St. Louis, Mo.

Again, we hardly agree with the statement that "*denverensis* may be traced through *ludoviciana* as merely another variety of *splendida.*" Why "through *ludoviciana,*" which is a very local and sporadic form? Professor Lantz has shown (3, p. 256) that the distributional boundaries between *splendida* and *denverensis* overlap just as do those between *transversa* and *splendida*: "In four cases I found *denverensis* and *splendida* in copulation, and my friend, Mr. Johnson, of the Ft. Collins, Colo., Experiment Station, has observed similar cases near Denver."

As to the reduction to synonymy of certain varietal names, without a more fundamental reason for doing so in each instance, the habit reveals itself as purely arbitrary. The authors, for example, annul the name *mirabilis,* which is abundantly distinct in form and color, as well as minor characters, from *audubonii,* but retain *ludoviciana,* which is very feebly separable in a large series from *denverensis.* The line of geographical separation between the red-and-green forms (*splendida; cyanocephala*) and the purely green, or blue and green (*ludoviciana; denverensis; propinqua*), inscribes a diagonal line from the northwest across northeastern Colorado and southwestern Kansas, bending eastward through Oklahoma and northeastern Texas to extreme northern Louisiana. There seems little doubt that in time connecting forms will be found between *denverensis* and *ludoviciana* that will sink the latter name to synonymy. On the other hand, the writer has shown (5, p. 183) that "*C. denverensis* occurs in two forms, corresponding to *splendida* and *amoena* in markings, which have not received distinctive names." Since *denverensis* was described as having maculation similar to *splendida,* the green form with complete markings corresponding to those of *cyanocephala* and *limbalis,* and which occurs in company with *denverensis* in the valley of the South Platte, is without proper characterization, and I suggest for it the name *Cicindela plattensis.* It bears to typical *denverensis*

exactly the same relationship that *cyanocephala* bears to *splendida,* or *limbalis* to *transversa,* and is fully as deserving of a name, both for reference purposes and for cabinet arrangements. Like the other fully maculate varieties (*limbalis; cyanocephala*), in the more northern extension of its range it sometimes occurs to the almost exclusion of its sister form, *denverensis.* It should not be confused with *pugetana,* which is perhaps more properly associated with *decemnotata,* although the key of the authors does not make this very clear.

The placement of *purpurea* and all of its close derivatives in a key under "thorax, head and elytra always the same or about the same color" is misleading, since some western varieties, such as *mirabilis,* have the head and thorax distinctly red or cupreous and the elytra quite green. To be useful to a student of this family, a key to its varieties should delineate and delimit groupings more closely.

Excluding only the forms of *decemnotata,* which is admittedly entitled to specific standing, the remainder of the *purpurea* group has all too evidently sprung from two stem forms, *purpurea* and *limbalis.* The genetic development of the group has taken two distinct and very divergent directions in its movement westward across the continent, which would seem to justify the separation of the group into two species. In habits also the two subgroups have diverged, those from the *purpurea* stock preferring open meadow roads or prairie, those from *limbalis,* clay banks or hilly clay roads. Whether this separation into two species is really justifiable rests, it seems, upon the one vital question: Do *purpurea* and *limbalis* ever occur together, and interbreed, in the Eastern States? (In the West we know that they do not.) This point has never been made clear to our knowledge. If they do interbreed, all varieties in the group (excepting *decemnotata* and possibly *pugetana*) should be thrown into one species; if they do not, the group can stand, as now considered, a complex of varieties of two species, *purpurea* and *limbalis.* Let the collector who is so placed as to find the two stem forms together decide this question.

Most of us are agreed that the acid test by which to deter-

mine whether two related forms that occur together are the same or separate species is whether or not they interbreed and give rise to intermediate forms, no matter what their similarity in structure may be. To determine this point in the Cicindelidae is comparatively easy because of their bold diurnal habits. The application of this test has separated *sexguttata* and *patruela,* that were once considered varieties of one species; likewise has separated *formosa* and *lengi.* It has kept together the rather dissimilar *repanda* and *duodecimguttata,* and the even more dissimilar Mexican *hydrophoba* and *quinquenotata.* The same test has definitely established *cuprascens* and *macra* as distinct species (4, p. 427), in spite of their frequent erroneous placement as varieties of one species by those not personally acquainted with their habits.

The references included here under Literature Cited, all of which papers discuss species of the *purpurea* group, will supply a few of the omissions from the Bibliography of the authors. Most of them will be found in Mr. Leng's able and complete Bibliography of Taxonomic Coleopterology to January 1, 1919, published with his Catalogue of the Coleoptera of America, North of Mexico.

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## A New Alcidamea (Hymenop.: Megachilidae).

By T. D. A. Cockerell, University of Colorado.

**Alcidamea brachyodonta** n. sp.

*Male.* Length about or nearly 6 mm., anterior wing about 3.8 mm.; black, with pale hair, dense and rather dull white on face, white and thin on cheeks and pleura, very dense and faintly fulvescent on middle of front, faintly fulvescent on thorax above, the fringe on scutellum erect and very long; eyes black; scape stout and black; flagellum beyond about the third joint clear ferruginous beneath; and the apical half clear red on both sides, the apex with the usual spiniform termination; mesothorax finely punctured, shining between the punctures; scutellum and base of metathorax shining; tegulae dark reddish; wings somewhat dusky, especially in the apical field, stigma and marginal vein dark, the other veins pale brown; second cubital cell receiving first recurrent nervure very near its base, and the second more than twice as far from the apex; basal nervure falling short of nervulus; legs black, with sparse white hair, the tibiae at end, and the small joints of tarsi, rufescent; abdomen finely punctured, shining, with five rather dull white hair bands, the first two broadly interrupted; apex produced and broadly rounded, a small tooth at each side of sixth tergite; second sternite with a rather small erect denticle.

Habitat: Pasadena, California. Charles H. Hicks, 2156. *A. colei* Crawford, from Redlands, is even smaller (male about 5 mm.), with brown antennae, and the apex of the abdomen is pointed, as in *A. producta* Cresson. The California *A. grinnelli* Ckll. is much larger, and differs in many respects, such as the venation, the structure of abdomen, and the green eyes.

## Changes at the Academy of Natural Sciences of Philadelphia.

The Academy of Natural Sciences of Philadelphia announces the following staff changes made by the Board of Trustees:

Mr. William J. Fox, for many years Assistant Librarian, was appointed Librarian.

Mr. Morgan Hebard, formerly Curator of the Department of Entomology, wishing to be relieved of all administrative duties and to devote his time more fully to the care and study of his personal collection, resigned as Curator and was appointed a Research Associate in the same department.

Mr. James A. G. Rehn, formerly Associate Curator of the Department of Entomology, was appointed Curator of the same department to succeed Mr. Hebard.

## Observations on a Chrysid Parasite and its Host (Hymenop.: Chrysididae, Megachilidae).

By CHARLES H. HICKS, University of Colorado.

Not a great deal is known concerning the early stages of chrysid larvae and their host relationships. This applies particularly to American species. It is rather generally believed that the young chrysid feeds only on the larva of the host although Chapman * has shown that some species, at least, first destroy the small, host larva and later eat the stored provisions of paralyzed caterpillars. A review of Chapman's paper, and certain others of importance, is given by Sharp in the Cambridge Natural History, vol. VI, pages 3 and 4, 1899. In the instances where the host is a bee, hence a pollen feeder, the chrysid either waits until the bee larva has grown before it attacks it or, as in a record by Ferton ** (and possibly others), the parasite is said to actually consume pollen and honey while waiting for the bee larva to develop or to reach sufficient size.

During the Spring of 1928, at Pasadena, California, the writer was fortunate in securing two nests of bees, each containing chrysid larvae. The chrysid involved is *Chrysis (Holochrysis) pacifica* Say or an unnamed variety or race of *pacifica*. This determination has been made by Dr. Leland H. Taylor to whom I am pleased to express my appreciation for this and other favors. Certain data concerning the development of the chrysid, together with notes on the host, follow:

The host from one nest proves to be that of a new species which Dr. Cockerell has described as *Alcidamea brachyodonta*, the description of which is published in this issue of the NEWS. The nest from which this specimen has been reared was taken at Pasadena, California, on May 28 and contained 4 completed cells. The builder and provisioner had but recently constructed a barricade to the outside and above the series of cells. The outer part of the barricade consisted of a plug, concave in outline as seen from above, formed of greenish and brown plant material and a few small pebbles, about one millimeter in thick-

* Chapman, T. A. "On the Oeconomy of the Chrysides parasitic on *Odynerus spinipes*." Ent. Monthly Mag., vol. 6, pp. 153-158, 1869.

** Ferton, Ch. "La Vie des Abeilles et des Guêpes." Chiron, Paris. 1923.

ness. The plant substance composing it was thought to have been obtained in part, at least, from lichens. Below, a space measuring some 24 mm. in length had been filled with loose pebbles. A support or partition of plant material held these pebbles from falling upon the content of the first cell (last to be constructed).

The first cell was 6 mm. long; 2nd, 13 mm.; 3rd, 8 mm.; and the 4th, 12 mm. in length. Between the first and the second cell, some pebbles had been used with the plant material in the partition; between the others, the partitions were thinner and consisted solely of a greenish substance. The content of the lowest cell rested on the concave base of the pith of the plant stem. Each cell contained some pollen and a larva of the host bee, *A. brachyodonta*, but the size of the larva was progressively larger and the amount of food increasingly less in the cells from one to four.

Each host larva had a small, parasitic, chrysid larva on its body. These parasites were of about the same size and remained attached to the hosts, although the latter were jarred considerably. At this time, just after the nest had been taken, the parasites were oriented as follows: No. 1 was on the segment just anterior to the mid-body region of the host, with its head toward or attached at a nearly dorsal position; No. 2 was on the 4th from the last segment with its head toward the dorsal region of the host and with its tail touching the pollen in the cell; No. 3 was on the 3rd segment from the last of the host and in a position similar to that of No. 2 except that it rested entirely on the host; No. 4 was like No. 3 but was attached midway between the head and tail of the host. The entire nest was placed in a test tube containing a cotton plug for a stopper. Certain facts of development and of larval reactions were subsequently observed and recorded.

Two days after the nest had been taken from the field, all the host larvae had grown much larger, those in the last two cells (numbers 3 and 4), having nearly finished their provisions. The chrysid larvae, changed in position on the host body, remained practically the same in size. During the afternoon of the following day, the host from the 4th cell began to spin its cocoon. This was after it had finished passing feces,

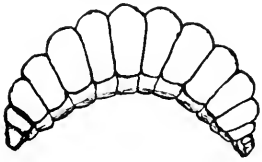
and apparently following complete evacuation of the digestive tract. These pellets had been plastered to the side of the small vial to which the host and parasite had been transferred following the period of feeding. Normally the feces would have been placed at the ends of the cell and outside the cocoon of the insect.

During the period of feeding of this specimen and that of the others of the nest, food and atmospheric conditions were kept moist. This was accomplished by placing periodically within the test tube enough fresh leaves to furnish sufficient moisture. The cotton stopper aided in preventing too rapid evaporation and allowed for an exchange of gases for respiration. This method, when properly regulated, keeps the pollen moist and provides better conditions for larval growth and development. It may be used to advantage where regulated moist chambers cannot be had.

The host larva, in spinning, attached its silk to cotton placed in the vial but it was unable to enclose itself in a cocoon, due to the large size size of the tube. This failure had been planned in order that the spinning would be dissipated and that with the host and parasite in view at all times. Thus when finished on the following day, a bed of silk lay beneath the larva and none at the side or above it.

During the active movement of the host while spinning, the parasite held on, seemingly shifting its position as the need for it arose. This was true likewise when the host was forced to tumble out onto my hand or when rolled back into the vial. It appeared that the chrysid larva held onto the host by means of its jaws, supplemented at times by the contact of the posterior end of the body. A dark spot in the center of the body indicated that it had probably fed a little although active feeding did not take place until the host had completed its work. Then it fed noticeably and actively until the tissues of the host were exhausted, spun its cocoon successfully (since cotton for a side attachment had been provided) and later in the laboratory completed its development. It emerged during the early winter a mature chrysid, *Chrysis* (*Holochrysis*) *pacifica* or an unnamed variety or race of *pacifica*.

The parasite from one cell was removed from the host and mounted on a slide in balsam. A sketch of it accompanies this article as well as that of the adult larva from another.



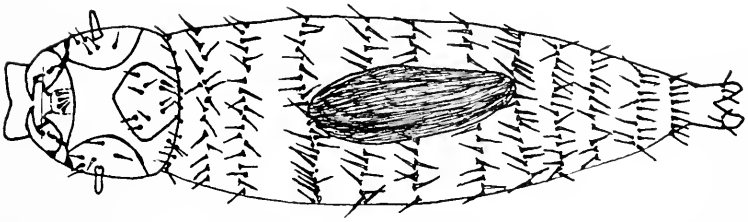


FIG. 1 Mature chrysid larva removed from cocoon. Anterior end is to the right. x 10.
FIG. 2. Sketch of first instar of *Chrysis* (*Holochrysis*) *pacifica* Say or an unnamed variety of *pacifica*, parasite of *Alcidamea brachyodonta* Ckll. Dark, central mass represents ingested food. x 85.

From still another host of this series, the young chrysid was forcibly removed and placed on the paralyzed, moth larva, prey of the wasp, *Podalonia violaceipennis* form *luctuosa*. It, however, did not attack this prey and later perished.

A second nest, believed to be that built by a species of bee belonging to the genus *Ashmeadiella*, likewise contained chrysid larvae. These parasitic larvae appeared very like those from the nest of *A. brachyodonta* and their reactions and relationships quite similar. It is hoped that the host from this nest may be identified and the data later presented. The parasite from one cell in this series was found at one time on the food mass.

It seems probable that the adult female chrysid seeks the nest and cell of the host (or hosts) and lays her egg therein. The larva then, upon hatching, attaches itself to the host and remains with little or no food until the host has reached a late larval or prepupal stage before attacking it. In nine instances, only one chrysid larva was found to a given host larva thereby suggesting that usually but a single fertile egg is deposited in a given cell.

## Two New Species of Calendra (Col.: Curculionidae.)

By A. F. Satterthwait, U. S. Bureau of Entomology.

The following species have been unearthed through the generous cooperation of Mr. Henry Dietrich, formerly inspector in the Mississippi State Plant Board, with the Webster Groves Station of the Bureau of Entomology in its investigation of the corn billbugs.

**Calendra dietrichi,** new species.

Front tibia narrowing toward apex, the outer edge, at the spot where the outer apical angle usually appears, not in the least angulate or lobed, but evenly merging into the terminal claw or uncus; third joint of each tarsus one-third to one-half wider than basal joint.

Pronotum without actual vittae; median line narrow, polished, impunctate, almost contacting base and apex; punctures circular, wide, shallow, heavily coated, only moderately variable in size, smallest at basal edge and at apical collar, some of them confluent near base on each side of the median line and in the posterior outer angles of the disk; all punctures of one type, each with an erect central seta slightly projecting. A small polished area, large enough to accommodate about two punctures, slightly cephalo-laterad of middle of each half of disk.

Beak moderately compressed, ventro-apical angle less than 90 degrees, apex above slightly concave, upper contour almost flat, very slightly convex from base past scrobes, then slightly concave, then convex, then straight for apical fourth; flattened portion at base with thoracic type of punctures from eye to eye, and extending slightly on to the head and part way laterad along eyes like eyebrows, except for a narrow, transverse, polished, impunctate area caudad of interocular puncture. Interocular puncture inconspicuous at base of long, wide depression.

Elytra thinly and generally covered with yellowish gray coating. Intervals flat, basal portion of third slightly elevated. Sutural interval uniseriately punctate, about 22 punctures in basal half; the second interval with 12 punctures in basal half not closely set and somewhat larger than those on sutural interval; the third with about 30 in basal half, those in basal third irregularly biseriate or uniseriate, balance uniseriate. Striae open, punctures large, 8 in basal half of first stria, 6 in basal half of second, the punctures in the apical half not conspicuous.

Pygidium bearing long, untufted setae across the apical third.

Last sternite setaceous, with tufts as long as the pygidial setae. Other ventral punctures generally like those of thorax, each with a slightly projecting seta.

General color dark grayish brown with yellowish gray coating in depressions. Measurements in millimeters: Female, total length 9.23; width of beak at middle 0.47, at apex 0.52, at base 1.06, least depth about 0.70, length 2.96; pronotal width 3.60, length 4.13, humeral width 3.80, elytral length 4.50.

The female *type* was reared from a larva in rice stubble from Wiggins, Mississippi, March 4, 1932, submitted by Mr. Henry Dietrich; the adult issued April 6 (Webster Groves No. 32002). Another female, collected in the adult state under chips at Delchamps, Alabama, December 13, 1931, by Mr. Dietrich (Webster Groves No. 31155), is almost exactly like the female type except that its feet are almost devoid of setae, and to this denuded condition is attributed the fact that the third tarsal joint of each foot appears somewhat inflated, at least 1½ times the width of the basal joint. The rostrum of the Alabama specimen has two concave spaces in the dorsal curve. The Alabama specimen differs also in that the polished impunctate area at the base of the beak extends completely across from eye to eye.

Through the courtesy of Mr. Henry Dietrich the type is deposited in the U. S. National Museum (Cat. No. 44807).

This species more closely resembles *C. germari* Horn than *C. chittendeni* Blatch. It differs from *germari* in having the lower apical point of the rostrum acute, in having a partial differentiation between the rostrum and the head, in having no notable irregularity in the sculpturing of the pronotum, and in having elytra with prominent wide open striae, fewer and much smaller strial punctures, much finer punctures on intervals, and more sharply defined intervals.

It differs from *C. chittendeni* in having the basal portion of the rostrum closely beset with large coated punctures and in the absence of a fovea in front of the eye, in having only a narrow smooth line on the disk of the pronotum and only one style of puncture, and in having much closer punctures on flat, square-shouldered elytral intervals.

**Calendra lucedalensis,** new species.

Tibia not truncate, broadly rounded or lobed at outer apical angle; all tarsi slender, the joints about equally wide. Elytral intervals flat and even, striae fine and shallow; strial punctures large, about twice as long as wide, shallow, about 12 to 16 in the first stria. Even intervals about equal. Punctures on intervals fine, uniseriate, except at base of third, where they are irregular. Coating even, though less opaque toward base of seventh and eighth intervals, apparently from abrasion.

Pronotum without actual vittae though there are slight depressions with large, more or less confluent punctures from the middle of the base forward and outward, practically lost before reaching middle. A slight depression with congested large punctures near center of each basal quarter. Median line less than half the thoracic length, moderately wide, impunctate in the center, failing to reach base and apex by about equal distances. Pronotum more clearly black than the elytra, yet lusterless or nearly so. Collar fold at apex not obvious across the median line.

Beak compressed, its depth at apex double its thickness at middle, flattened above at base, moderately curved with a fossal bump near base above, and about a 25 degree bend near apex. Apex above concave; below, about a 95 degree angle, not rounded. Interocular puncture deep, circular, without canal. Metasternum with a few very coarse punctures, some confluent. Punctures coarse on sternite 1, deeper on 5, moderately fine on 2, 3 and 4. Sternites shiny, without obvious setae. Pygidium coarsely, not very densely, punctured, with a slight median elevation indicated at the apex. Pygidial setae all very fine, short.

General color blackish-brown with scant yellowish-gray coating.

Measurements in millimeters: Female, total length 11.25; width of beak at middle 0.38, at base 0.76, length 3.55; pronotal width 3.13, length 4.43, humeral width 3.96, elytral length 5.01.

Type locality, Lucedale, Mississippi, June 22, 1932. Found dead by Mr. Henry Dietrich.

Described from one specimen in very good condition.

Through the courtesy of Mr. Henry Dietrich the *type* is deposited in the U. S. National Museum (Cat. No. 44808).

This species is somewhat suggestive of *scoparia* Horn, especially those specimens of the latter species in which the pronotal irregularities are at a minimum. The elytral pattern is quite distinctive; this and the character of the front tibiae and

the slenderness of the tarsi separate it from most of the species of the eastern and central states, and indicate nearness to *C. cicatistriata* (Fahr.) (*ulkei* Horn). There are slight serrations in the tibiae but they are not nearly so strong as in *C. serratipes* Chitt.

### The Marloff Collection of Insects.

The late Mr. Fred Marloff, Jr., bequeathed his entire collection of insects with the cabinets to the Carnegie Museum. This is the largest and the most valuable bequest ever received in the Section of Entomology. The collection contains 27,000 specimens mostly from United States and Canada. Mr. Marloff's beautful collection of Micro-Lepidoptera had already some years before been acquired by this museum through the generosity of Dr. George H. Clapp. Mr. Marloff until his death preserved the greatest interest in the Carnegie Museum, and he used to express his desire to the curator, that his collection would be there preserved. This collection will always stand as a monument of this gentle, true, and spirited lepidopterist. 34th Ann. Rep. Carnegie Mus. 1931:31.

## Entomological Literature

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

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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Hugh Scott. General Conclusions Regarding the Insect Fauna of the Seychelles and Adjacent Islands. Trans. Linnean Soc. London xix, Part 3. (March, 1933). pp. 308-391.—Many years ago it was recognized that the faunae of remote islands were of extraordinary interest to students of geographical distribution and evolution; and furthermore, that if collections were not made in the near future, many of the inhabitants of these islands would be lost for ever, having disappeared as a result of human occupation. The dodo, the history of which is familiar to every one, is but an example of the sort of thing which has happened or is happening on almost all islands possessing endemic species. Accordingly, a

Committee was appointed under the auspicies of the Royal Society of London, the British Association for the Advancement of Science and the Bishop Museum at Honolulu, to explore and report on the Zoology of the Hawaiian Islands. The resulting publications, issued under the title *Fauna Hawaiiensis*, were recognized as representing a contribution to zoological science of the first magnitude, and a source of information and inspiration to all subsequent generations of zoologists. It was evident, however, that the Hawaiian group was in many respects unique and so far from settling the problems connected with insular faunae, strongly suggested the importance of investigating other islands or groups of islands. It would be through comparisons of the various results thus attained that some of the most important and interesting generalizations could be made. Attention was directed to the Seychelles group in the Indian Ocean. The Zoology of these islands was briefly discussed by A. R. Wallace in *Island Life* (second edition, 1892, Chap. xix), and the conclusion reached that "we have the fragments of a very ancient island, which may perhaps never have been continental." The insect fauna was evidently very little known, and owing to the great number and variety of insects, it seemed that an entomological expedition was particularly desirable. Accordingly, with the aid of the Percy Sladen Trust, Dr. Hugh Scott and others visited the islands, and made a very careful investigation of the insects. Dr. Scott spent eight months, working hard; and being already a skilled and experienced collector, he secured an immense amount of material. It was roughly estimated that there were fifty thousand specimens. This was a great achievement, but equally great was that of getting practically all the material worked up, by Dr. Scott himself in the groups of beetles with which he is especially familiar, and by numerous other specialists in other groups. In all, eighty-three reports were published, and the whole results are fairly to be compared with those given in the *Fauna Hawaiiensis*. As an example of constructive, purposeful entomology, it would be hard to find anything better. Two hundred and thirty-three genera and 1423 species were described as new, these including a certain number from the Aldabra group, north of Madagascar. It is impossible in a brief space, to review all the conclusions derived from or suggested by these reports. Comparing the Seychelles group (about 160 square miles) with the Hawaiian Islands (about 7000 square miles) we find:

Seychelles. 2090 species (1366 believed endemic)
1217 genera (215 believed endemic)

Hawaiian Islands. 3115 species (about 2726 regarded as endemic)
613 genera (178 endemic)

Necessarily, these figures will be altered greatly as the result of future work, thus it is estimated that not more than about half the existing insect fauna of the Hawaiian Islands is known. Nevertheless, it is quite certain that the main statistical features will stand, and represent positive facts. How are we to interpret these facts?

Probably we may classify insular faunae on the following basis:

A. Very ancient islands, with a high percentage of endemic genera and species.
   1. Oceanic islands, with comparatively few genera, and various important families wholly absent. Species often very numerous and closely allied. Example: Hawaiian Islands.
   2. Islands with old continental connections, hence very many genera, and fewer species per genus. Example: Seychelles, New Caledonia. Using this classification, a good argument can be made for the continental origin of the Madeira Islands.*

B. Relatively recent islands, with a much smaller percentage of endemic forms, or sometimes hardly any.
   1. Oceanic islands, with a small fauna, usually now consisting principally of species introduced by man. Examples hard to demonstrate, but doubtless can be found.
   2. Islands with continental connections, and a fauna almost identical with that of the adjacent continent. Examples: Tasmania, Ireland, Formosa

On some such basis we may perhaps determine rather exactly the past history of an island, and at the same time get some idea of the rate of evolution of different forms of life. There are various modifying factors to be taken into account. Thus, for example, Formosa is mountainous, and no doubt the fauna of its higher altitudes was largely differentiated before the separation from China occurred. Tasmania contains some distinct animals, which are evidently relics of a time prior to its separation, but have died out in Australia. In some cases,

*A new analysis of the Madeira fauna is perhaps called for. The extreme poverty of various groups (*e. g.*, Buprestidae, Elateridae, Scarabaeidae) is very striking. Buprestidae are now extremely numerous and varied in North Africa. Madeira appears to have no native ants. For an argument against the continental origins of the Madeiras, see Nature, April 8, 1922, p. 446.

oceanic islands have been so completely overrun by rats or other pests, that it is difficult to find the original inhabitants, most of them having been exterminated. Sometimes, as in the case of New Caledonia, there is reason to believe that there have been great changes of level, at one time increasing the land area, at another reducing it to a relatively small amount. As a consequence of this many species may have been exterminated long ago.

Dr. Scott remarks that there is no evidence that the Seychelles originated "before all the orders of living insects were differentiated." On the contrary, many modern genera were evidently already in existence, but we know from the fossils that many genera of insects are of enormous antiquity. The early continental connection was surely with Asia. The resemblances to the Ethiopian fauna, such as they are, may be readily explained by the survival in Africa of various genera once also living in Asia. The wider distribution of many groups now exclusively African is well known to paleontologists. The total absence of several important groups (*e.g.*, the sawflies) in the Seychelles is surprising, but does not indicate that they were not in existence when the islands were formed. The islands are mountainous, with elevations up to nearly 3000 feet, but it is possible that the elevations at some former period were not so great. Also, no doubt, they have been greater, but presumably never comparable to those of the Hawaiian Islands. Nearly all the apparently endemic genera and species were found in the small areas, totalling about five square miles, where the ancient forest still survives. It is easy to imagine the losses to fauna and flora resulting from this restriction of the original forested area. We are indeed amazed that under such conditions Scott was able to discover such a large and varied insect fauna.

This discussion does scant justice to Scott's paper, the study of which may be commended to every entomologist who is interested in the larger aspects of his science.

T. D. A. Cockerell.

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Fighting the Insects: the Story of an Entomologist. By L. O. Howard. The Macmillan Company. 333 pages. 1933. $2.50.—This is Dr Howard's own story, told humorously, genially and modestly, and is both romantic and dramatic. He tells of his boyhood in Ithaca, his days at Cornell University, his growing interest in insect life, his work, from 1878 to 1931, first as Assistant Entomologist and later as Chief of the Bureau of Entomology. He writes in popular vein of his scientific

work, avoiding all technicalities, and making the gipsy moth, the mosquito, and the silk worm equally delightful to read about. He tells lively stories of his travels in many lands and of a host of notable scientists and public men whom he has met. Dr. Howard says that an entomologist is still a queer fellow in the eyes of many, but he is really very much like other people. Very likely people might find the story of an entomologist—that is, an average typical entomologist—interesting; but the particular entomologist who writes this, being perhaps more like the average man than is the average entomologist, has had the good luck to be thrown into positions in which he has been able to draw forcible attention to the insect problem, since he has in the course of the years taken part in many investigations that have been successful and have proved useful to all humanity. So why should not his life be interesting? This book will be found interesting, not only to those who know Dr. Howard personally and to entomologists in general, but to others who find entertainment in reading of the lives of useful men; and its moderate price brings it within the reach of all.

[E. T. C. Jr.]

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Medical Entomology. A survey of insects and allied forms which affect the health of man and animals. By William A. Riley, University of Minnesota, and Oskar A. Johannsen, Cornell University. First edition McGraw-Hill Book Co., Inc., New York and London, 1932. Pp. xi, 476, 184 figs. and frontispiece, $4.50.

Medical Entomology. By Robert Matheson, Cornell University. Springfield, Illinois & Baltimore, Maryland. Charles C. Thomas, 1932. Pp. xiii, 489, 211 figs. and double frontispiece. $5.00.

It is not often that two different books under the same title by two members of the same faculty appear about the same time, but such is the case in the present instance. It is natural, on reading the names of the authors of the first volume, to recall their earlier work on this subject, reviewed in the News for May, 1915, and to assume that their present work may be merely a slight revision of their previous text. This is far from being the case. They do indeed speak of it, in the preface, as a revision, but at once explain that they have so recast the material as to arrange it in a systematic order. After a brief historical chapter and a second summarizing the ways in which Arthropods may affect the health of man and animals, the arrangement is strictly taxonomic. We still think, as we did in 1915, that this is preferable to the ecological arrange-

ment adopted in their volume of that year. The sequence which they here follow is: Crustacea, Arachnida, Myriopoda, Insecta. An appendix deals with hydrocyanic gas fumigation against household insects.

Prof. Matheson likewise begins with a chapter embracing a brief historical account and some generalities on insect-borne diseases and then follows a taxonomic arrangement whose sequence is Crustacea, Arachnida, Insecta. His nineteenth chapter, Poisonous and Urticating Arthropods, contains nearly all that he has to say on Myriopods, Coleoptera, Lepidoptera and Hymenoptera, while certain Arachnida and mosquitoes find a place here also. The last chapter is on collecting, preserving, mounting, dissecting and rearing insects. The Orthoptera are practically omitted from the book.

Matheson makes greater provision (32 pages, 25 figures) for those users of his book whose knowledge of insect structure in general is scanty than do Riley and Johannsen (16 pages, 4 figures). The latter authors employ only the Comstock-Needham nomenclature of wing-venation; Matheson gives both this and also that which is widely used by writers on Diptera, as by Williston in his *Manual*. Both volumes contain numerous keys for identification of Arthopods; those in Riley-Johannsen are in most cases fuller in characters employed and include a greater number of genera, families, or other taxonomic divisions. Thus, Matheson's 1 page key to Culicidae is for 11 genera, and the key to the species of *Anopheles* (pp. 237-238) embraces those of the Americas only. Riley-Johannsen give a two page key to 41 genera and 12 pages to keys for the species of *Anopheles* of the entire world, grouped by continents. Yet 36 species of *Aedes* appear in Matheson's index to 5 in the other work. Both books give extensive, selected bibliographies; Matheson places them at the end of each corresponding chapter; Riley-Johannsen has one comprehensive list at the end of the volume.

P. P. Calvert.

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Houard, C., (preface par E. L. Bouvier). Les Zoocecidies des plantes de l'Amerique du Sud et de l'Amerique Centrale. 1-546 p. Map, 1027 fig., Hermann et Cie: Paris, 1933, Pr. 120 fr.—This general summary of the gall fauna of South and Central America is the first comprehensive tabulation we have had of this comparatively unknown and most interesting fauna. The author, exceptionally well equipped through his preparation of five similar volumes on the galls of the Mediterranean region, Asia, Africa and Oceania, has followed the same general plan in this work. It is a descriptive, admirably illustrated list of plant galls, arranged in a botanical sequence. There

are 1,341 deformities described from 98 plant families. The general discussion of the galls as a whole and of those of each of the families add greatly to the value of the work. The descriptions of the individual galls are accompanied by citations, making it comparatively easy, in connection with the extensive bibliography, to ascertain further details in regard to any species or group. The tabulated matter respecting the gall makers and their hosts greatly aids a comprehensive view of the whole.

The fact that but 229 species are definitely associated with the deformities they produce indicate there is much to be learned in regard to this fauna with its known 1,341 galls, the latter by no means representing the whole number. The gall midges are responsible for over 50% of the deformities produced by identified species and this ratio is not far from that of the gall faunae of Dutch East Indies, the Mediterranean region, North America and Central Europe as indicated by earlier published works. The 20 psyllid galls make a relatively poor showing compared with the 145 recorded from the Dutch East Indies and the 19 deformations produced by gall mites are a mere drop in the bucket compared to the 355 recorded from the Dutch East Indies and 263, 162 and 196 listed respectively from the Mediterranean region, North America and Central Europe. The other identified gall makers are represented by even fewer species.

A comparison between the gall makers and their host preferences also shows interesting conditions. The 164 galls in the Composites compare favorably with the 181 and 182 recorded in earlier lists from Asia and North America, through decidedly low for the 660 listed from the Mediterranean region. The 48 galls of the Spurge family are low for the 129 listed from Asia and also from the Dutch East Indies, though they compare favorably with the 43 from the Mediterranean region. The 39 galls listed from the Madder family are small compared with the 91, 71 and 160 recorded from Asia, Dutch East Indies and the Mediterranean area respectively. There is a closer approximation in the fauna of the Laurel family, 36 galls being recorded in this work and 53 and 48 from Asia and the Dutch East Indies respectively. The 16 galls in the Beech family and the 14 in the Rose family present marked contrasts to conditions recorded for these groups in Asia, the Mediterranean region and North America respectively.

The author is to be congratulated upon the preparation of such a satisfactory volume which cannot prove otherwise than an invaluable guide to all future students of plant deformities in that section of the world. E. P. Felt.

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

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The subscription price per year of ten (10) numbers is as follows:

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| United States and possessions, Central and South America | $3.00 |
| Canada | 3.15 |
| Foreign | 3.25 |

Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance.
One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 7.00
Ten issues " 11.00, " 20.00, " 35.00, " 60.00

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ENTOMOLOGICAL NEWS, 1900 Race Street, PHILADELPHIA, PA.

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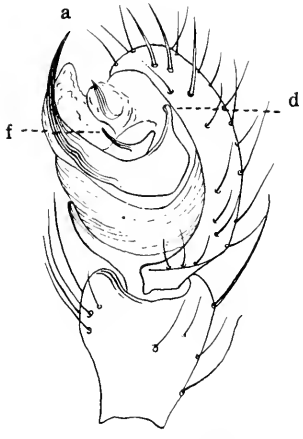


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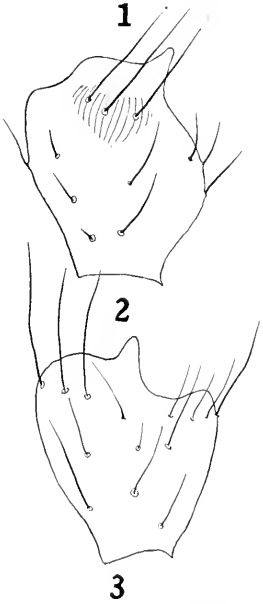

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EPERIGONE AUGUSTAE 1-4, E. AUGUSTALIS 5-7
CROSBY AND BISHOP.

# ENTOMOLOGICAL NEWS

VOL. XLIV. NOVEMBER, 1933 No. 9

## Two New Species of Eperigone (Araneae).

By C. R. CROSBY and SHERMAN C. BISHOP.

(Plate VII)

Since our revision of *Eperigone* in 1928 (N. Y. State Museum Bul. 278) the following two new species have come to hand.

**Eperigone augustae** n. sp. (Plate VII, figs. 1-4).

♂. Length, 1.1 mm. Cephalothorax grayish yellow, with distinct radiating lines and margin darker; a distinct dark spot in front of dorsal furrow connected with the posterior lateral eye by curved dark lines; viewed from above evenly rounded on the sides, slightly convergent towards the front, broadly rounded in front; viewed from the side, steeply ascending behind, a slight depression at the cervical groove, then gently rounded over to the posterior eyes. Clypeus almost straight and slightly protruding.

Posterior eyes in a straight line, equal, the median separated by two-thirds the diameter and from the lateral by the radius. Anterior eyes in a straight line, the median smaller than the lateral, all separated by the radius. No tooth on face of chelicera. Sternum dark greenish with scattered minute yellow spots, broad, rounded on the sides, produced in a truncate point between the hind coxae which are separated by the diameter. Labium grayish. Endites banded with gray. Legs dusky yellowish. Palpus gray over yellow with minute light dots. Abdomen dark greenish gray with a few minute, light spots.

Femur of palpus normal and gently curved. Patella short and slightly arched above. Ratio of length of femur to that of patella as 9 to 3. Tibia longer than patella, moderately widened distally, the dorsal margin thin and depressed, the edge gently sinuate, the lateral angle produced into a short blunt tooth. Laterally from this tooth there is a smooth, semicircular excavation. Paracymbium broad at base, very strongly curved and hooked at tip. Bezel high and pointed. The embolic division is a modification of the Eperigone type, the scapium is widened and broadly rounded on the mesal side of

the bulb, the posterior tooth (a) is developed into a very long, slender, gently curved and pointed process, the mesal tooth (d) well developed, lying close to the place usually occupied by the anterior tooth which in this species seems to be lacking. The duct opens through a short slender process (f) lying in the concavity of the scapium.

♀. Length 1.1 mm. Similar to male. The epigynum of the same general form as in *augustalis* but the posterior margin is convex in the middle; the receptacles are twice their diameter apart.

*Holotype*, male, East Aurora, New York, May 13, 1926; *allotype*, female, Enfield Glen, New York, May 22, 1932.

New York: Voorheesville, June 19, 1923, 1 ♂ (Augusta Wolf). East Aurora, May 13, 1926, 2 ♂ (Henry Dietrich). Enfield Glen, May 22, 1932, 1 ♂ 1 ♀.

**Eperigone augustalis** n. sp. (Plate VII, figs. 5-7).

♂. Length 1 mm. Cephalothorax dusky over dull yellow, darker along the radiating lines, at the margin and in a patch in front of the cervical groove; viewed from above, broadly rounded on the sides, slightly crenulate, a slight constriction at the cervical groove, broadly rounded across the front; viewed from the side rather steeply ascending behind the cervical groove, then nearly level to the head which is gently rounded over the top to the posterior median eyes. Clypeus nearly straight and very slightly protruding. Sternum dark greenish-gray with small light yellow flecks. Endites dull yellow at base, darker distally. Legs dull yellow. Abdomen dark gray.

Posterior eyes in a straight line, equal, equidistant, separated by two-thirds the diameter. Anterior eyes in a straight line, the median smaller than the lateral, all separated by the radius of the median.

Femur of palpus normal, slightly curved. Patella short. Ratio of length of femur to that of patella as 16 to 5. Tibia has the dorso-lateral surface deeply excavated toward the tip and the integument thin and semi-transparent. It is armed dorso-laterally with a stiff, slightly curved, rather narrow process. Paracymbium broad at base, strongly curved and slightly hooked at tip. The embolic division of the bulb is very similar to that of *augustae* but the duct (not shown in drawing) is placed far beyond the mesal tooth (d).

♀. Length, 1.1 mm. Similar to male. Posterior eyes in a straight line, the median separated by the diameter and a little nearer the lateral. Anterior eyes in a straight line, the median

smaller than the lateral, separated by the radius and from the lateral by a little more. The epigynum strongly convex, the posterior margin strongly convex with a minute notch in the middle, marked with a dark median line and with the receptacles showing through the integument far forward, about their diameter apart.

*Holotype* male, *allotype*, female. Raquette Lake, New York, June 11, 1927. Also 2 male paratypes.

Explanation of Plate VII.

1. *Eperigone augustae*. Male, right palpus, ventromesal view.
2. *Eperigone augustae*. Male, tibia of right palpus, dorsal view.
3. *Eperigone augustae*. Male, tibia of right palpus, dorsolateral view.
4. *Eperigone augustae*. Female, epigynum.
5. *Eperigone augustalis*. Male, right palpus, ventromesal view.
6. *Eperigone augustalis*. Male, tibia of right palpus, dorsal view.
7. *Eperigone augustalis*. Female, epigynum.

## A New Genus and Species of the Dipterous Family Ephydridae Reared from Duck Weed.

By E. T. Cresson, Jr.

**Lemnaphila scotlandae*** new genus and species.

The systematic position of this species seems to be in the tribe Hydrelliae of the subfamily Notiphilinae, near the genus *Nostima*. In this treatment I am influenced by the pubescent eyes, development of the antennae, the arrangement of the dorsocentrals and the venation.

I consider the following characteristics of generic importance: Wings normally developed with the costa attaining the fourth vein and the second basal and discal cells united; eyes pubescent; medifacies bare, in profile, concaved, with epistoma protruding; arista with long hairs; dorsocentrals arranged, 0:1.1, the antesutural pair being absent. Additional characters may be gleaned from the following, rather full description of the genotype.

* Genus named on account of the species' fondness for *Lemna*.

Black; halteres pale yellow; trochanters, femora more or less basally, extremities of tibiae and bases of tarsi, yellowish. Wings immaculate, hyaline with black veins.

Subopaque with brownish suffusion; frons entirely densely cinereous to niveous from cephalic aspect; upper part of face almost shining, lower part and cheeks opaque black; upper posterior part of mesopleura densely niveous from dorsal aspect.

Head almost twice as high as long, distinctly broader than high with concaved occiput closely applied to thorax. Eyes large almost height of head, micropubescent. Frons almost twice as broad as long, with anteocellar distance about equal to transverse interocellar distance; profile convex; postocelli situated at the sharp vertex, with the divergent ocellar bristles between the postocelli situated at the sharp vertex, with the divergent ocellar bristles between the postocelli; inner and outer verticals strong; frontalia not differentiated except as blackish wedges mesad of the more or less distinct line limiting the narrow, anteriorly attenuating, parafrons. Face about one-third width of head, in profile, concaved above with obtuse interfoveal carina and strongly protruding epistoma, the epistomal margin well above the line of the buccal orbits; parafacies linear, not dilated below; facialia not marked, with about two fine dorsocinate bristles situated below linė of buccal orbit and a few dorsoclinate setulae nearer the parafacial suture. Cheeks very narrow; postbuccal area convex, contiguous with occiput, with one ventroclinate bristle near oral margin. Mouth opening comparatively large, about one-half width of head; tormae narrow, compressed laterally with anterior margin reflexed. Palpi well developed, with several (about three) apical setae. Proboscis short, normal. Antennae large, nearly attaining epistoma, situated well above center-line of eyes; first segment not exserted; second broader than large, bare or microscopically pubescent, without dorsal bristle; third very broad, about one-half width of face, slightly longer than broad, truncate apically, pilose; arista twice as long as third segment, with seven long hairs above.

Thorax broad as long with convex mesonotum, bare except a few scattered acrostichal setulae; two post-dorsocentrals, the posterior pair much more widely separated than the sutural pair; about three appressed antesutural dorsocentral setulae; no humerals; one small presutural; one weak and one strong notopleurals. Mesopleura with the dorso-posterior area flat, bare, anterior and ventral areas convex and sparsely setulose; pos-

terior margin with one strong bristle. Scutellum triangular, broad as long, flat on disc basally, bare; two apical and two lateral marginal bristles.

Abdomen broad as thorax, slightly longer than broad, sparingly setulose, setulae not noticeably longer on distal margins of segments; lateral margins sharp. In the male, segments two to three subequal in length, four slightly longer, fifth pointed, longer than four.

Legs slender, bristling weak. Wings elongate; costa attaining fourth vein with humeral break but none noticeable at tip of first vein; subcosta coinciding with first at middle of costal cell; costal setae distinct but no noticeable bristle at tip of first vein; second vein short making the second costal section slightly shorter than third; veins three and four parallel; ultimate section of four distinctly longer than the preceding; discal cell narrow; posterior crossvein but slightly longer than the anterior one; vein five extending beyond posterior crossvein more than length of the latter. Length, 1.2 mm.

*Type.*—♂; reared by Miss Minnie B. Scotland, from leaf mines in duck weed (*Lemna minor*) collected in a fish hatchery at Fall Creek, Ithaca, New York. Emerged August 25-26, 1933. [A. N. S. P. No. 6501.] *Paratypes.*—11 ♂, 10 ♀; topotypical.

## Orthoptera to be Found in Winter and Spring in and near Tucson, Arizona.

By Morgan Hebard, Philadelphia, Penna.

After numerous collecting trips in the southwest during the Summer and Fall, I was somewhat surprised to find how very few were the species of Orthoptera which survived during the winter in the comparatively mild climate of Tucson, Arizona and the adjacent foothills: Rare examples of *Trimerotropis pallidipennis pallidipennis* (Burmeister) and *Heliastus parviceps* (Walker) [1] were seen at wide intervals and even fewer individuals of *Schistocerca vaga vaga* (Scudder).

In April, 1932, almost the same as winter conditions persisted in that general region though I saw for the first time the desert green and a great variety of plants and shrubs in

[1] In recent literature this species usually has appeared as the synonym *Heliastus aridus* (Bruner).

full bloom. I was then at the Flying V Ranch at the mouth of Rock Canyon at the southern base of the Santa Catalina Mountains. There, at 2730 feet, is a grove of cottonwood trees beside a very small stream, this being in the middle of the zone in which the Sahuaro or Giant Cactus flourishes.

In my cabin an adult male of the earwig, *Spongovostox apicedentatus* (Caudell), was taken, a species which is probably present adult throughout the year in the decaying areas to be found on occasional Sahuaros. On the night of April 1st a light brown male of *Neoconocephalus triops* (Linnaeus) began singing lustily in the dead grasses under the cottonwoods and was easily taken. The next night another was heard in the same spot and, later still, one additional individual only. On April 18th a small colony of *Conozoa carinata* Rehn was located in the sandy wash of a canyon at about 2700 feet at the western base of the Santa Catalina mountains.

In late April several trips were made up Rock Canyon and the adjacent Bird Canyon as far as the zone of oaks, and from 4000 to 5000 feet the species listed in the following pages were secured. It is of interest to note that, although at that time the region about Tucson showed so little Orthopteran life, as soon as the zone of oaks was reached some of the most interesting and least known Arizona species were not only present but often adult and locally often in moderate numbers.

ACHURUM SUMICHRASTI Saussure. On hillsides thickly covered with very thick patches of a low yucca interspersed with fine grasses a few immature individuals were found at 5000 feet. The largest were about three-quarters grown in the later part of April. This Mexican insect in Arizona probably reaches its maximum adult abundance in May and June and by July has become scarce. In August and September though we have found many small individuals there locally in the foothills, we have not seen a single adult. The species was not previousy known as far north as the Santa Catalina mountains.

AMBLYTROPIDIA MYSTECA (Saussure)

A series of twelve males, six females and two large immature females were taken in the same environment, but particularly in the grassy spots, in late April. Specimens of this Mexican

species from Fort Grant, Arizona, furnished the basis for the incorrect records in past literature of *Amblytropidia occidentalis* (Saussure) from "Arizona," that insect being a closely related species occurring in the southeastern United States as far west as Alvarado in Johnson County and Colorado County, Texas. In actions close resemblance to *occidentalis* was shown, individuals springing powerfully with flight short, direct and rapid, then hiding quickly and thus difficult to capture in the thick patches of low yucca.

We have taken small immatures of *mysteca* in late September in the Tumacacori National Forest, the Santa Rita Mountains and on Atascosa Mountain near the Mexican line in Arizona but the present is the first sizeable series of adults to be secured in the United States.

Our collections now show the range of *mysteca* to extend in the United States to the Chinati Mountains in the Big Bend of the Rio Grande in Texas and southeastern Arizona. Whereas *occidentalis* in Georgia appears adult abundantly in the spring and late fall and so is probably double-brooded there, we believe that *mysteca* in the United States appears adult only in the spring and that by midsummer adults have disappeared.

Amphitornus ornatus McNeill. One moderately large immature male was secured April 27 in this same environment; areas of fine thick grass, low mats of yucca, scattered cat-claw, sotol, prickly pear and occasional oaks. This species appears adult in the summer in Arizona, where it has never been found to occur abundantly.

Horesidotes papagensis Rehn and Hebard. A few immatures in different stages were found in scant grasses under oaks on the canyon floor at 5000 feet, higher than any place we have previously found this relatively scarce species in southern Arizona.

Psoloessa texana pusilla (Scudder). Quite numerous in the immature stages with the last species and two adult males were secured on April 23 and 28.

Scyllina viatoria viatoria (Saussure). As we knew this species to be locally moderately numerous on the flats and in the foothills in the fall in southern Arizona, it was rather sur-

prising to find three adults so early—a female on April 23, males on April 27 and 28, in the same environment in which *Achurum* occurred.

ARPHIA ABERRANS Bruner. Five males and three females were taken in this same area, widely distributed but scarce and usually flushed from bare spots. The wing disk in all is amber yellow.

XANTHIPPUS CORALLIPES CORALLIPES (Haldeman)

Fourteen males, five females and one large immature female were taken among the mats of low yucca at 5000 feet. The species was there present in small colonies and the males were very alert, as a rule hiding in the yucca and then suddenly flying out rapidly.

The internal surface of the caudal femora is rich pink except in one male in which it is dark brown with a broad flesh-colored pre-genicular annulus.

Late April is the time of greatest adult abundance for this race in southern Arizona.

LEPRUS, near INTERIOR Bruner. Four males and one female were secured April 23 and 27 from 4000 to 5000 feet in similar environment but found singly on bare spots.

Nearest *interior,* described from Utah, this southern Arizonan insect may prove to be a distinct though closely related species when the genus is revised.

LACTISTA OSLARI Caudell. A single adult male was secured in Rock Canyon at 5000 feet on April 27. This is certainly about the earliest date an adult could be expected.

PLATYLACTISTA AZTECUS (Saussure). A pair were captured April 23, the observations under *Lactista oslari* applying similarly to these.

TOMONOTUS FERRUGINOSUS Bruner. Five males and seven females were secured from among dead oak leaves and small patches of scattered grasses under oaks on the canyon floor and another female in the yucca with *Achurum,* all at approximately 5000 feet.

This very interesting species appears adult in greatest numbers in the spring, rare battered individuals only being present late in the season (September).

SCHISTOCERCA VAGA VAGA (Scudder). A single male was taken at 5000 feet on April 27, a very few females having been seen down Rock Canyon to near its mouth.

POECILOTETTIX SANGUINEUS Scudder. Absent from Rock Canyon, eight males and four females were secured April 27 on a ridge to the east where the species was locally moderately abundant in grass interspersed with low plants at 4500 feet. This was an open slope just below the first oaks. It was a distinct surprise to find all individuals adult so early, as this beautiful species is very local but when it does occur is often moderately numerous both in the summer and fall. Moreover it will be noted that apparently the many species of the Melanopli of this region do not appear adult so early in the season.

## Hawks Eating Dragonflies (Odonata).

In ENTOMOLOGICAL NEWS, Vol. 43, No. 9, November, 1932, p. 242, is a communication by Ralph D. Bird on "The Pigeon Hawk as an Odonatologist" in which interest is expressed in other similar information. As a contribution to the subject, it may be stated that Biological Survey files show 389 records of dragonflies in 727 stomachs of the pigeon hawk. A great many of these birds were collected at Fisher's Island, New York, a point in an important migration route for both birds and insects. The pigeon hawk's habit of preying on its fellow wayfarers has been commented on by the writer in *Nature Magazine*, Vol. 12, No. 3, September, 1928, pp. 171-172.

As to the numbers of dragonflies eaten at a meal by the pigeon hawk, they frequently exceed 10 and according to our findings may reach as high as 34. Species identified include: *Aeshna canadensis, A. constricta, A. multicolor, A. verticalis, Epiaeschna heros,* and *Anax junius*, apparently only the larger forms being taken.

Other hawks do not seem so prone to take dragonflies but several species are known to do so and their preferences also seem to be for large dragonflies, especially the common *Anax junius*.

The Mississippi kite, Cooper's hawk, sharp-shinned hawk, red-tailed hawk, red-shouldered hawk, broad-winged hawk, Swainson's hawk, marsh hawk, sparrow hawk, duck hawk, and Aplomado falcon are the species, stomach analysis in the Biological Survey has hitherto revealed as predators upon Odonata.—W. L. MCATEE, U. S. Dept. Agr., Washington, D. C.

## Did this Wasp Reason? (Hym., Sphecinae).

By H. T. Fernald, Ph.D., Orlando, Florida.

One bright day in late October, 1932, the writer observed a digger wasp *(Sphex arvensis floridensis*)* dragging a green larva, about the size of that of a full-grown *Pieris rapae* larva, over the sand. The wasp was startled by the writer's approach and flew off but soon returned and, after a brief search, located the caterpillar and resumed its dragging, placing itself astride its prey.

To appreciate what followed, a description of the locality seems necessary. The place was near one corner of a city block in Orlando, Florida. The lot itself had not been built upon and the strip next to the street had no sidewalk. The street was brick-paved, about 25 feet wide, with a cement curb rising six inches above the bricks and its level top four inches wide. Within the curb was the usual sand of this region, partly covered by small tufts of grass, these not forming anything like a sward though the tufts were fairly close to each other. This condition of the ground extended well into the lot except that about nine feet from the curb passersby had worn an indefinite path in the sand about two feet wide, which was without grass tufts and leaving the sand there looser than elsewhere. Dead live-oak leaves were abundant over all this area except in the path.

When first seen the wasp was in the middle of the path, evidently crossing it, heading toward the curb and nearly at right angles to it. Evidently its nest was somewhere in the nine feet between the path and the curb. But as the insect came close to the curb, doubt gradually developed in the mind of the observer. Did the wasp intend to drop six inches to the brick pavement with its prey; cross about twenty-five feet of brick road; climb up the curb on the other side in some way, and then find her nest somewhere on the other side? No: on reaching the curb the wasp turned sharply to the left along its top, still dragging the caterpillar, until she had travelled almost eight feet, then she turned at right angles to her last

* New variety: to be described later.

course, back onto the sand for a distance of some seven inches to the base of a tuft of grass, and pushing aside a live-oak leaf lying there, revealed the mouth of a hole. After examining this, she threw out a little sand, then backed into it, dragging the caterpillar after her. She remained out of sight about forty seconds, then emerged and began to scratch in sand, putting in a little, then apparently pounding it down with her head, to judge from such body motions as were visible in the later part of the process, until the hole was full. This procedure required approximately three minutes. The hole was filled only level with the surface of the ground around and the last sand put in was not pounded down. A dead oak leaf nearby was drawn partly over where the hole had been, either intentionally, or by chance as a result of scratching about for more sand toward the last of her work.

After completing this task the wasp remained nearby, seemingly resting, with an occasional visit to the place where her tunnel had been, presumably to assure herself that everything was all right. Every few minutes she was disturbed by automobiles passing and flew off but she quickly returned. After three examinations of the spot she did not return to it again during the ten minute period which followed during which she was watched.

These observations, together with some made in other cases, have led the writer to some conclusions and questions. The first of these (supported by other cases observed) is that in the loose, sandy soil of this locality difficulty in digging a hole which will not collapse is always present. All those seen dug have been begun close to a tuft of grass or other plant and the tunnel appears in every case to run under the plant, close to its roots. Is this not because the roots tend to hold the sand in place and keep it from caving in?

The other thought is that this insect had some particular purpose in not dragging the caterpillar in a direct line to her nest but in taking a roundabout and considerably longer path, though there was no obstacle to a direct course. It is true that to have taken the direct way to her tunnel would have

meant dragging her prey much farther over the loose sand while the insect actually took the shortest distance on the sand to where the level, hard, and quite smooth surface of the curbing could be followed to within a few inches of her destination. She certainly took the easiest way, but how did she come to do this? What explanation of this action on her part can be offered? Did reason come in to help her solve the problem how best to get the food for her young to the place provided for it?

## Dr. Marlatt Retires as Entomology Chief in U. S. Department of Agriculture.

Dr. Charles L. Marlatt, who reached his seventieth birthday on September 26, retired September 30, 1933, as Chief of the Bureau of Entomology, U. S. Department of Agriculture. Before coming to the Department, in 1889, Dr. Marlatt was assistant professor of entomology and horticulture at the Kansas State Agricultural College, where he had received B. S. (1884), M. S., and D. Sc. degrees.

Dr. Marlatt soon became associated with the administrative work of the Bureau of Entomology and served as assistant chief from 1894 to 1927. During that period he made important contributions on the life-history, habits, and methods of controlling household insects and those that attack fruit trees, cereal and forage crops, and stored-products. He also conducted technical studies on the classification of insects. He is probably best known for his work which led to the passage of the Plant Quarantine Act of 1912, designed to stop the stream of pests of plants that had been coming into the United States without restriction from Colonial times.

When Dr. Marlatt became chief of the Bureau of Entomology in 1927, he reorganized, under the authority of the Secretary of Agriculture, the plant quarantine work in the Department, bringing the sections which had been distributed in the Bureau of Entomology and the Bureau of Plant Industry under a new organization, now designated the Bureau of Plant Quarantine. For a brief period he served as chief of this bureau, as well as chief of the Bureau of Entomology. He relinquished the former position in December, 1929.—U. S. Department of Agriculture, Office of Information, Press Service.

## Species and Less, an Open Letter (Lepid.: Rhopalocera).

My dear Mr. Gunder:

I have been reading your paper: "Macrolepidoptera: Species and Lower Concepts," * which you were so kind as to send me. I find myself frequently in agreement with what you write, but more frequently in conflict; and I suspect that where we disagree I will more often than not find a good company of other zoologists in my party.

I must confess that I may have mistaken your meaning in a number of cases. I find that the language which you write is a very different "form" from my New England subspecies. If I have translated incorrectly into the New England race, please correct and excuse me.

### Species.

"A prime group of individuals reproducing their own in kind."

This definition I find far too inclusive, for all inheritable varieties also reproduce their like if in a "group" so that they remain uncontaminated. This will include all Mendelian forms, whether sexual like the white sulphurs, or bisexual like the many melanic geometers which have been reared in Europe; even monstrosities if they happen to be inheritable and not fatal, as much pedigree work on *Drosophila* and Man has shown. It will include all variant groups characterized by groups of inheritable characters, like the races of man, and presumably of butterflies.

In the "Lepidoptera of New York," page 8, I tried to restrict the concept by bringing in the factor of lack of fertile *cross*-breeding between species. The definition is still imperfect, but I think reaches at least 90% efficiency. I take it that you use the word "prime" not in this sense, but to set off one of the local subdivisions as primary, to be called the "species" against the others as races; whereas recent usage and the implications of the code are that no one of the subdivisions is primary, but *each* is a race, and *all together* form the species.

* Ent. News for July, November and December, 1932.

### Subspecies and Race.

I see you use these terms as synonymous. I feel that it might be better to remind the reader that after all locality (race) is not the only criterion of subspecies, which would also include such factors as host-variation (apple maggot) and even ecological surroundings (ants). The distinction may be useless in the butterflies of the West Coast, but even there I have my suspicions of *Thanaos afranius*. Certainly in the eastern members of this group *(persius)* there are three "forms" on different foods, which I have been calling species, but Skinner considered all one species. They may well turn out to be subspecies on a food basis when they are finally reared from *Baptisia*, Willow and Columbine. *Lycaena argiolus* must also be considered, as well as plenty of moths. I may also suggest (following Dr. Austin H. Clark) that *Junonia* probably has *biological* subspecies, for the nervous and sedentary strains have almost certainly a different biological background.

So I should revise your statement at the foot of p. 172 to read: "All butterfly subspecies *yet fully studied* are races" (i.e. geographical).

I take it the word "predetermined" in the definition of a race is merely a correlate of "prime" in the definition of species, and a product of the same divergence from the uses of the terms in the code.

I might add for the sake of others brought up on Staudinger and Rebel's catalogue, Jordan's publications and other works of German origin or inspiration, that this word "race" corresponds to the "varietas" of Staudinger. On the other hand I note that the "trans." of Staudinger has its traditional meaning and has nothing in common with your "transitional forms."

### Form and Variety.

I think our disagreement on the uses of these two words is psychological in origin. You appear to have no need for words of inclusive meaning, while I find myself quite unable to express myself without words that will not commit me to the more restricted definitions of "subspecies," "race," "aberra-

tion," etc. I think I am following general English precedent in reserving the two words "form" and "variety" to this use. To me the word "form" implies 1, homogeneity, 2, definiteness and distinctiveness. Thus I consider it allowable for the word to be used for any thing more substantial than an individual freak up to and including a species, and to be used when because of our lack of detailed knowledge, or for better emphasis on these two qualities of distinctiveness and homogeneity, some more restrictive word is not called for. Similarly to me the word "variety" excludes "species" but is otherwise also an inclusive term, perhaps might even be stretched to include individual freaks, not biologically definite enough to make forms.

I should not accept the word "form" as you use it without some further restricting word, such as "sexual," "seasonal" and the like.

We have a serious practical difficulty, in the fact that when a new form (in this inclusive sense) is first discovered, we rarely know its status. Formerly we merely described it as a "variety," which expressly did not commit us. The recent changes in the code are bribing us to guess it to be a race in cases of doubt, for the code seems to recognize race names as taking priority, and lower names as not; but that does not alter the fact that generally *we don't know*. In any case we need the inclusive word in discussion, and shall need it till that far distant date when all the variant forms of all the species have been fully studied and put in their proper pigeon-holes.

### Transition.

You do not seem to realize that there are two separate and wholly distinct objections to your "transition" form. First in the way of English. The word transition, in *all* usage except your own, means an intermediate condition between two end-states, not themselves included in the series of transitions. You extend it to comprise also the rarer end form (the commoner end-form is I suppose your "species)." This objection could be easily obviated by coining a new word. The second objection is really more serious. That is, that among your transition forms you seem to include a variety of different things. You

mention *V. cardui* f. *clymi*, which is produced by cold on the pupa, and the *Euphydryas* aberrations, which are almost certainly produced in the same way, but your definition would also include mendelian forms (like all the cases of melanism yet investigated), inheritable monstrosities (your "pellucidism" is merely a mild form of the "scaleless" kind of thing you group among the "synonyms"), and I get the impression you would include variations of whatever true character which happened to fall in line with one of your eight types, and appear in both sexes. In fact I think it is safe to say that 100% of your categories "change of color" *so far as studied* are mendelian, and that 100% of the albifusism, chromatifusism and melanifusism *genetically studied* is due to external disturbance, so far as I know, by temperature abnormalities. Which is of course the reason why these categories are practically limited to the part of the world which has frost periods. In the tropics, varieties (in the broad sense) of the mendelian type are by no means rare.

MULTINOMIALS.

You state, so far as I can see arbitrarily, on p. 171, that names in your system will not go beyond the quadrinomial stage. I don't see how you figure it out. For instance I try to apply your definitions to the buckeye butterfly. Using your categories (and the frequently necessary subgenus) we have a mountain form (s. l.) from Peru, and it becomes *Precis (Junonia) lavinia hubneri* f. loc. *huacapistana*. Add the fact that the form throws a melanistic "transition form" which I did not name, but suppose you would, and that this is the sedentary phase of a species which also has a parallel series of active phases, and you see the possibilities. And we have right in Ithaca, here, the common blue: *Plebeius (Lycaenopsis) argiolus pseudargiolus* f. vern. *lucia*, tr. f. *marginata*, strictly following your scheme, for the "immaculism" of form *marginata* is limited to the spring form *lucia*. In fact this is only a first spring form, since there is a second f. vern. *violacea*, nearer to the summer than to the first spring form. And what do you do where two "transition" processes are combined.

*E.g.*, if I understand you rightly my *Caripeta divisata* ab. *nigraria* combines albifusism and melanism. And I should not be surprized if the next *Colias* you catch is a *f. vern.*, ♀ *f.*, and *tr. f.* (say melanifusistic) of *Colias eurytheme*.

By the way, you do not seem to know that *hirsuta* is the early spring form, and not a race of *Papilio philenor*. (See Clark, Bull. 157, U. S. Nat. Mus., p. 11; I have also reared it from a wintering pupa from Boston, many years ago.) I understand that the Californian summer form also is typical *philenor*, just as in the East.

TRIVIA.

There are a few minor notes that I cannot pass over.

P. 170. I should say that all the races of a species are in *general* equally mature (including the "prime" one you call the species). Of course there are exceptions, due to retarding or accelerating local factors; *e.g.*, in the black swallowtail, the central race is more mature than the Newfoundland, Cuban and Central American ones that surround it; and in *P. machaon* the Canadian race *hudsonianus* and the Tibetan *montanus* are less mature than the other races. And it is purely arbitrary (though in line with the code) to say that a form is a subdivision of a race. It is just as logical, *e.g.*, to say that the various spring-brood forms of the common blue belong each to its race, or that the species has a spring form as a whole (let's call it *violacea*) with racial characters parallel to those of the summer forms.

P. 171. You say there is no such thing as a tr. f. of a f. ♀. There is certainly the combination, whichever you put first, and either way there are just as many names. What do you call the black-shaded female *Colias philodice* (which may have a white f. ♀) or the solid black male? And what on earth will you call a white female *C. philodice*, which happens to show the characters of ab. *rothkei?*

P. 172. I suppose "form morn." is a misprint for "norm."

P. 174. I think an altitude form might well be considered a subspecies but not a race, especially if it reappears at the same altitude in several places.

P. 175. You speak of the "misuse" of well-known classificatory terms, yet still use the term "transition form" in a way that denies the basic meaning of the word "transition."

P. 236. *A. milberti*, form *subpallida* is found east as well as west, but is rare in the humid areas (Massachusetts).

I don't understand why the eye-color series of *Drosophila melanogaster* does not constitute a typical transition-form (or pair of forms) in your sense. They make a nice series from the original red to deep brown on one side and to white on the other. Is it merely because their origin is known (except perhaps the original white eye), and do you intend to add to your definition the words "of unknown origin," calling a thing mendelian and putting it with the "aberrations" as soon as its mendelian character is proved?

P. 237. What do you call a form otherwise like a "transition form" but limited to one sex?, *e.g.* the yellow *Pieris rapae*, clean-cut and rare in the male, vague and common in the female. Does the excessively rare white male *philodice* destroy the sexual category of the common white female and make it an albinic form instead?

P. 240. Note that types are a bit ephemeral, while descriptions are more lasting. I suppose everywhere is not as bad as California, practically all of whose butterfly types disappeared during the earthly restlessness of 1906, but even in steady Europe, I find that many of Linnaeus's types are gone, and more of Cramer's have vanished or lost their labels. How many of ours will survive in another 150 years?

P. 261. You speak of the apparent lack of color variation in other orders. I think you mistake the facts; I believe the depreciation of names for color forms is not due to any such cause, but to the fact that workers in most other orders do not think such variations worth naming. All the orders have the variation; only lepidopterists, and a few coleopterists, bumblebee specialists and the like, bother to put names on them. Your footnote has the wrong premise.

P. 262. I should just like to see you put the names of the 1917 checklist in their proper categories according to your

scheme. I doubt if you could even get all the California butterflies quite to suit you.

P. 263. I knew the word "happenstance" since I was a boy. I suspect Josh Billings or some one like that invented it before I was born.

P. 265. I feel you may be trying to oversimplify *Melitaea-Euphydryas*. My impression is that the oldest color was neither red nor yellow but tawny like typical *Melitaea* and *Phyciodes*. In such a case, where different parts of the wing have gone in opposite directions at once, would you call it bichromatism?

Yours,

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## Priority in Diptera.

We quote a footnote to article by Miss D. Aubertin in Ann. Mag. Nat. Hist. (10), 141. "The question of priority arises in connection with Wiedemann and Robineau-Desvoidy names of 1830, published respectively in 'Aussereuropäische zweiflügelige Insekten,' vol. ii., and 'Essai sur les Myodaires, Mémoires présentés à l'Académie Royale des Sciences de l'Institute de France,' vol. ii. According to Mr. C. D. Sherborn there is no contemporary evidence of the month in which either of these works appeared, but the former was reviewed in 'Isis' in June, 1831, while the latter was not reviewed in the same periodical until the following November. In the absence of conclusive evidence, it would appear reasonable to assume that the order in which the works were noticed in 'Isis' indicates the order in which they were published. Wiedemann's names are therefore given priority in this paper" [by Miss Aubertin].

## Collecting Insects in the Canadian Rockies.

Mrs. J. Norman Henry, of Philadelphia, and her daughter, Miss Josephine Henry, have recently returned from an adventurous trip into a little known section of northern British Columbia. They left Edmonton in June and from there went to Pouce Coupee in the Peace River district from where they began a journey that took them more than 500 miles on horseback through a remote part of the Canadian Rockies. Because of an unusually heavy snow-fall during the winter, and the continual cold weather, insect life was very scarce. On a trip last year to this practically unknown entomological field, Miss Henry secured a very interesting collection of insects.—Canadian Nat. Railways.

# Entomological Literature

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

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.—Aue, A. U. E.**—Insekten-Massenmord! [26] 13: 102-105, cont. **Barnes, H. F.**—Gall midges (Cecidomyidae) as enemies of mites. [22] 24: 215-228. **Brues, C. T.**—Progressive change in the insect population of forests since the early tertiary. [90] 67: 385-406. **Bryson, H. R.**—The amount of soil brought by insects to the surface of a watered and an unwatered plot. [103] 6: 81-90. **Davis, J. J.**—Insects of Indiana for 1932. [Indiana Acad. Sci.] 42: 213-225. **Giovannoli, L.**—Invertebrate life of mammoth and other neighboring caves. [American Midland Nat.] 14: 600-635, ill. **Holland, W. J.**—Obituary. By A. Avinoff. [3] 21: i-iv, ill. **MacGillavry & MacGillavry.**—Entomologische brief uit Cuba. [58] 8: 511-513. **Niblett, M.**—Plant galls and their causers. [Trans. So. London Ent. & N. H. Soc.] 1932-33: 36-45. **Schade, F.**—Winter in den subtropen. [17] 50: 192-194, 200-201. **Smith, M. & F. S.**—A home-made light trap for moths. [Trans. S. London Ent. & N. H. Soc.] 1932-33: 46-49, ill. **Trägardh, I.**—Methods of automatic collecting for studying the fauna of the soil. [22] 24: 203-214, ill. **Williams, C. B.**—Further collected records relating to insect migration. [36] 81: 103-115.

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*Sageder, F.—Neue Saturniden-formen aus meiner sammlung. [17] 50: 209-211, ill. **Tanner & Davis.**—Notes on Utah lepidoptera. [Pro. Utah Acad. Sci.] 10: 151-152. **Van Son, G.**—A revision of South African moths of the tribe Nolini. [Ann. Transvaal Mus.] 15: 181-232, ill. [Contains some phylogenetic remarks.]

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THE MOTHS OF SOUTH AFRICA, Volume 1. SEMATURIDAE AND GEOMETRIDAE. By A. J. T. JANSE. Published by the University of Pretoria, 1932. Pp. 376, 130 text figures and 15 plates.

In 1931 I had the pleasure of visiting Professor Janse at Pretoria, and was shown his collection of the Lepidoptera of South Africa, and the Pyraloid moths of the world. Within the scope of Janse's labors, it seemed to me that the organisation of the work and the perfection of the technique left nothing to be desired. The pertinent literature appeared to be all there, minutely indexed. The morphology of the moths had been subjected to the most critical scrutiny, and the drawings illustrating the significant parts were exquisite. The first volume of The Moths of South Africa, including the Geometroid series, is therefore of great interest to students of Lepidoptera in all parts of the world. The species, so far as available, are described and illustrated, and the genera are fully diagnosed. It is evident that the Geometroids of South Africa were little known until Warren and Prout took up the study in recent years, each describing very many species. The work of these writers was so far exhaustive that Janse has only had occasion to describe seventeen new species, though his structural studies have led to the separation of many new genera. The natural history of the insects appears to be almost unknown, or at least is not discussed. The larval food-plants of a good many species are cited on the authority of Mr. E. E. Platt of Durban. The number of genera is very large, with as a rule few species to the genus. *Boarmia,* with ten species, is said to be probably composite. *Drepanogynis,* with forty-seven species, is divided into a series of subgenera, which were regarded as genera by Warren. *Semiothisa,* not divided into subgenera, has forty-nine species. This is the *Macaria* of our North American lists; we have seventeen species.

Of greater general interest is the classification of the whole order Lepidoptera, given in the form of a key on pp. 67-86. The most striking innovation here is the great reduction in the number of families. Janse says: "I mainly follow Handlirsch's view, as I quite agree that the family groups, etc., we form in Lepidoptera do not have these high values in other orders and classes of animals." This opinion may well be subject to criticism, as the study of fossils has shown the enormous antiquity of not only families but genera of insects. Thus in the North American Eocene there are primitive members of Equidae and Tapiridae, but in general the mammals are represented by wholly extinct families. The insects of the same period belong to families still living, and it is certainly true that the insect-families are more distinct judged by their long separation and

permanence, than those of mammals. It is more difficult to compare the structural differences, but I do not believe the Lepidoptera would suffer in the comparison. The wide divergence of opinion is shown by comparison with the recent "Classification of Insects," by Brues and Melander. These authors recognize 143 families of Lepidoptera, but Janse has only 32 families, and counting subfamilies, only 90. All the butterflies, except the skippers, are included in Papilionidae! The tendency of strictly morphological classifications is to unite forms having similar structures, not always taking the whole range of pertinent facts into account. If we had to classify Lepidoptera from the larvae alone, it is probable that we should assemble together the *Melitaea* group of Nymphalidae and certain of the Saturniidae, so extremely similar are the larvae of these otherwise totally diverse groups. The extraordinary Sematuridae, discussed and illustrated by Janse, have hooked antennae and much in common with Hesperiidae, but the venation allies them with Uraniidae and Epiplemidae; and Prout, getting a specimen without antennae, described it as a new geometrid genus. This family seems to have got quite lost in the Noctuoidea of Brues and Melander. Janse treats the Uraniidae and Epiplemidae as subfamilies of Geometridae, but A. G. Richards has shown that they have quite a different type of tympanum, on the second abdominal segment. In discussing the general principles of the classification of Lepidoptera, Janse says: "Most workers assume monophyletic origin—that is, they hold that genera of one family must have had one origin or very few common ancestors, and that primitive families are the remains of the ancestors of the more specialised groups. I cannot agree with this view, and hold that the present most primitive groups are not ancient, but, on the contrary, more recent, though they resemble most closely those ancient forms. For instance the Hepialidae of the present day are not, I think, the offspring in a direct line of the Hepialid ancestors of all other Lepidoptera, but are more recent forms that would, if circumstances were favorable, give rise to forms similar to certain of our present more specialised Lepidoptera." Probably few will subscribe to these doctrines, yet the cropping up here and there of characters generally supposed to belong to quite remote groups, shows how underlying tendencies may remain hidden or dormant, ready to astonish us by their appearance where we supposed they could not belong. For this reason the seemingly reasonable assumption of genetic continuity, at least in the sense of the continuous exhibition of certain characters, may sometimes be fallacious.

T. D. A. COCKERELL.

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CORRECTION.—The even-numbered pages of Vol. XLIV, No. 4, are incorrectly dated Apr., '32, but should be Apr., '33.

# EXCHANGES

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

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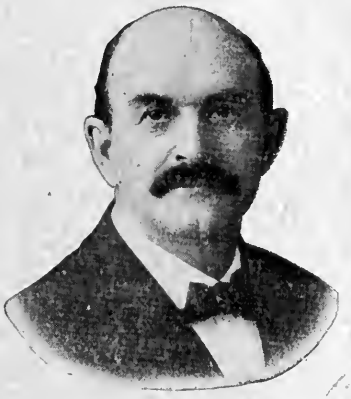

CHARLES WILLISON JOHNSON
1863-1932.

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, Sc.D., John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

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# ENTOMOLOGICAL NEWS

VOL. XLIV. DECEMBER, 1933 NO. 10

## Butterfly Clouds, their Origin and Infrequent Occurrence (Lepid.: Pieridae).

By J. R. HASKIN, Auburndale, Florida.

A study of *Eurema jucunda* recently has led my imagination far afield bringing to me visions of clouds of butterflies darkening the skies, showers of "Red Rain" such as has been recorded from time to time since the first century A.D., emigrations of enormous swarms from one place to another. In Dr. Holland's first Butterfly Book is a most intriguing account of some historical "showers of blood." Again we have accounts of clouds of butterflies and of enormous traveling swarms or flights of butterflies. (I am referring to those phenomena which happen only occasionally and not to the regular flights of such butterflies as *plexippus,* our lordly monarch.)

How is it possible for such masses of butterflies to assemble? Perhaps these observations will add to what is already known about the matter.

For years I have had the vague idea that under extremely favorable conditions a large brood might develop but not until the summer of 1932 could I grasp a possible solution. Ordinarily nature takes care to prevent these undue happenings. Storms, winds, driving rains, the attacks of living enemies on eggs and larvae, the destruction of eggs and pupae by parasites which have introduced eggs into them, all these act to kill off hordes of developing insects.

I have seen and noted many such things. I have seen the cultivated passion vine so infested with the larvae of *D. vanillae* as to be almost destroyed, and yet hardly a handful of the pupae developed butterflies for their insides had all been eaten by parasites.

Last February I gathered a dozen eggs of *A. monuste* laid on nasturtium, leaving great clusters of eggs on the growing plants. Then came a severe driving wind and rain storm thrashing plants, branches, leaves, beating them to the ground

and splashing them with mud. The eggs placed in a breeding cage all developed perfectly but on the day after the storm not an egg was to be found on the nasturtium in the garden. And furthermore, not a single *monuste* have I seen in this vicinity since that happened over eight months ago.

On September 11, 1932, there was a great swarm of *E. nicippe* along an old road near my present home, passing through a strong, young patch of freshly grown *Cassia tora*. I gathered several plants covered with eggs after watching the female *nicippe* depositing them. Ten days later I revisited this spot and found the plants in some places with the leaves eaten into mere ragged semblance of their former selves. And yet a close search failed to find a single larva or pupa. The eggs in my breeding cage had all hatched and I had about fifty flourishing larvae. The leaves of the food plant had been eaten just as had been those in the field. In fact it was that that led me back for a fresh supply. By October 5, all my larvae had developed into butterflies but in the open field only a few scattered specimens were to be seen. During the first ten days of this period we had had several fairly heavy rains and some wind. Either these rains or living enemies had destroyed the thousands of partly grown larvae in the field.

Many observations such as these might be cited, to show how the balance of Nature keeps the land from being overwhelmed with insect life. But occasionally certain conditions seem to combine to get the best, or rather the worst, of this balance. Then we have swarms of *A. californica* such as are reported from California, clouds of *E. lisa* floating over the Bermudas as described by Jones, flights of *A. monuste* drifting over southeastern Florida for days at a time, as my father has observed. I have seen the same sort of flights twice in California, once in 1907 when a great flight of *V. cardui* drifted south over Los Angeles for five days, and again when tremendous numbers of the same species drifted northwest over Tulare in the San Joaquin Valley of California in 1924.

All these occurrences have seemed more or less a mystery accustomed as I have been to thinking in terms of single brood, double-brood, and even triple brood butterflies, in which a brood has implied *one* generation. It remained to make a prolonged study the summer of 1932 of *E. jucunda* to learn that

in such a climate as Florida's a brood or seasonal growth of butterflies may not mean a single generation but many generations.

All through July of 1932 I had observed *E. jucunda* flitting over my lawn. Finally in August I watched a female laying eggs on a small creeping vetch, *Aeschynomene viscidula*, common in this region. Gathering 25 eggs I started a study of *jucunda*. The eggs hatched in three days, the larvae developed in about 12 days. Five days later I had released the new generation of butterflies. It took about twenty days from the egg to the imago. Meanwhile on my lawn and in the open woods nearby *jucunda* was flying in fair numbers all through July, August, September and October. Almost any day I could go out, follow a female a few minutes and gather some fresh laid eggs. If it were not that *jucunda* and its larvae are small and rather delicate, that the food plant has small leaves and is a lowly creeping plant, and that winds and driving showers have been very frequent during this period, one could well imagine swarms of jucunda in the *district*.

Consider the progeny of one female under absolutely one hundred per cent favorable conditions for breeding and developing such as one provides in the breeding cage. It may lay a hundred eggs during its lifetime and in twenty days we may imagine fifty new *pairs* on the wing. In possibly twenty-five days more, the fifty females will have produced 5,000 young of which 2,500 would probably be females. Another 25 days and the original single female would have 250,000 great-grandchildren, all in the space of seventy days. We can then begin to realize how, under extremely favorable conditions, a few thousand individuals of a species can easily raise a perfect cloud of progeny. Then, the favorable food supply having been eaten up or otherwise destroyed, this enormous brood migrates. I doubt if there is any particular instinct as to the direction of the migration but probably instinct does cause them to move away from the barren area where the food supply has been exhausted.

a very different world from the one we enjoy today.

How fortunate it is for us then that Nature's forces as a difference in these checks and balances would have resulted in rule, act in such a way as to balance all things. Only a slight

## A Preliminary List of Indiana Neuroptera.

By B. Elwood Montgomery, Purdue University and
A. W. Trippel, Mishawaka, Indiana.

The first record of Neuroptera in Indiana appeared in the paper on North American Neuropterous Insects by Thomas Say, published posthumously in 1839,[1] in which *Formicaleo grata* was described from Indiana, although two species recorded from the Northwest Territory by Say in 1823[2] may have been taken within the state. Hagen quoted these records in 1861[3] but the next direct record, and the only other one which we have been able to find did not appear until 1903,[4] when K. C. Davis reported *Chauliodes rasticornis* Rambur from Sullivan.

When Professor Roger C. Smith of Kansas Agricultural College informed us recently that there were few published records of Neuroptera from this state, we sent him all the specimens of the order which we could find in the Purdue Collection or in the collections of Purdue entomologists. These specimens were determined by Professor Smith and were used in compiling the following list.

This list adds *27* species and varieties to the two species already known from Indiana. Many of these have long been known to be regional for the state and lack of records has been due to a lack of interest in the order by collectors working in Indiana. Professor Smith wrote, "There was nothing very surprising about the collection, except the *Dendroleon;* I did not know that it extended so far east."

Specimens from Clark County were collected by students at the Purdue Forestry Camp in the Clark County State Forest at Henryville. Most of the specimens from Tippecanoe County were collected by students enrolled in entomology classes at Purdue University. In each case in which it is known, the name (or initials if one of the authors) of the collector is placed in parenthesis following the record of collection.

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[1] Jr. Acad. Nat. Sci. Phil., *8*: 9-46.
[2] Godman's Western Quart. Report., *2*, (2):160.
[3] Syn. Neur. N. Amer., Smithsonian Misc. Coll.
[4] N. Y. St. Mus. Bull. *68*: 442-486.

If a specimen is retained in the collection of the collector the name or initials of the collector are starred (*); all other specimens, except as indicated otherwise, are in the Purdue Collection.

All records without indication of the year are for the 1932 season. The arrangement within families is alphabetical by genera, species, and varieties, respectively.

SIALIDAE.

1. CHAULIODES CONCOLOR Davis. Clark Co., June 23, 1931; Tippecanoe Co., May 25 (in Coll. Roger C. Smith).

2. C. PECTINICORNIS Linn. Clark Co., July 27, at light; Tippecanoe Co., May 28 and June 2, 1923, May 18, 1931, "Purdue library," May 11, under street light (R. C. Kellar), May 20, at light.

3. C. RASTICORNIS Rambur. Sullivan Co., reported from Sullivan by Davis.[4]

4. C. SERRICORNIS Say. Tippecanoe Co., May 10, 1930 (R. R. Heaton).

5. CORYDALIS CORNUTA Linn. Cass Co., Logansport, June 24, 1916; Clark Co., July 12, 1930; Green Co., 1895; Knox Co., Vincennes, July 31, 1924 (B. E. M.); Parke Co., Turkey Run State Park, Aug., 1932 (F. H. Test. Determined by the authors); Tippecanoe Co., —, 1914, June 15, in wood, July 6, at light (B. E. M. in Coll. Roger C. Smith).

6. NEOHERMES ANGUSTICOLLIS Hagen. Clark Co., July 4, 1931.

7. N. FILICORNIS Banks. Clark Co., June 24, July 20, at light.

MANTISPIDAE.

8. MANTISPA BRUNNEA Say. Knox Co., Aug. 19, 1929, in syrup bait trap (W. P. Yetter, Jr., in Coll. B. E. M.).

HEMEROBIIDAE.

9. HEMEROBIUS HUMULI Linn. Tippecanoe Co., Apr. 12, 13 (G. B. Cummins) and 14, 1930, six specimens from Apr. 15 to May 21, 1931 (one each collected by L. I. Musgrave* and T. Harrison), some of these at light, Apr. 15, June 15; White Co., Freeman Lake, July 20 (E. M. Heiss. in Coll. B. E. M.).

10 H. STIGMATERUS Fitch. Tippecanoe Co., Apr. 6, sweeping weeds (C. Yarwood) and 10, 1930; May 21, in swamp (J. W. Ham).

11. MICROMUS POSTICUS Walker. Porter Co., Mineral Springs, Sept. 1, 1925, three specimens by sweeping vegeta-

tion in maple zone of tamarack swamp (B. E. M.*); Tippecanoe Co., Apr. 10, 1931, sweeping.

CHRYSOPIDAE.

12. CHRYSOPA HARRISII Fitch. Tippecanoe Co., June 2, 1926.

13. C. OCULATA Say. Clark Co., July 4, 1931; St. Joseph Co., Aug. 22, sweeping ragweeds (A. W. T.); Tippecanoe Co., May 12, 1915, May 16 and 18, 1931, nine specimens from May 1 to 24, some of these at light, others by sweeping vegetation.

14. C. OCULATA var. ALBICORNIS Fitch. Tippecanoe Co., May 25 and 30.

15. C. OCULATA var. BIPUNCTATA Fitch. Tippecanoe Co., May 20, June 7, sweeping grass (A. W. T.), July 1 (B. E. M.).

16. C. OCULATA var. CAREI Smith. Vigo Co., Apr. 7, in clover; one unlabelled.

17. C. OCULATA var. CHLOROPHANA Burmeister. Tippecanoe Co., May 19, 1930, May 11.

18. C. OCULATA var. ILLEPIDA Fitch. Tippecanoe Co., Oct. 13, 1930 (G. E. Lehker), May 17 (L. I. Musgrave*) and 24 at light, June 17, sweeping grass (A. W. T.*).

19. C. NIGRICORNIS Burmeister. Tippecanoe Co., 11 specimens, May 15-25, sweeping vegetation, at light, etc.

20. C. PLORABUNDA Fitch. Clark Co., July 15, 1931; Posey Co., Poseyville, July 11, 1929, sweeping (B. E. M.*); Tippecanoe Co., May 20, 1926, May 9, 1930, Oct. 15, 1930, at light (A. W. T.*), Nov. 12, 1930, May 5, 1931, sweeping (A. W. T.*), five specimens from Apr. 10 to Nov. 10, 1931, Apr. 21 and Oct. 1 (both by L. I. Musgrave*).

21. C. QUADRIPUNCTATA Burmeister. Tippecanoe Co., May 16, 1931.

22. C. RUFILABRIS Burmeister. Tippecanoe Co., June 28, 1928 (H. K. Riley).

MYRMELEONIDAE.

23. DENDROLEON OBSOLETUM Say. Clark Co., one specimen summer of 1931 and four July 18-31, 1932; Morgan Co., June 12, 1931 (L. I. Musgrave, in Coll. Roger C. Smith).

24. GLENURUS GRATUS Say. Green Co., July 23, 1895; Vanderburg Co., "near Evansville" (type locality), recorded by Say.[1]

25. HESPEROLEON ABDOMINALIS Say. Clark Co., June 20, 1931; Tippecanoe Co., June 7, 1921.

26. MYRMELEON IMMACULATUS DeGeer. Clark Co., June 15.

ASCALAPHIDAE.

27. COLOBOPTERUS EXCISUS Hagen. Lawrence Co., near Bed-

ford, July 10, 1929, on an apple branch with the specimen of the following species of this date (J. J. Davis).

28. ULULODES HYALINA Latreille. Lawrence Co., July 10, 1929, with the preceding species and the two thought by the collector to be a mating pair (J. J. Davis), orchard near Mitchell, July 24, 1931 (G. E. Marshall, in Coll. B. E. M.).

29. U. QUADRIMACULATA Say. Clark Co., two specimens, summer of 1931 (one in Coll. Roger C. Smith).

## Notes on Utah Heteroptera.[1]

By GEORGE F. KNOWLTON.

This paper lists a number of species of Heteroptera not heretofore recorded from Utah and adds to the known distribution of other forms. The writer is indebted to Mr. H. G. Barber for the identification of many of the species here reported.

PENTATOMIDAE (Leach).

EUSCHISTUS ICTERICUS (Linn.). Farmington, July 23, 1930 (M. J. Janes).

COENUS DELIUS (Say). Logan, July 11, 1931 (W. L. Thomas).

NEOTTIGLOSSA SULCIFRONS Stal. Logan, August 22, 1908 (J. B. Horton); Salt Lake City, July 14, 1904.

COSMOPEPLA CONSPICILLARIS (Dall.). Soldier Creek, June, 1928 (Knowlton).

COREIDAE (Leach).

LEPTOGLOSSUS OCCIDENTALIS Heid. Blue Creek, August 17, 1931 (Knowlton, Janes); Logan, February 18, 1930 (L. Stirland); Snowville, June, 1931 (Knowlton).

L. CLYPEALIS Heid. On *Atriplex rosea* at Blue Creek, August 17, 1931 (Knowlton, Janes); Fort Duchesne, June 23, 1931 (R. L. Janes); Logan and Trenton on August 17, 1931 (Knowlton, Thomas).

ALYDUS EURINUS (Say). Logan, October 17, 1909.

A. PILOSULUS H. S. Myton, August 23, 1932 (L. Cutler).

A. CONSPERSUS Montd. Fort Duchesne, August 25, 1930 (R. L. Janes); on alfalfa at North Ogden, August 16, 1929 (H. J. Pack); Providence (Janes).

TOLLIUS CURTULUS (Stal). Logan (Knowlton).

T. SETOSUS (Van D.). Logan, July 3, 1931 (Thomas).

[1] Contribution from the Department of Entomology, Utah Agricultural Experiment Station, Logan, Utah. Publication authorized by the director, February 20, 1933.

HARMOSTES REFLEXULUS (Say). Amalga, August 31, 1927; Hatton, May 5, 1927; Honeyville, May 11, 1931 (Knowlton).

AUFEIUS IMPRESSICOLLIS Stal. Bear River City, July 22, 1929, and on sugar-beets at Ogden, August 18, 1927 (Knowlton).

CORIZUS HYALINUS (Fabr.). Corinne, July 8, 1929; on beets at Lehi, July 25, 1927; Provo, July 13, 1927 (Knowlton).

C. LATERALIS (Say). Kanosh, June 25, 1927; on sugar-beets at Thatcher, July 30, 1929; on *Sophia sophia* at Snowville, May 24, 1930 (Knowlton).

NEIDIDAE (Kirk.)

NEIDES MUTICUS (Say). Spring Canyon, August 28, 1925 (Knowlton).

JALYSUS SPINOSUS (Say). Logan, August 7, 1931 (Thomas); on sugar-beets at Nibley, August 28, 1930 (Knowlton).

LYGAEIDAE (Schill.).

LYGAEUS BICRUCIS Say. Logan, September 7, 1931 (Thomas).

GEOCORIS PALLENS Stal. Delta, June 24, 1930 (Clarke); Logan Meadows, September 11, 1929 (Knowlton).

G. PALLENS DECORATUS Uhl. Amalga, Flux, Grantsville, Kelton, Monticello, Moab, Ogden, Orr's Ranch, Portage, Salt Lake City, Snowville, Skull Valley, Trout Creek, and Vernal (Knowlton).

G. ATRICOLOR Montd. Taken upon alfalfa at Logan, September 18, 1932; a specimen attacked the beet leafhopper, *Eutettix tenellus* (Baker), when placed with it in a small cage (Knowlton); Layton; Providence (D. M. Hammond); Salt Lake City.

HETEROGASTER BEHRENSII (Uhl.). Logan, June 15, 1931 (Thomas).

CROPHIUS IMPRESSUS Van D. Ephraim, June 15, 1904.

SPHAEROBIUS INSIGNIS (Uhl.). Brigham, August, 1914 (E. G. Titus); Logan, October 4, 1909.

PERITRECHUS SASKATHEWANENSIS Barber. Northern Utah (Knowlton).

TINGIDIDAE (Lap.).

PIESMA INCISA McAtee. Monument (Knowlton).

P. CINEREA (Say). Richfield, August 7, 1904.

CORYTHUCHA PADI (Drake). Logan Canyon, August, 1929, and Lake Point, June 17, 1927 (Pack).

C. ARCUATA (Say). Camp Williams, July 3, 1929; Ogden,

June 9, 1927 (Knowlton); Logan; Mt. Pleasant, August 20, 1929 (Pack).

C. MORELLI O. and D. Kanab, June 26, 1927 (Knowlton); Thompsons, August 9, 1906.

C. MARMORATA (Uhl.). Stansbury Island, June 13, 1913 (Pack, Hagan, Titus).

C. IMMACULATA O. and D. Logan Peak, July 10, 1908 (J. R. Horton); Logan; Salt Lake City.

C. DISTINCTA O. and D. Bountiful, May 1, 1927, and Brigham City, June 21, 1929 (Knowlton).

REDUVIIDAE (Latr.).

REDUVIUS PERSONATUS (Linn.). Benson, July 6, 1929 (Knowlton); Snowville, September 21, 1932 (Cutler).

RASAHUS BIGUTTATUS (Say). Venice, California, July 22, 1924 (Knowlton).

ZELUS SOCIUS Uhl. Iosepa, August, and St. George, June, 1929 (Knowlton).

Z. RENARDII Kolen. St. George, June 9, 1928 (Knowlton).

MIRIDAE (Hahn).

MIRIS DOLABRATUS (Linn.). Salt Lake City, June 14, 1904.

TRIGONOTYLUS BREVIPES Jak. On sugar beets at Lehi, July 25, 1927 (Knowlton).

PHYTOCORIS LAEVIS (Uhl.). Santaquin, September 20, 1927 (Knowlton); Soldier Summit, August 13, 1906.

DERAECORIS BAKERI Knight. Cache Junction, 1907 (Titus).

D. ATRIVENTRIS Knight. Soldier Summit, August 13, 1906.

CLIVINEMA MEDIALIS Knight. Richfield, August 7, 1904.

DACERLA INFLATA (Uhl.). Cache Junction, Logan and Logan Canyon (E. D. Ball).

ORECTODERUS OBLIQUUS Uhl. Logan Canyon, July 6, 1908 (Ball).

COQUILLETTIA INSIGNIS Uhl. Park Valley, June 28, 1929 (Knowlton).

STRONGYLOCORIS ROBUSTUS (Uhl.). Monroe, July 25, 1906.

LOPIDEA DAKOTA Knight. Fort Duchesne, August 28, 1932 (C. J. Sorenson).

HADRONEMA BREVIATA Knight. Monroe, July 25, 1906.

PHYLLOPIDEA PICTA (Uhl.). Logan, July 30, 1904.

ORTHOTYLUS VIRIDICATUS Uhl. Bothwell, June 2, 1931 (Knowlton).

O. ANGULATUS (Uhl.). Smithfield, July 6, 1907 (Titus).

MELANOTRICHUS COAGULATUS (Uhl.). Upon *Sophia sophia* at Snowville, July 16, 1930 (Knowlton).

LABOPIDEA ALLII Knight. On sugar-beets at Hyde Park, August 2, 1929 (Knowlton).
L. CHLORIZA Uhl. Brigham, July 21, 1907 (Titus).
L. VIRIDULA Knight. Fort Duchesne, June 15, 1932 (Stoffers).
GERHARDIELLA RUBIDA Popp. Fort Duchesne, July 18, 1932 (Stoffers).
PLAGIOGNATHUS MOERENS Reut. Sevier, June 27, 1927 (Knowlton).

## On the Hesperiidae Described by Mr. A. G. Weeks, Jr. (Lepidoptera)

By E. L. BELL, Flushing, New York.

Through the courtesy and co-operation of Mr. D. Marston Bates, of the Museum of Comparative Zoology, Harvard University, Cambridge, Mass., the writer has had the privilege of examining the type of the various species of *Hesperiidae* described by Mr. A. G. Weeks, Jr., now in that Museum.

Mr. Weeks, in the majority of his descriptions, did not attempt to place his species definitely in their respective genera but merely used a blanket generic term for certain groups and thus placed together insects which in some cases are not closely related, and as the details of superficial sexual characters are generally omitted from the descriptions it has been impossible accurately to place many of the species in their proper genera. Some of the species are represented only by females and these cannot always be properly placed without knowing what the male is like, and they are here placed as nearly as possible in their correct genera as the lack of knowledge of the male permits.

The specimens from which the original drawings were made bear a label to that effect and in most of his species Mr. Weeks has attached to one of the specimens a label reading "Type" but in a few cases this label has been omitted.

A considerable number of the insects described by Mr. Weeks have been omitted from Volume V of Seitz's Macrolepidoptera of the World.

var. ALEXANDERI Weeks, THYMELE PERVIVAX. 1906, Psyche, xiii, p 71. 1911, Ill. Diurn. Lep., ii, p. 15, pl. ix. Suapure, Venezuela. Genus *Chrysoplectrum*. A synonym of *bahiana* Herrich-Schaffer. The type is a male.

ALLENI Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 85. 1905, Ill. Diurn. Lep., i, p. 71, pl. xxvii, fig. 1. La Paz, Bolivia. Genus *Dalla*. The type is a male.

ALLIANCA Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 93. 1905, Ill. Diurn. Lep., i, p. 83, pl. xxxiii, fig. 1. Bolivia. Genus probably *Cobalus*. The type is a female.

AMBROSEI Weeks, CARYSTUS. 1906, Psyche, xiii, p. 67. 1911, Ill. Diurn. Lep., ii, p. 18, pl. xi, fig. 2. Suapure, Venezuela. Genus *Metrocles*. Allied to *leucogaster* Godman. The type is a female.

ARGENTEA Weeks, PAMPHILA. 1901, Can. Ent., xxxiii, p. 296. 1905, Ill. Diurn. Lep., i, p. 53, pl. xv, fig. 2. Cusilluni district, Bolivia. Genus probably *Mucia*. The stigma of the male type is similar though not exactly the same as found in the genus *Mucia*.

ARTIEI Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 91. 1905, Ill. Diurn. Lep., i, p. 79, pl. xxx, fig. 2. Coroico, Bolivia. Genus *Lerema*. A synonym of *idee* Weeks. The type is a male and lacks the abdomen but there are two paratypes.

BARBARA Weeks, PAMPHILA. 1902, Can. Ent., xxxiv, p. 138. 1905, Ill. Diurn. Lep., i, p. 75, pl. xxviii, fig. 3. Bolivia. Genus *Artines*. Closely related to, if not a synonym of, *aepitus* Geyer. The type is a female.

BENCHOS Weeks, CARYSTUS. 1909, Ent. News, xx, p. 263. 1911, Ill. Diurn. Lep., ii, p. 28, pl. xx. 200 miles north of Cochabamba, Bolivia. Genus *Carystoides*. The type is a female.

BOBAE Weeks, PAMPHILA. 1906, Ent News, xvii, p. 203. 1911, Ill. Diurn. Lep., ii, p. 11, pl. vii, fig. 1. Suapure, Venezuela. Genus *Pellicia*. The type is a male and has the characteristic hair-tuft from the basal costal area of the upper side of the secondaries.

BRIDGMANI Weeks, THYMELE. 1902, Proc. New England Zool. Club, iii, p. 6. 1905, Ill. Diurn. Lep., i, p. 89, pl. xxxviii, fig. 1, Bolivia. Genus *Goniurus*. Allied to *ridens* Hewitson, with which the form of the genitalia shows considerable similarity. The type is a male.

BRIQUENYDAN Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 87. 1905, Ill. Diurn. Lep., i, p. 82, pl. xxxii, fig. 1. La Paz, Bolivia. Genus probably *Atrytone*. The type is a female.

BROOKSII Weeks, PAMPHILA. 1906, Ent. News, xvii, p. 204. 1911, Ill. Diurn. Lep., ii, p. 11, pl. vii, fig. 2 Suapure, Venezuela. Genus *Orphe*. The peculiar stigma of the male type, seamed with longitudinal lines giving it an undulate appearance,

allies *brooksii* with *Orphe vatinius* Godman, which has a stigma of similar construction, according to the description.

BRYANTI Weeks, PAMPHILA. 1906, Can. Ent., xxxviii, p. 175. 1911, Ill. Diurn. Lep., ii. p. 27, pl. xviii, fig. 2. Suapure, Venezuela. Genus *Eutychide*. The male type and two male paratypes have the typical stigma of this genus. Although the three specimens are undoubtedly con-specific no two of them are exactly alike in the extent of their maculation; one has two spots in the cell of the primaries, one has a single spot and the other one has none. The one with the two spots is apparently the one which Mr. Weeks has figured.

BUFFUMI Weeks, AETHILLA. 1906, Can. Ent., xxxviii, p. 174. 1911, Ill. Diurn. Lep., ii, p. 26, pl. xviii, fig. 1. Suapure, Venezuela. Genus *Telemiades*. A synonym of *amphion* Geyer. The type is a female.

CALIFORNICA Weeks, PRENES. 1902, Proc. New Eng. Zool Club, iii, p. 11. 1905, Ill. Diurn. Lep., i, p. 63, pl. xxii, fig. 2. Lower California. Genus probably *Prenes*. Type is a male.

CHINGACHGOOK Weeks, ATRYTONE. 1909, Ent. News, xx, p. 264. 1911, Ill. Diurn. Lep., ii, p. 30, pl. xxi, fig. 2. Suapure, Venezuela. Genus probably *Atrytone*. The type is a female.

CHINOBA Weeks, PAMPHILA. 1906, Can. Ent., xxxviii, p. 175. 1911, Ill. Diurn. Lep., ii, p. 25, pl. xvii, fig. 2. Suapure, Venezuela. Genus *Zopyrion*. A synonym of *satyrina* Felder, which Mr. Weeks has noted by placing a box label bearing that name under his label *chinoba*. The type series consists of twelve specimens, with no specific type marked; but the figured specimen, which Mr. Weeks usually called the type, is a male.

COROICANA Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 79. 1905, Ill. Diurn. Lep., i, p. 56, pl. xvi, fig. 2. Near Coroico, Bolivia. Genus *Lerodea* (*Megistias auct.*). The abdomen of the type is missing so the sex is uncertain.

COROICONENSIS Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 92. 1905, Ill. Diurn. Lep., i, p. 84, pl. xxxiii, fig. 2. Coroico, Bolivia. Genus *Metiscus*. A synonym of *atheas* Godman. The type is a male.

CUADRADA Weeks, PAMPHILA. 1901, Trans. Amer. Ent. Soc., xxvii, p. 359. 1905, Ill. Diurn. Lep., i, p. 78, pl. xxix, fig. 3. Near Coroico, Bolivia. Genus *Dalla*. The type lacks the abdomen so the sex is uncertain, but there is a male paratype.

CUSILLUNIA Weeks, PAMPHILA. 1901, Ent. News, xii, p. 267. 1905, Ill. Diurn. Lep., i, p. 54, pl. xv, fig. 3. Near Cusilluni, Bolivia. Genus *Perimeles*. A synonym of *remus* Fabricius. The type is a male.

DIFFICILIS Weeks, GORGYTHION. 1901, Proc. New England Zool. Club, ii, p. 82. 1905, Ill. Diurn. Lep., i, p. 50, pl. xiv, fig. 2. Near Cochabamba, Bolivia. Genus *Quadrus*. The type is a male.

DUOVATA Weeks, BUTLERIA. 1901, Proc. New England Zool. Club, ii, p. 89. 1905, Ill. Diurn. Lep., i, p. 66, pl. xxiv, fig. 2. Near Coroico, Bolivia. Genus *Dalla*. A synonym of *diraspes* Hewitson. The type lacks the abdomen and antennae so the sex is uncertain.

DUSPECCA Weeks, COBALOPSIS. 1902, Ent. News, xiii, p. 105. 1905, Ill. Diurn. Lep., i, p. 71, pl. xxvi, fig. 2. Coroico, Bolivia. Genus *Cobalus*. A synonym of *cannae* Herrich-Schaffer. The type is a male.

ELIDES Weeks, CALLIMORMUS. 1909, Ent. News, xx, p. 263. 1911, Ill. Diurn. Lep., ii, p. 29, pl. xxi, fig. 1. Suapure, Venezuela. Genus *Lerodea* (*Megistias auct.*). Synonym of *telata* Herrich-Schaffer. The type is a female.

ERRATOR Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 73. 1905, Ill. Diurn. Lep., i, p. 53, pl. xv, fig. 1. Coroico district, Bolivia. Genus Lerodea. The type is a female, but there are two male paratypes.

FERA Weeks, ARCHLYODES. 1901, Proc. New England Zool. Club, ii, p. 107. 1905, Ill. Diurn. Lep., i, p. 67, pl. xxiv, fig. 3. Bolivia. The examination of the female type was not conclusive as to the generic alliance.

FINITIMUS Weeks, TELEGONUS. 1901, Proc. New England Zool. Club, ii, p. 104. 1905, Ill. Diurn. Lep., i, p. 90, pl. xxxviii, fig. 2. Bolivia. Genus *Perichares*. The type is a male.

GUILFORDI Weeks, ACHLYODES. 1901, Proc. New England Zool. Club, ii, p. 106. 1905, Ill. Diurn. Lep., i, p. 94, pl. xli, fig. 1. Coroico, Bolivia. Genus *Pellicia*. A synonym of *costimacula* Herrich-Schaffer. The type is a male.

HIRTA Weeks, PYTHONIDES. 1901, Can. Ent., xxxiii, p. 321. 1905, Ill. Diurn. Lep., i, p. 104, pl. xlv, fig. 2. Bogota district, Colombia. Genus *Potamanaxas*. Possibly a synonym of *paralus* Godman & Salvin. The type lacks the abdomen so the sex is uncertain.

HOYTI Weeks, PYTHONIDES. 1906, ENT. NEWS, xvii, p. 202. 1911, Ill. Diurn. Lep., ii, p. 10, pl. vi, fig. 2. Suapure, Venezuela. Genus *Telemiades*. The type appears to be a female.

HURLEYI Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 97. 1905, Ill. Diurn. Lep., i, p. 72, pl. xxvii, fig. 2. Bolivia. Genus *Dalla*. A synonym of *ibhara* Butler. The type is a male.

IDEE Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 86. 1905, Ill. Diurn. Lep., i, p. 79, pl. xxx, fig. 1. La Paz, Bolivia. Genus *Lerema*. The type is a male.

KIKKAWAII Weeks, PLESTIA. 1906, Can. Ent., xxxviii, p. 177. 1911, Ill. Diurn. Lep., ii, p. 9, pl. vi, fig. 1. Suapure, Venezuela. Genus *Hydraenomia*. Allied to, and probably a synonym of, *orcinus* Felder. The type is a male.

LEOPARDUS Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 96. 1905, Ill. Diurn. Lep., i, p. 73, pl. xxviii, fig. 1. Bolivia. Genus *Eutocus*. A synonym of *lucia* Capronnier. The type is a female.

MELCHERI Weeks, ACHLYODES. 1906, Can. Ent., xxxviii, p. 176. 1911, Ill. Diurn. Lep., ii, p. 27, pl. xix. Suapure, Venezuela. Genus *Pellicia*. Lindsey placed *melcheri* as a synonym of *licisca* Plotz and a superficial comparison of a specimen of *licisca* with the type of *melcheri* seems to confirm this synonymy. The type is a male.

MENGELI Weeks, PAMPHILA. 1906, Psyche, xiii, p. 68. 1911, Ill. Diurn. Lep., ii, p. 17, pl. xi, fig. 1. Suapure, Venezuela. Genus *Chaerephon*. A synonym of *vesana* Weeks, as stated below, being merely a somewhat paler form with the veins on the underside of the secondaries more prominently pale. The type is a male.

MENUDA Weeks, NISONIADES.. 1902, Proc. New England Zool Club, iii, p. 4. 1905, Ill. Diurn. Lep., i, p. 101, pl. xliv, fig. 2. Bolivia. Genus *Pholisora (Staphylus auct.)*. The type is a male and has a costal fold.

MILESI Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 88. 1905, Ill. Diurn. Lep., i, p. 81, pl. xxxi, fig. 2. Coroico district, Bolivia. Lindsey placed this species in *Tirynthia*, but whether it belongs here or in *Cobalus* is uncertain as the type is a female.

NAKAWARA Weeks, ERYCIDES. 1906, Psyche, xiii, p. 70. 1911, Ill. Diurn. Lep., ii, p. 20, pl. xiii. Suapure, Venezuela. Genus *Phocides*. A synonym of *distans* Herrich-Schaffer. The type is a female.

NIGELLA Weeks, SYRICHTHUS. 1902, ENT. NEWS, xiii, p. 107. 1905. Ill. Diurn. Lep., i, p. 76, pl. xxix, fig. 1. Sicasica, Bolivia. Genus *Pyrgus*. Related to *biseriatus* Weymer but with more spots on the upper side of the secondaries. The type is a female but there is a male specimen in the series of three. The male has no costal fold but has a tibial tuft. The very long white fringes of the female are not well shown in the figure given by Weeks.

PARKERI Weeks, THANAOS. 1906, Psyche, xiii, p. 72. 1911, Il. Diurn. Lep., ii, p. 19, pl. xii, fig. 2. Suapure, Venezuela. Genus *Erynnis (Thanaos auct.)*. *Parkeri* has considerable similarity with *heteropterus* Plotz and may be a synonym of that species, but certain differences in maculation and the more pointed primaries of *parkeri* render it necessary to compare

the form of the genitalia in order to determine their exact relationship. The type is a male.

PELAGICA Weeks, PYRGUS. 1891, Can. Ent., xxiii, p. 126. 1905, Ill. Diurn. Lep., i, p. 4, pl. 1, fig. 5. Near San Jose del Cabo, Lower California. Genus *Chiomara*. A synonym of *asychis* Cramer. The type is a male.

PLANUS Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 95. 1905, Ill. Diurn. Lep., i, p. 80, pl. xxxi, fig. 1. Bolivia. Genus *Methionopsis*. The stigma of the male type is the same as that of *ina* Plotz but rather more heavily developed. The type is a very large individual and has the pale anal angle area of the underside of the primaries not so prominently shown as in *ina*.

PLUMMERTINI Weeks, NISONIADES. 1906, Psyche, xiii, p. 73. 1911, Ill. Diurn. Lep., ii, p. 18, pl. xii, fig. 1. Suapure, Venezuela. Genus *Pholisora (Staphylus auct.)*. A synonym of *mazans* Reakirt. The type is a male.

REEDI Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 86. 1905, Ill. Diurn. Lep., i, p. 70, pl. xxvi, fig. 1. Coroico district, Bolivia Genus *Dalla*. The type is a male.

REEDII Weeks, PYRRHOPYGOPSIS. 1901, Can. Ent., xxxiii, p. 295. 1905, Ill. Diurn. Lep., i, p. 57, pl. xvii. Five days north of Cochabamba, Bolivia Genus *Pyrrhopygopsis*. A synonym of *quispica* Plotz, as has been noted by previous authors. The type is a male.

RICHARDI Weeks, CARYSTUS. 1906, ENT. NEWS, xvii, p. 199. 1911, Ill. Diurn Lep., ii, p. 7, pl. iv, fig. 3. Suapure Venezuela. Genus *Vettius*. A synonym of *lafrenaye* Latreille. The type is a female.

SEATONI Weeks, ACHLYODES. 1901, Proc. New England Zool. Club, ii, p. 108. 1905, Ill. Diurn. Lep., i, p. 95, pl. xli, fig. 2. 200 miles north of Cochabamba, Bolivia. Genus *Quadrus*. A synonym of *narycus* Mabille. The type is a male.

SEPTIMANUS Weeks, PAMPHILA. 1901, Proc. New Eng. Zool Club, ii, p. 104. 1905, Ill. Diurn. Lep., i, p 83, pl. xxxii, fig. 2. Chulumani, Bolivia. Genus probably *Cobalus*. The type is a female.

SERENUS Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 93. 1905, Ill. Diurn. Lep., i, p. 56, pl. xvi, fig. 3. Near Coroico, Bolivia. Genus *Lerodea (Megistias auct.)*. The type lacks the abdomen so the sex is uncertain, but there is another male paratype, and two other specimens, a male and a female, in the series which may not be conspecific with the type and paratype.

TABERI Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 95. 1905, Ill. Diurn. Lep., i, p. 74, pl. xxviii, fig. 2.

Cochabamba, Bolivia. Genus probably *Cobalus*. There is no apparent stigma on the primaries of the type, but the superficial examination was not conclusive as to the sex.

TIHONETA Weeks, NICONIADES. 1901, Can. Ent., xxxiii, p. 323. 1905, Ill. Diurn. Lep., i, p. 62, pl. xxii, fig. 1. Near La Paz, Bolivia. Genus *Thespius*. The type is a male.

TRITONAE Weeks, TELEGONUS. 1901, Proc. New England Zool. Club, ii, p. 105. 1905, Ill. Diurn. Lep., i, p. 85, pl. xxxiv. Near Chulumani, Bolivia. Genus *Celaenorrhinus*. The type and two paratypes are females.

VERDANTA Weeks, PAMPHILA. 1906, Psyche, xiii, p. 67. 1911, Ill. Diurn. Lep., ii, p. 16, pl. x, fig. 2. Suapure, Venezuela. Genus *Metrocles*. Probably a synonym of *oropa* Hewitson. The type is a male.

VESANA Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 80. 1905, Ill. Diurn. Lep., i, p. 55, pl. xvi, fig. 1. Yacanachi district Bolivia. Genus *Chaerephon*. *Mengeli* Weeks and *lindseyi* Bell are both synonyms of *vesana* Weeks. The type is a male.

VIRIDENEX Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 80. 1905, Ill. Diurn. Lep., i, p. 52, pl. xiv, fig. 3. Five days north of Cochabamba, Bolivia. Genus probably *Atrytone*. The type is a male.

WARRENI Weeks, PAMPHILA. 1901, Proc. New Eng. Zool. Club, ii, p. 93. 1905, Ill. Diurn. Lep., i, p. 77, pl. xxix, fig. 2. Coroico, Bolivia. Genus *Amblyscirtes*. The type is a female and there is one male paratype.

WINSLOWI Weeks, PAMPHILA. 1906, Psyche, xiii, p. 69. 1911, Ill. Diurn. Lep., ii, p. 15, pl. x, fig. 1. Suapure, Venezuela. Genus *Catia*. A synonym of *otho* race *curassavica* Snellen, which represents the race of *otho* Abbot & Smith from Curacao, Trinidad, Panama and parts of South America. This race is distinguished by the more extended and paler yellowish maculation of the upper side, the paler yellow color of the under side, and the rather distinct yellow stripe in the cell of the upper side of the secondaries. The type is a male.

## Stridulating Organs of Female Tettigoniidae (Orthoptera).

By B. B. FULTON, N. C. State College, Raleigh, North Carolina.

The literature on the Orthoptera contains a number of records in which an observer claims to have heard calls by the female of some species of Tettigoniidae. Riley, describing the song of *Scudderia furcata*, says "the call is occasionally re-

sponded to by a faint chirp from the females, produced by stretching out their wings as if for flight." He described the prolonged rattling song of *Microcentrum rhombifolium* and says that it "is invariably answered by a sharp 'chirp" or 'tschick' from one or more females who produce the sound by a sudden upward jerk of the wings." Were it not for the last statement one would strongly suspect that he had heard the other type of male song, which he apparently failed to recognize.

Caudell has reported that the female katydid (*Pterophylla*) makes a sharp scraping noise when handled, and this observation has been confirmed by Allard, who also reports that he has heard the females of other species of Tettigoniidae making a noise of their own accord out of doors, and mentions specifically *Scudderia curvicauda*, *Amblycorypha rotundifolia*, and *Microcentrum rhombifolium*. He says that "these call notes appear to be in the nature of true sex calls or invitations to the males, for a number of these in every instance at once congregated about her, some of them flying from the shrubbery around."

My own observations include instances of stridulation by females of three species of Tettigoniidae. Late one afternoon I heard five sharp but not loud sounds like "tsip," coming from a small bush in which only a female *Microcentrum rhombifolium* could be located. At another time while collecting after dark I heard close by a faint ticking sound. I turned my flash light in the direction of the sound and saw a female *Amblycorypha rotundifolia*. She did not repeat the sound but no other insect could be found at that place.

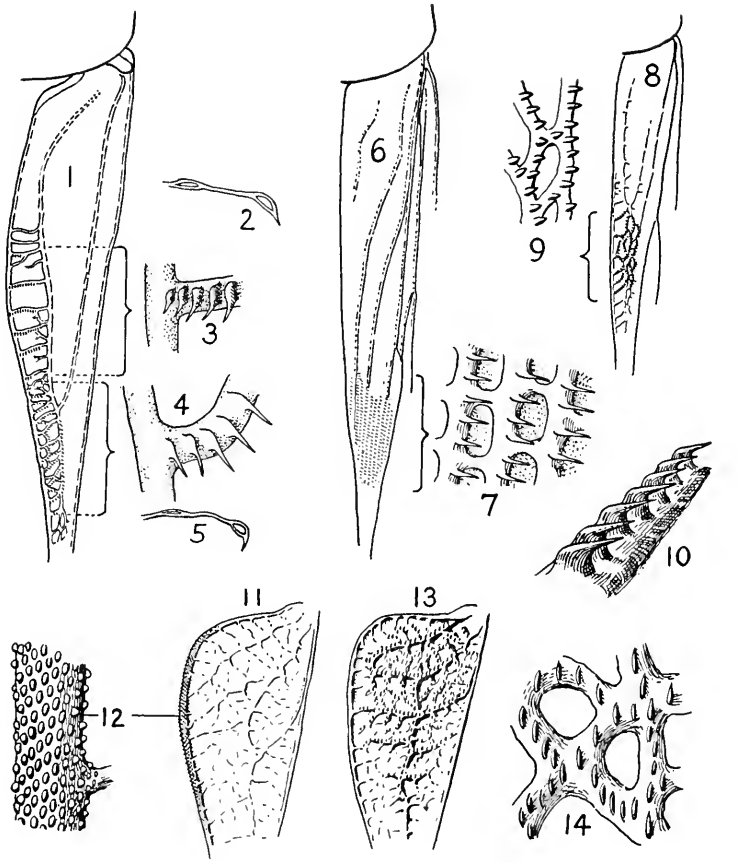
A more striking observation was made on *Scudderia texensis*. While sitting on the porch one night I heard a male of this species singing in the lot next door and noticed that immediately after it sang, a brief series of faint tapping sounds came from a cedar tree at the edge of the porch. With a flash light I located a female in the tree and saw it produce the sound by working the tegmina in a manner similar to the male. The reply always came about a half second after the conclusion of the male song. I caught the female to verify the species and turned it loose again. A little later I heard a similar reply coming from another cedar tree at the edge of the lot and found another female there. Presently the male came to this

second tree and each time its song ended both females could be heard simultaneously. The female in the further tree remained on the branch where first found and the male crawled over to her. Later a spermatophore was found attached to her.

On another night I heard at a distance of about 30 feet a faint sound like "chp," following the prolonged ticking song of *Microcentrum rhombifolium*. This was repeated nearly every time a *Microcentrum* sang within a radius of about 40 yards. I located the female in a low tree branch and watched her make the noise by spreading the dorsal edges of the tegmina a few millimeters and closing again. I went on past the tree to listen to another insect but noticed that a male *Microcentrum* sang twice in the upper branches of the tree and that the female replied each time. I heard no more of this male and after several minutes I went back to look at the female. I found her licking the abdomen of a male who was humped up so that the closed tegmina were perpendicular to the leaf it was standing on. The female had a large spermatophore attached to her.

The last two observations agree with Allard's statement that the males come to the females. The females did not move from the places where they were first discovered. If the males are guided only by the faint replies made to their songs, they must have a remarkable ability to locate sounds.

For a long time the writer supposed that the sounds made by female Tettigoniidae were produced by merely striking the overlapping anal areas of the tegmina together. This theory was rejected when it was found that a faint rasping noise could be produced by manipulating the tegmina of a recently killed female *Scudderia*. The specimen was examined under a binocular microscope and there it was noticed that a portion of the edge of the left or upper tegmen near the caudal part of the anal area was bent downward to form a scraper (Fig. 5) and that when it was dragged over the anal area of the right tegmen a rasping sound was produced. The right tegmen at this point bears a patch of minute stout spines (Fig. 4) projecting from the veins and directed diagonally backward and to the right so as to catch in the recurved margin of the left tegmen when the two are moved apart. Anterior to this area there are trans-




Stridulating organs of female Tettigoniidae. Fig. 1. Anal area of right tegmen of *Scudderia curvicauda* showing spined veins. Figs. 2 and 5. Cross sections of margins of left tegmen showing scrapers for anterior and posterior sets of spines, respectively. Fig. 3. Anterior spines, enlarged. Fig. 4. Posterior spines. Fig. 6. Anal area, right tegmen of *Neoconocephalus triops*, showing patch of spines. Fig. 7. Enlarged portion. Fig. 8. Anal area, right tegmen of *Orchelimum concinnum*. Fig. 9. Enlarged portion. Fig. 10. *Microcentrum rhombifolium*, perspective of spines on one of anterior transverse veins. Fig. 11. Anal area, right tegmen of *Pterophylla camellifolia*. Fig. 12. Vein on inner margin. Fig. 13. Ventral surface, anal area, left tegmen of *Pterophylla*. Fig. 14. Enlarged portion.

verse veins near the margin which bear rows of minute knobs (Fig. 3) each with a stiff spine directed posteriorly and nearly parallel to the tegmen surface. At this level the margin of the left tegmen projects downward with a sharp edge (Fig. 2) but is not recurved or hooked. This edge catches on the spined knobs when moving either direction but more so when the tegmina are coming together.

Although the structures described are minute, they appear to be specialized stridulating organs. The anal edge of the right tegmen does not project to the same extent and is nowhere recurved. The left tegmen does not bear any spines and does not have any well developed transverse veins. The right tegmen of the male has some spines along the veins in the posterior part of the anal area, but they are much more delicate in structure than those of the female.

After making this discovery the writer went through his collection, which contains nearly all the common eastern Tettigoniidae and many western species, and examined the females. Every species in which the female has overlapping tegmina was found to have some form of female stridulating organ. All species examined in the genera, *Scudderia* (8 spp.), *Amblycorypha* (5 spp.), *Microcentrum* (2 spp.), *Inscudderia*, and *Symetropleura* have an apparatus very similar to the one described above. In *Microcentrum* the spines (Fig. 10) are unusually well developed.

The species of *Neoconocephalus* (Figs. 6, 7) and *Pyrogocorypa unicincta* have an area of spines only at the caudal part of the anal area. All species of *Orchelimum* (Figs. 8, 9) examined (13 spp.) have well developed areas of very short blunt spines mostly in the caudal part of the anal area, but in some species extending farther forward somewhat as in *Scudderia*. *Conocephalus* (12 spp. examined) has less well developed patches of blunt spines. They were found even in *C. saltans* which has very abbreviated tegmina.

Among the Decticinae only three species having overlapping tegmina in the female were found in the collection. *Capnobotes fuliginosa* and *C. occidentalis*, have long tegmina with a patch of scattered but well developed spines on the caudal portion of the anal area of both tegmina. *Apote notabilis* has small ovoid

tegmina with a well developed scraper on the left and an extensive area of conical erect spines on the right.

*Pterophylla camellifolia*, the true katydid, has an apparatus similar to those described, but the spines are relatively few and scattered. This species however has another structure which is apparently designed for sound production. The vein bounding the anal area of the right tegmen only (Fig. 11) is large and well rounded above and for a considerable part of its length is thickly studded above with very minute but prominent knobs (Fig. 12) arranged in regular diagonal rows. The under surfaces of the anal areas of both tegmina have a network of prominent veins (Fig. 13) bearing many short ridges or keels (Fig. 14) all directed parallel to the length of the tegmen regardless of the direction of the vein. They are most numerous in the central portion of the anal area where those on the left tegmen would scrape over the file-like vein bordering the right if the tegmina were slightly spread apart.

No stridulating organ could be found on females of any of the Gryllidae. Baumgartner claims that the female *Gryllotalpa* has a loud distinct chirp and that in both this genus and *Scapteriscus* the females have stridulating organs. The writer has not been able to locate any file or spines on any of the veins on either surface of the tegmina in any of the female mole crickets in his collection.

A distinctly audible sound can be produced by manipulating the tegmina of a freshly killed female of any species of Tettigoniidae as large as an *Orchelimum*. A very faint sound can be produced with species as small as *Conocephalus fasciatus*. Such sounds have been heard in nature only from those species in which the males sing at irregular intervals. With many species the males keep up such a constant noise that the female reply, if made, could not be heard, at least by human ears. It is probable that only females in a certain "mood" or physiological state reply to the calls of the male.

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# Entomological Literature

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

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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GULLIVER IN THE BUSH. Wanderings of an Australian Entomologist. By H. J. CARTER. Angus & Robertson, Ltd., Sydney. 234 pp., plates. Price, 6 sh. A book of interesting reading, especially for entomologists of Australia or who contemplate travelling there for collecting. Scientifically, Mr. Carter is a "full" man. And as one would expect, one gets much more than entomological lore in these chapters. One sees the Australian countryside from a fresh viewpoint and is given interesting information concerning its entomology, botany, forestry and geology. The author enlivens the narrative with tales of folk met with and happenings on the road. He puts one in touch with those well known entomologists as J. J. Walker, George Masters, E. W. Ferguson, W. J. Rainbow and others. He tells of excursions into the habitats of many species of Coleoptera described from Australia and Tasmania. These excursions were made into the Blue Mountains, the costal and inland country of New South Wales, Highland Rainforests, Alpine Australia, Victoria, South Australia, Queensland, West Australia and Tasmania. E. T. CRESSON, JR.

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### Silk worm Gut.

A gut used for surgical and fishing purposes is made from the intestines of silkworms which would otherwise form the silk spinning apparatus. These are extracted, dried and packed in bundles. Millions of worms are killed at a time for this purpose in Spain, Formosa, Italy, Japan and India. [ENT. RECORD.]

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Section XI—Taxonomy (History, theory and practice—Typic, subtypic and atypic categories—Restricted versus loose genera—Correlation of fly and maggot characters)

Section XII—Terminology (Terms used in keys and diagnoses, only those of venation and chaetotaxy abbreviated—Plates)

Section XIII—Myodarian Superfamily and Muscoid Family and Tribal Synopses (Key of Cylorrhapha leading to Myodaria and defining typic to atypic categories—Keys leading to 4 superfamilies of Myodaria and to 9 families and 39 tribes of Muscoidea)

Section XIV—Muscoid Tribal Diagnoses and Generic Synopses (39 tribes defined on external fly, male and female reproductive, alimentoexcretory, egg and maggot characters, habits and habitats—Keys under separate tribes leading to over 500 restricted muscoid genera of the world with genotypes, original localities and holotype locations)

Section XV—Muscoid Generic Synonymy (Complete synonymy to date for all muscoid genera and for all species affecting the stability of their genotypes—Emendations of original spellings—Brauer & Bergenstamm's sense in those cases in which they misinterpreted the genus)

PART III—OESTROID TAXONOMY AND BIONOMY

Section XVI—Oestroid Family and Tribal Synopses (Keys leading to 7 families and 93 tribes of Oestroidea)

Section XVII—Oestroid Tribal Diagnoses and Generic Synopses (93 tribes defined and keys under separate tribes leading to over 1,750 restricted oestroid genera of the world with data for definitions and keys as in XIV)

Section XVIII—Oestroid Generic Synonymy (Complete synonymy for oestroid genera, emendations and BB's sense as in XV)

PART IV—DISTRIBUTION AND ENVIRONMENT

Section XIX—Dynamic Distribution and Descent (Geographic distribution in geologic time and phylogeny—Colored maps—Chronologic history by geologic periods with time-table—Geologic environments and dispersal centers)

Section XX—Static Distribution and Biota (Geographic distribution in recent time and biotal areas with life zones—Laws of dispersal and habitat classes)

Section XXI—Host Catalogue (Index to parasitic forms by host genera with classes of parasitism designated)

Section XXII—Flower Catalogue (Index to flower-visiting forms by plant genera with flower habitats and distribution)

Section XXIII—Environment and Response (Media, factors and controls and their influence in various environmental classes—Morphologic, physiologic, metabolic and tropic response with classes of first and last—Records of response on biometric, metabolometric and tropometric scales—Life-cycle phases—Extremes of specialization in diverse lines)

Section XXIV—Relations to Man and Control (Myiasis, disease-transmission and beneficial parasitism—Suppression of malefactors and extension of benefactors with directions for establishing parasitic flies to destroy noxious insects)

PART V—FOSSIL AND RECENT GENERA

Section XXV—Generic Diagnoses of Fossil Forms (Characters of fossil genera with genotypes, origins and holotype locations—List of localities for fossil flies)

Section XXVI—Generic Diagnoses of Recent Forms (Characters of egg, maggot, fly, male and female reproductive and alimento-excretory systems so far known for genera of Glossinidae, Muscidae, Gasterophilidae, Rhiniidae and Calliphoridae with authors, dates, bibliographic references, genotype-designation details and references, synonyms, type locations, hosts and host habits, habitats and flower habits, geographic range—By tribes in systematic order)

PARTS VI to XI—RECENT GENERA (1 Section to each Part)

Section XXVII—(Same as XXVI for genera of Stephanostomatidae, Cuterebridae, Hypodermatidae and Melanophoridae)

Section XXVIII—(Same for genera of Oestridae and Phasiidae)

Section XXIX—(Same for genera of Dexiidae, Calirrhoidae and Rutiliidae)

Section XXX—(Same for genera of Larvaevoridae)

Section XXXI—(Same for genera of Salmaciidae from Neominthoini to Belvosiini)

Section XXXII—(Same for genera of Salmaciidae from Samaciini to Actiini)

PART XII—PLATES AND BIBLIOGRAPHY

Section XXXIII—Plates and Explanations (Male and female reproductive systems—Eggs and microstructure of choria—Maggots—Head Skeletons—Anal stigmata—Flies—Habitats)

Section XXXIV—Appendices (Addenda from results secured since publication of preceding Parts)

Section XXXV—Unidentified Genera (Tentative tribal references)

Section XXXVI—Bibliography and Index (Titles on all aspects of the subject—Indices to all 12 Parts)

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# ENTOMOLOGICAL NEWS

## VOLUME XLV, 1934

HARRISON GRAY DYAR,
1866-1929.

PHILIP P. CALVERT, PH. D., EDITOR

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PUBLISHED BY
THE AMERICAN ENTOMOLOGICAL SOCIETY,
PHILADELPHIA, PA.:
THE ACADEMY OF NATURAL SCIENCES
LOGAN SQUARE
1934

The several numbers of the NEWS for 1934 were mailed at the Post Office at Philadelphia, Pa., as follows:

| | |
|---|---|
| No. 1—January | January 18, 1934 |
| " 2—February | February 13 |
| " 3—March | March 9 |
| " 4—April | April 10 |
| " 5—May | May 7 |
| " 6—June | June 11 |
| " 7—July | July 25 |
| " 8—October | October 3 |
| " 9—November | November 9 |

The date of mailing the December, 1933, number will be announced on the last page of the issue for January, 1935.

SUBSCRIPTIONS FOR 1934 NOW PAYABLE

Detachable Subscription Blank in this Number

# ENTOMOLOGICAL NEWS


## JANUARY, 1934

Vol. XLV No. 1

SMITHSONIAN INSTITUTION

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, Sc.D., John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows:

| | |
|---|---|
| United States and possessions, Central and South America | $3.00 |
| Canada | 3.15 |
| Foreign | 3.25 |

Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance.
One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 7.00
Ten issues " 11.00, " 20.00, " 35.00, " 60.00

SUBSCRIPTIONS. All remittances and communications regarding subscriptions, non-receipt of the NEWS or of reprints, and requests for sample copies, should be addressed to

ENTOMOLOGICAL NEWS, 1900 Race Street, PHILADELPHIA, PA.

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# ENTOMOLOGICAL NEWS

VOL. XLV. JANUARY, 1934 No. 1

## At what Point does Insect Attack become Damage ?

By W. DWIGHT PIERCE, Biological Abstracts, Philadelphia, Pa.

Two recent articles passing before the writer for abstract have called to mind other personal observations, and bring up an important question in economic entomology.

Is all insect attack to be computed as assessable damage? If not at what point does it become assessable? Is control work warranted when the damage is below that point?

It is well known to all horticulturists that many kinds of trees put on many times more blossoms than they can possibly set into fruit, and bring to maturity. The entire skeletal structure of the plant would require strengthening to carry the weight of 100% fruiting. As it is, many fruit trees have to be heavily thinned of fruit in order to relieve the overloaded branches, and also to obtain standard size fruit.

There is a weight limit of fruit that can be held by a tree, due to skeletal structure.

The weight limit of fruit that can be matured, is controlled by the nutriment in the soil available to the plant, and the available water. In periods of drought the plant cannot mature as much fruit as in periods of abundant moisture.

To meet such situations the plant produces its full quota of flowers, so that there may be a sufficient proportion fertilized. Then if too many are fertilized, the plant must drop some.

It becomes necessary for the economic entomologist who is attempting to compute damage, to know the normal capacity to fruit or produce, under the existing conditions, and to determine the approximate normal shedding or fall, by which the plant adjusts itself. Then, to that should be added the amount of thinning advisable to obtain the best quantity of best quality fruit of standard size. It seems to the writer that any insect

attack which is below the sum total of natural fall, and necessary thinning is not to be assessed as damage.

The real damage comes when the insects reduce the yield below the normal productive capacity of the crop.

Thus, we may have a 30% insect injury in one grove and none in another, and yet find that both groves have set a 12% crop. Then the uninfested has shed 88% of its bloom, and we can consider that there was no assessable insect damage.

While in the Philippines the writer was investigating dead heart borers of sugar cane. Some of the planters insisted that the borers were doing no real harm, because the stools of cane would replace all injured shoots by new shoots. They said that the cane could only mature so many stalks per stool, and that many would naturally have to be starved out, so why worry when the insects did the thinning?

It seemed to the writer that there was a fallacy involved. It was quite true that in most fields the average number of canes was finally the same, no matter what the early hisory of dead heart borers. But cane which had no borer pruning was not delayed by the necessity of replacing one to three months old shoots in order to make its full capacity. The important question here was one of time. Infested cane took two to three months longer to mature when there was a large percentage of pruning of the young shoots. By actual counts the cane developed an average of 3 shoots per stool in 3 months, but because of borers it required at least 5 months to set enough shoots to net 3 per stool. If the normal time for a crop was 11 to 12 months, and a badly attacked crop required 15 months to mature, then in 5 years, the unattacked cane would produce 5 crops, but the badly attacked cane would produce but 4 crops. This was in a section where cane was planted and harvested at all months in the year. But in a section where the cane must be harvested before a certain time, dead heart attack becomes very serious. In the case of sugar cane attack by dead-heart borers I figured that all damage was assessable in terms of time and money. In fact there were fields where the damage was so great that two and three replantings were necessary. The

weevil borer, *Trochorhopalus straugulatus*, attacks the mature canes, that is, after the crop has adjusted itself to the normal stalk capacity of the field.

Actual measurements of bored canes, and analyses of sugar proved beyond a doubt that the length and diameter of bored canes was less, and that the purity and sugar yield was reduced. Therefore all injury whatsoever by the stalk borer was to be assessed as damage, and this could be figured in sugar and money.

These points above mentioned are shown in detail in my bulletins issued by Victorias Milling Co., Occidental Negros.

An outbreak of *Laphygma exempta* swept over the cane fields, and in two or three days the fields were stripped to the ground. It looked like a major calamity, but a planter told me that he was always glad to have the worms devastate his crop, because he got a better crop. It actually happened that the cane shot up a new stand of shoots and grew very rapidly, with the result that it caught up in height with surrounding undamaged cane, and the actual assessable damage was incomputable.

The cotton crop never matures 100% of the bloom, but always shows more or less natural shedding, which has so far never been attributable to other than physiological causes. To obtain true boll weevil damage we must subtract the normal shedding from the total drop.

To get a good peach or apple crop the grower must thin, sometimes a very large proportion of the young fruit. If insect injury does not take more than this thinning would, then it is not assessable as damage.

Mr. T. Aristov (1932) in the Bull. Plant Protection of the Lenin Acad. Agr. Sci. U. S. S. R., ser. I: Entomology, No. 6, pp. 6-30, shows that no more than 1/5 of the apple blossoms formed in Russia ever develop into fruit, and he believes that injury caused by the apple-blossom weevil, *Anthonomus pomorum* only has economic importance when this favorable balance is destroyed, which occurs comparatively rarely. Infestation up to 51% of the blossoms shows no effect upon the final yield.

He holds that the weevil has an economic importance, 1. when the percentage of injuries caused by the weevil is higher than the percentage of the natural loss (i.e., failure of blossoms to develop into fruit), or physiological dropping; 2. when the percentage of the injuries equals the percentage of the natural loss and when there are other negative factors which hinder a natural sitting; and 3. when the percentage of the injuries is lower than that of the natural loss, but the total of negative factors preventing a normal setting is very high and the probability of fruit formation depends on a large number of blossoms.

G. H. Corbett (1931) in Dept. Agr. Straits Settlements and Federated Malay States, Scientific Series, no. 8, pp. 1-14, reports on *Tirathaba rufivena*, the Greater Cocoanut Spike Moth, and finds that the cocoanut palm appears capable of maturing a certain number of flowers and to drop those which it cannot sustain. The largest normal fall of female flowers occurs in the fifth week, while *Tirathaba* does its principal damage in the second week. During the interval between the time of maximum bored female flowers and maximum dropped flowers, the palm appears to be continually making adjustments, and instead of dropping other flowers, drops the *Tirathaba* bored flowers. When *Tirathaba* injury was reduced the drop from other causes rose, so that the end results were the same. Corbett suggests that the percentage of bored flowers would have to reach the high percentage of 58% before this insect could be considered responsible for reducing the number of nuts.

These two estimates are strikingly close, and it will be interesting to have others look at their respective problems and assess the damage due to insects as that which reduces yield below normal. Perhaps we get unduly excited sometimes over insect attack, and forget the normal shedding or the normal recuperative powers of the plant.

Nature has its checks and balances, and I have often thought that if we were to let down on the insecticides which kill both insects and parasites, and often ultimately injure the plant life; and do more toward building up natural agencies of control, we would in the long run have a far saner program.

## Field Notes on Texas Orthoptera.

By F. B. Isely, Trinity University, Waxahachie, Texas.

The last three days of August, 1932, afforded the writer an opportunity to make a "sampling check" of the late summer diurnal Orthoptera of northwestern Texas. Entering the state near the northeast corner of the pan-handle our trip carried us west through Follett, south through Lipscomb, Canadian (via highway 4), Shamrock, Childress, and southeast (via highway 5) thru Vernon and Iowa Park.

Eleven collecting stations representing habitat differences were selected chiefly on the basis of topography, soil, and vegetation. It is a well known fact that "highway stations" often leave untouched unique and virgin habitats. Our limited time, however, did not permit a more thorough method.

Weather conditions were not always favorable for the best work as high winds and several showers interfered with our studies. In the field work I was ably assisted by two collectors (Mrs. F. B. Isely and Frederick B. Isely, Jr.).

Six hundred and sixty-six of the collected specimens were checked and sixty-two species are here reported. Specimens of most of the species taken are in the Hebard Collection and the writer is much indebted to Mr. Morgan Hebard for determinations.

The only important paper * dealing with the Orthoptera of this area was based on a most interesting nine day reconnoisance survey made by Dr. A. P. Morse in August, 1905. Morse started at Denison, Texas; working northwest he studied in five Red river and two panhandle counties.

A very brief sketch of our collecting stations is given.

1. Three miles east of Follett, VIII, 29, 1932. Rolling upland prairie tract and adjacent ravines. Vegetation, bunchgrass (*Andropogon*), mixed weeds, and some bare ground.

2. Three miles west of Follett, VIII, 29, 1932. Level buffalo-grass (*Bulbilis*) pasture and adjacent weedy flat and slough.

3. One mile north of Lipscomb, VIII, 29, 1932. Bare clay

* Further Research on North American Acrididae, Carnegie Institution of Washington, Publication No. 68.

hillside and adjacent rough upland prairie. The first three stations were all in Lipscomb county. Altitude from 2500-3500 feet.

4. Two miles north of Canadian, VIII, 29, 1932. Canadian river sandy soil pasture land covered in collecting area chiefly with scattered plum bushes, johnston-grass (*Holcus*) and coarse weeds.

5. Three miles south of Canadian, VIII, 30, 1932. A "dry creek" valley and adjacent prairie hillsides. In the flat, coarse weeds and short grasses.

6. Seven miles south of Canadian at the top of "cap-rock," VIII, 30, 1932. Very rough broken upland, bare rocky ravines and near-by prairie tract. Stations 4, 5 and 6 were in Hemphill county. Average altitude 2700 feet.

7. South of Shamrock in Collingsworth county, altitude 1,950 feet, VIII, 30, 1932. Rough topography, over grazed "red-bed" pasture land. We collected among mixed weeds and grasses.

8. Two miles north of Childress in Red river valley, VIII, 30, 1932. Sandy soil, open mesquite and ground cover of broom weed (*Amphiachyris*), Childress county, altitude 1,875 feet.

9. Eight miles northwest of Vernon, VIII, 31, 1932. A "vernon" clay soil mesquite flat cover with broom weeds (*Amphiachyris*).

10. Near Vernon, VIII, 31, 1932. Pease river sandy soil cover with tall grasses (*Andropogon*) and weeds. Station 9 and 10 are in Wilbarger county, elevations about 1,200 feet.

11. Seven miles northwest of Iowa Park, Wichita county, 9,000-1,100 feet altitude, VIII, 31, 1932. Open mesquite flat, the grass cover was very different from stations 8 and 9, being a soft growth of curly mesquite-grass (*Hilaria*).

Of the sixty-two species listed below only twenty-two, or a third, are represented by ten or more individuals in the checking. This would suggest that these are the common August species at the places where collecting was done. As is usually the case in "sampling" collecting, the collector is on the lookout for species not yet taken and the commoner "known at sight" species are passed by. The number of juveniles was relatively small as would be expected in late August.

With the list of species the number of individuals checked for the species and the stations where they were taken is indicated.

Litaneutria minor (Scudder) 2 ♀, sta. 5 & 7.
Stagmomantis carolina (Johansson) 2 ♀, sta. 1 & 10.
Diapheromera v. veliei Walsh 2 ♂, 2 juv. f, sta. 10.
Paratettix c. cucullatus (Burmeister) 2 ♀, sta. 1.
Tettigidea l. lateralis (Say) 1 ♀, sta. 1.
Mermiria neomexicana (Thomas) 18 ♂, 13 ♀, sta. 1-3, 5, 7, 10.
M. m. maculipennis Bruner 10 ♂, 11 ♀, sta. 1, 2, 4, 7, 9-10.
Syrbula admirabilis (Uhler) 15 ♂, 17 ♀, 6 juv. ♀, sta. 1-2, 4-7, 9-10.
Opeia obscura (Thomas) 19 ♂, 43 ♀, sta. 1-3, 10.
Amphitornus coloradus (Thomas) 1 ♀, sta. 2.
Philibostroma quadrimaculatum Thomas 7 ♂, 9f, 6 juv. ♀, sta. 1-3, 7, 11.
Orphulella speciosa (Scudder) 1 ♂, sta. 1.
Ageneotettix deorum (Scudder) 39 ♂, 51 ♀, sta. 1-3, 5-7, 9, 11.
Boopedon nubilum (Say) 2 ♀, sta. 11.
Aulocara elliotti (Thomas) 1 ♀, sta. 7.
Arphia xanthoptera (Burmeister) 1 ♂, sta. 1.
A. pseudonietana (Thomas) 3 ♂, 1 ♀, sta. 2.
Chortophaga viridifasciata (DeGeer) 1 ♂, 2 juv. ♀, sta. 1 & 11.
Encoptolophus costalis (Scudder) 1 ♀, sta. 5.
Hippiscus rugosus (Scudder) 6 ♂, 9 ♀, sta. 1-5, 9, 11.
Pardalophora saussurei (Scudder) 1 ♂, 1 ♀, sta. 4.
Dissosteira longipennis (Thomas) 1 ♂, 1 ♀, sta. 2.
Spharagemon collare cristatum Scudder 11 ♂, 22 ♀, sta. 1, 3-5, 6, 7, 10.
S. equale (Say) 2 ♂, 4 ♀, sta. 8-10.
Trachyrhachis k. kiowa (Thomas) 1 ♂, sta. 2.
T. k. fuscifrons (Stal) 3 ♂, 7 ♀, sta. 3, 5, 11.
Mestobregma p. plattei (Thomas) 6 ♀, sta. 3.
Psinidia f. fenestralis Stal. 1 ♀, sta. 4.
Trimerotropis pistrinaria Saussure 5 ♂, 6 ♀, sta. 6-8, 11.
Hadrotettix trifasciatus (Say) 9 ♂, 25 ♀, sta. 1-9.
Circotettix n. nigrafasciatus Beamer 3 ♂, 2 ♀, sta. 6.
Brachystola magna (Girard) 1 ♀, sta. 5.
Paropomala wyomingensis (Thomas) 4 ♀, sta. 1 & 6.
Schistocerca americana (Drury) 1 ♂, 2 ♀, sta. 10.
S. lineata Scudder 2 ♂, 3 ♀, sta. 4-5.
S. obscura (Fabricius) 1 ♀, sta. 5.
Hypochlora alba (Dodge) 1 ♂, 2 ♀, sta. 11.
Campylacantha o. olivacea (Scudder) 3 ♂, 6 ♀, sta. 1, 2, 7.
Hesperotettix v. viridis (Thomas) 6 ♂, 12 ♀, sta. 1, 3, 6, 8, 9.
H. speciosus (Scudder) 2 ♂, 9 ♀, sta. 1, 2, 4, 7.

MELANOPLUS GLAUCIPES (Scudder) 1 ♂, 3 ♀, sta. 9 & 11.
M. DIFFERENTIALIS (Thomas) 3 ♂, 10 ♀, sta. 2, 9, 10.
M. BIVITTATUS (Say) 1 ♂, 1 ♀, sta. 10.
M. REGALIS (Dodge) 1 ♂, sta. 9.
M. LAKINUS (Scudder) 1 ♂, 2 ♀, sta. 9.
M. M. MEXICANUS (Saussure) 3 ♂, 4 ♀, sta. 1, 2, 8, 9.
M. K. KEELERI (Thomas) 1 ♂, sta. 6.
M. PACKARDII Scudder 18 ♂, 20 ♀, sta. 1, 3, 5-7, 9.
M. PLEBEJUS (Stal) 1 ♂, sta. 11.
M. F. FOEDUS Scudder 2 ♂, 1 ♀, sta. 3, 6.
M. F. FLUVIATILIS Bruner 3 ♂, 2 ♀, sta. 10.
M. BISPINOSUS Scudder 10 ♂, 7 ♀, Sta. 1, 3, 5, 7, 10.
M. E. ELONGATIS Scudder 30 ♂, 34 ♀, sta. 1, 3-10.
M. B. BOWDITCHI Scudder 1 ♀, sta. 6.
M. P. PONDEROSA (Scudder) 4 ♂, 2 ♀, sta. 9.
PHOETALIOTES NEBRASCENSIS (Thomas) 7 ♂, 5 ♀, 3 juv., sta. 1, 3, 6.
DACTYLOTUM PICTUM (Thomas) 6 ♂, 6 ♀, sta. 1, 2, 5-7.
ORCHELIMUM SILVATICUM McNeill 1 ♂.
CONOCEPHALUS STRICTUS (Scudder) 2 ♂, 2 ♀, sta. 11.
REHNIA VICTORIAE Caudell 2 ♀, sta. 10 & 11.
GRYLLUS ASSIMILIS Fabricius 1 ♂ sta. 3.
OECANTHUS NIGRICORNIS F. Walker 1 ♀, sta. 10.

## The Osborn Collections of Insects.

Dr. Herbert Osborn, of the Ohio State University, recently retired as Professor Emeritus, has donated his collections of Hemiptera to the University, and the Trustees, in accepting the gift, have provided a Curator of Insect Collections and additional housing equipment in the department of Zoology and Entomology to ensure permanent care and preservation of these and other collections belonging to the institution. Mr. J. N. Knull, formerly with the Bureau of Plant Industry of Pennsylvania and an expert in the care of insect collections, has been secured as Curator and will assume his duties in January. The Osborn collections are extensive and contain a large number of types of the species described in his scientific papers.

## Types of Insects in the United States National Museum.

Each species represented by type material is recorded under a serial number in the type-books of the Division of Insects. The number passed 50,000 on September 12, 1933. To show the rate of growth in recent years, it may be added that the number passed 25,000 on October 31, 1921.

J. M. ALDRICH, Associate Curator, Division of Insects.

## Five New Species of Coleoptera (Cleridae, Elateridae, Buprestidae and Cerambycidae).

By Josef N. Knull, Hummelstown, Pennsylvania.

**Cymatodera neomexicana** n. sp. (Cleridae.)

Light brown above and below, with a median transverse yellow band.

Head finely punctured; moderately pubescent; eyes not prominent; antennae reaching humeral angles of elytra, joints two to ten sub-equal in length, joints five to ten feebly serrate, eleventh joint about twice the length of tenth.

Pronotum nearly twice as long as wide, wider in front than at base, widest in middle, ante-scutellar impression small with a feeble tubercle each side; surface very finely and densely punctured; moderately clothed with long and short pubescence. Scutellum small, pubescent.

Elytra nearly twice as wide as base of pronotum; sides subparallel, feebly divergent posteriorly, apices rounded to suture; punctures coarse, deep, closely placed, gradually decreasing in size posteriorly, becoming obsolete near apices; intervals flat, punctures minute; moderately clothed with hairs of varied lengths; wings present.

Body beneath shining, sparsely pubescent; punctures of abdomen fine; legs clothed with slender hairs of varied lengths.

Length 8 mm.; width 2.5 mm.

♂.—Last ventral segment broader than the last dorsal, the sides of the former reflexed partly enclosing the latter; fifth ventral deeply emarginate; sixth ventral about as long as broad; sides sub-parallel, the angles produced into short spines, between which the apex is bisinuately emarginate, a longitudinal carina in middle and an oblique one on each side, running to points; fifth dorsal segment deeply emarginate, narrower than corresponding ventral.

*Type*, a male labeled New Mexico, in the collection of the writer.

According to Wolcott's key[1] this species would come under the *knausi-morosa* group, near *longula* Wolcott.

**Limonius ovatus** n. sp. (Elateridae.)

Moderately robust, shining dark brown in color, beneath slightly lighter.

Head with front convex; surface coarsely punctured; clypeal

[1] A. B. Wolcott, Proc. U. S. Nat. Mus. 59: 269-290, 1921.

margin truncate, slightly emarginate in middle; second joint of antennae cylindrical, nearly twice as long as wide, third joint cylindrical, one and one-half times length of second, fourth and following joints serrate slightly longer than third.

Pronotum longer than wide, broader at base than at apex; sides nearly parallel, broadly rounded anteriorly, slightly sinuate near hind angles; prehumeral carinae distinct; surface coarsely punctured, clothed with rather long suberect pubescence. Scutellum nearly round, pubescent.

Elytra with sides nearly parallel in basal two-thirds, broadly rounded to rounded apices; surface striato-punctate, punctures small; interspaces more finely punctured; clothed with short suberect pubescence.

Abdomen finely punctured, pubescence short; prosternal sutures distinctly grooved in front.

Length 10 mm.; width 2.5 mm.

Described from a specimen labeled Laguna, CALIFORNIA, August 8, in writer's collection. A *paratype* from the same locality labeled August 23.

According to Van Dyke's key[2] this species would run to *L. griseus* Beauv. It can readily be separated by the smaller size, more slender form and lack of dense pubescence.

**Athous paradisus** n. sp. (Elateridae.)

Dark brown, head and thorax piceous, resembling the dark form of *A. pallidipennis* Mann., form more slender.

Head densely coarsely punctured, front deeply impressed, with prominent clypeal margin; clothed with dense pubescence which is longer in depression; antennae reaching to apical third of elytra, second joint small, about as long as broad, third joint nearly three times as long as second, fourth joint length of third.

Pronotum longer than wide, wider at base than at apex; hind angles short, broad and ear-like; sides broadly rounded anteriorly, subparallel in middle, slightly sinuate toward base; hind angles without carinae; a lateral oblique depression on each side in middle; surface finely densely punctured, pubescence dense. Scutellum nearly round, pubescent.

Elytra with sides parallel on basal two-thirds, then broadly rounded to rounded apices; surface striato-punctate, intervals finely punctured; clothed with short suberect pubescence.

Abdomen finely densely punctured; first joint of anterior

[2] E. C. Van Dyke, Proc. Calif. Acad. Sci., 20, No. 9, pp. 291-456, 1932.

tarsi as long as two following joints, first joint of middle and posterior tarsi longer than the two following joints; joints of tarsi on all feet decreasing in length from first to fourth, anterior tarsi with second joint nearly cylindrical, third but slightly lobed beneath, fourth somewhat more elongate.

Length 10 mm.; width 3 mm.

Described from a male specimen labeled Paradise Park, White Mountains, ARIZONA, July 15, D. K. Duncan collector. *Type* and *paratypes* from the same locality in writer's collection.

According to VanDyke's key[2] the species runs to *A. pallidipennis* Mann., but it is smaller and less robust. There is an oblique carina near the apex on each lateral lobe of the aedeagus, whereas in *A. pallidipennis* Mann., it is more parallel to the sides.

**Agrilus arizonus** n. sp. (Buprestidae.)

Form robust, bronze, beneath more shining than above, sides of pronotum and each elytron clothed with short, recumbent, white pubescence.

Head convex, with a moderately deep depression extending from occiput to epistoma; surface rugose, depresion containing recumbent white pubescence; antennae extending to about middle of pronotum, serrate from the fifth joint.

Pronotum wider than long, wider at base than at apex, widest about middle; sides broadly rounded from apex toward base, sinuate near hind angles; marginal carina strongly sinuate, submarginal carina slightly sinuate, inferior near hind angles; the two carinae separated and not touching at any point; anterior margin broadly rounded, slightly sinuate; disk convex, with a slight indication of a median depression extending from scutellum to middle, lateral depressions well marked; prehumeral carinae strong, sinuate, enlarged anteriorly; surface transversely rugose, lateral depressions clothed with white recumbent pubescence. Scutellum distinctly transversely carinate, surface reticulate.

Elytra at base as wide as base of pronotum, constricted near middle, expanded behind middle; sides broadly sinuate, tips obliquely rounded; disk slightly flattened, sutural margins elevated in apical third; surface coarsely imbricate, clothed with short recumbent pubescence, longer white hairs of same type forming a dense white sutural vitta on each elytron.

Abdomen beneath finely, sparsely punctate, clothed with recumbent white pubescence which forms dense patches along the sides of the last three segments.

Prosternum broadly emargenately truncate. Tarsal claws cleft, the inner teeth broad and not turned inward, Pygidium carinate, carina not projecting.

Length 6.5 mm.; width 1.5 mm.

Described from a female labeled, White Mountains, ARIZONA, August 28, D. K. Duncan collector. *Type* in writer's collection.

According to Fisher's key,[3] this species would run to *A. felix* Horn. It is distinguished from this species by the pronotum being wider than long, and the surface being less rugose. The marginal and submarginal carinae are separated their entire distance in *A. arizonus*, whereas in *A. felix* Horn they are joined back of the middle.

**Elaphidion (Anoplium) magnipunctata** n. sp. (Cerambycidae.)

Moderately robust, shining dark brown in color, superficially resembling *A. imbelle* Lec.

Head with large punctures moderately spaced; eyes prominent, coarsely granulate; antennae extending to apices of elytra when laid back over dorsal surface, first three joints cylindrical, others somewhat flattened, second joint small, slightly longer than wide, third joint about four times length of second, fourth joint shorter than third, fifth joint longer than fourth, joints five to ten of about equal length, last joint longer than tenth, joints three to seven inclusive containing small spines on the inside which gradually decrease in size toward the outer joints; joints five to ten with prominent acute angles on the outside; antennae coarsely punctured, sparsely pubescent with short hairs, intermixed with a few long flying hairs.

Pronotum about as long as broad, widest in apical half, constricted at base and apex; sides broadly rounded in front, nearly parallel in middle, then subparallel to base; surface coarsely punctured, punctures becoming smaller and confluent on sides, an irregular median basal callous; pubescence sparse and inconspicuous. Scutellum small, densely pubescent.

Elytra with sides nearly parallel, broadly rounded toward tips, apices rounded to suture; surface covered with coarse,

[3] W. S. Fisher, U. S. Nat. Museum, Bull. 145, pp. 1-347, 1928.

widely separated punctures, which become obsolete toward apices; pubescence short and inconspicuous.

Ventral surface lighter in color than above; abdomen sparsely punctured with very fine punctures, a long hair arising from each depression.

Length 14 mm.; width 3.5 mm.

Described from a specimen labeled Grant County, NEW MEXICO, July 15, R. T. Kellogg collector. *Type* in writer's collection.

## The Sexes of Harroweria gloriosa Hebard (Orthoptera; Tettigoniidae; Phaneropterinae).

By MORGAN HEBARD.

On September 9, 1932, an orchid plant (*Oncidium stipitsutum*) was shipped from the Canal Zone, Panama, to Hawaii, which plant was found to be bearing a number of eggs of a katydid. From these O. H. Swezey reared the larval and the adult specimens described below. The eggs hatched in Honolulu from March 20 to April 13, 1933, and adults matured from May 26 to July 2 of that year. Eight males and three females were reared to maturity, eight immatures being preserved to show the six instars through which the insect passes before the adult condition is reached. The species proves to be *Harroweria gloriosa* Hebard, of which a color figure of the unique female type was printed at the time of original description.[1]

The immatures in their earliest instar bear only one of the hairy sections of the antennae characteristic of the species. In the next instar two such sections are present and in the following instars three or four (as in the adults). The earliest instars are black with a small greenish white mark meso-dorsad on the caudal femora, but later all the markings shown by adults on the body and limbs appear.

The most interesting feature which the series reveals is the fact that the adult male has an entirely different tegminal and wing coloration from that of the adult female. Such sexual dimorphism is so very rare in the Orthoptera that any specialist

[1] Trans. Amer. Ent. Soc., LIII, p. 89, pl. XVIII, fig. 2 (1927).

might well have believed distinct species to be represented had the present series not been raised from the same lot of eggs. Unlike the female the male has the tegmina in proximal two-thirds with the half toward the sutural margin transparent pale brownish buff with cross-veinlets transparent greenish white. The tegmina elsewhere are as in the female, blackish brown with cross-veinlets pale brownish buff and two transverse bands of the latter distad, of which the first is broader but more broken than the apical band. Much more unlike the female are, however, the wings of the male, which have their entire proximal portion (including about two-fifths of their entire surface) transparent whitish (in four specimens immaculate, but in two with every minute cross-vein very finely margined on each side with brown). The wings elsewhere are exactly as in the female, brilliant metallic purple black with distal portion of anterior field strikingly white, blackish brown, pale brownish buff and again blackish brown.

The male cerci are simple, slender, elongate, weakly sigmoid and moderately flattened distad and terminate in a small triangular tooth. The male subgenital plate is slender distad, there with a deep and narrow U-emargination, the lateral apices so formed truncate and each bearing a small, simple, socketed style.

The genus is shown by these males to be, as we supposed, a member of the Group Ceraiae. The species is one of the most brilliantly colored and distinctively specialized of all katydids. The fact that only one adult specimen has ever been secured in collecting indicates that, like many katydids, the insect is nocturnal, probably hiding during the day in recesses in the thickest of tropical forest foliage.

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**Manual of Myiology, by Charles H. T. Townsend.**

Recent advices from the author state that the size of the edition will be determined by the number of subscriptions received prior to March 1, 1934, as it is planned to issue Part I on that date. We are also advised that, in view of the action taken by the International Zoological Congress in Padua, the Meigen 1800 names will not be employed in the work. Address Charles Townsend & Filhos, Itaquaquecetuba, E.F.C.B., São Paulo, Brazil.

## Two New Species of the Tachinid Genus Siphosturmiopsis with Key and Notes (Diptera).

By H. J. Reinhard, College Station, Texas.

Although I have discussed this genus recently (Proc. U. S. N. M. vol. 79, 1931, p. 8), the accumulation of two new forms described herein gives opportunity to present an amended key to the species and additional notes.

The genotype of *Siphosturmiopsis*, designated by Townsend in 1915, is *rafaeli*, new species, from Vera Cruz, Mexico, (Ins. Insc. Menst., vol. 3, p. 91). Townsend mentioned that the same species had been previously determined by Coquillett as *Brachycoma ruficauda* van der Wulp and referred to the genus *Atacta*. Wulp's type series, now in the British Museum of Natural History, was not seen by either author and until specimens are examined it appears expedient to consider the forms distinct.

The present genus has the essential characters of *Siphosturmia*, with the exception that the proboscis is short and rather stout, with the apical and basal segments about equal in length and together hardly totaling the height of the head. Townsend has pointed out that the epistomal characters of *Siphosturmiopsis* are the same as in *Masiphya*, which is true, and it may be added that the other cephalic characters are also very similar. However, the latter genus may at once be distinguished by the chitenized ovipositor in the female sex and by the peculiar structure of the male genitalia. There are other less important differences.

Key to Species of *Siphosturmiopsis*.

1. Four sternopleural bristles.....2.
   Three sternopleurals; middle tibiae with one stout bristle on the outer front side; palpi usually black; fourth abdominal segment red on apex (United States, widespread), *phyciodis* Coquillett.
2. Abdomen black on venter.....3.
   Abdomen entirely red on venter and on the sides above; antennae two-thirds the length of face, third segment red except on the anterior apical border; cheek clothed with coarse black hairs; palpi rather slender, brownish near base pale yellow apically (California)...*rufiventris*, new species.

3. Apex of abdomen black.....4.
Apex of abdomen yellow; parafacial at narrowest part approximating one-half the width of facial depression; ocellars small in female, hairlike in male (Mexico).
*rafaeli* Townsend.

4. Fourth abdominal segment obviously longer than the preceding one; lowermost frontal bristle situated at middle of parafacial on level with apex of second antennal segment; last three abdominal segments above shining black on posterior third or more, robust species 10 to 12 mm. in length (Texas) .....*melampyga* Reinhard.
Fourth abdominal segment barely exceeding the length of third; lowermost frontal bristle situated nearer to margin of eye; narrow hind margins of the intermediate abdominal segments subshining at most; arista thickened hardly to middle; moderate-sized species 7 or 8 mm. in length (New Mexico).....*oteroensis*, new species.

SIPHOSTURMIOPSIS RAFAELI Townsend

*Siphosturmiopsis rafaeli* Townsend, Ins. Insc. Menst., vol. 3, 1915, p 91.—Reinhard, Proc. U. S. N. M., vol. 79, 1931, p. 8.

The type series, consisting of two females and one male, is in the U. S National Museum. I do not know of any specimens in other collections. Townsend's description and the items mentioned by me in 1931 seem sufficient to identify the species.

Type locality: San Rafael, Vera Cruz, Mexico.

SIPHOSTURMIOPSIS MELAMPYGA Reinhard

*Siphosturmiopsis melampyga* Reinhard, Proc. U. S. N. M., vol. 79, 1931, p. 9.

I have given a full description of the species which is readily accessible. Known only in the female sex. The holotype is in the U. S. National Museum, and one paratype specimen is in my collection.

Type locality: College Station, Texas.

**Siphosturmiopsis oteroensis,** new species.

♀.—Front at extreme vertex 0.38 and 0.37 of the head width in the two specimens, widening uniformly downward; parafrontals gray pollinose, clothed with black hairs and bearing three or four weak bristles on widest part outside the main frontal rows; median stripe red, broad to triangle and at middle distinctly wider than one parafrontal; verticals two pairs, the

inner largest and reclinate, the outer ones divaricate; ocellar bristles well-developed; orbitals three pairs, the two anterior proclinate and the upper one reclinate; frontal bristles rather weak, the rows strongly diverging toward the eye beneath the antennae extending to level with apex of the second segment, uppermost bristle rather short and stout, reclinate; entire face including cheeks with dense cinereous pollen; parafacial narrowed downward, bare except a few delicate hairs just beneath the lowermost frontal bristles; face rather flat with the lower border slightly prominent, its ridges divergent below bearing a few bristles above the vibrissae, which are situated a little above the front edge of mouth; antennae a little shorter than the face, basal segments yellow, third black and a trifle less than twice the length of second; arista blackish, moderately thickened hardly to middle, penultimate segment but slightly longer than wide; cheek clothed with fine brownish-black hairs, about one-fifth the eye height; proboscis rather stout, obviously shorter than height of head, labella moderately enlarged; palpi yellow, somewhat thickened and strongly bowed upward beyond the middle; eyes bare; back of head gray pollinose, clothed with pale gray or whitish hairs.

Thorax black, gray pollinose; mesonotum marked with four or five poorly defined dark stripes which appear most distinct when viewed at a lateral angle; scutellum red, dusted with uniform gray pollen. Chaetotaxy: Humeral 4; posthumeral 3; notopleural 2; presutural 2; acrostichal 3, 3; dorsocentral 3, 4; intraalar 3; supraalar 3; postalar 2; pteropleural 1 or 2; sternopleural 2, 2; scutellum with three marginal, a rather long decussate apical and a wide-spaced discal pair, disk bearing numerous short erect bristly hairs which become larger toward the apex; postscutellum normally developed, dusted with gray pollen; calypters opaque, white.

Abdomen black first three segments reddish on the sides, with gray pollen which is rather thin beyond the middle of the second segment above, denser on the third and extending nearly to the hind margin; fourth segment conical and deflexed, wholly black, the pollen confined to the basal margin above and extending to the middle on the sides; first segment with a pair of small median marginal bristles; second with a rather short moderately stout pair; third segment bearing a marginal row of about ten; fourth segment with erect bristles and hairs over the entire upper surface which become weaker toward the tip; ovipositor retracted, not fitted for piercing.

Legs black; middle tibia with two or three large bristles on outer front side; hind tibia ciliated on outer posterior edge with one large bristle in the row beyond the middle; pulvilli short.

Wings grayish hyaline; veins bare except third which has two to four setules at the base; fourth vein with a rounded almost rectangular bend, without a stump or fold at latter; apical cross vein a trifle concave on its entire length; first posterior cell open far before the wing tip; hind cross vein joining fourth at less than one-third the distance from bend to small cross vein; costal spine vestigial.

Length, 7 to 8 mm. Male.—Unknown.

Two female specimens contributed by D. G. Hall, labeled Otero county, New Mexico, June 20, 1929. The *holotype* is deposited in the U. S. National Museum, and the *paratype* is in my collection.

The species resembles *melampyga* but is distinctly less robust in build. The principal differences are mentioned in the key. The host relationships are not known.

**Siphosturmiopsis rufiventris,** new species.

♀ Front at vertex 0.35 of the head width in the single specimen, gradually widening downward; parafrontals broad, with yellowish-gray pollen becoming paler below; frontal stripe reddish-brown, obviously narrower than one parafrontal on entire length; ocellars strong; verticals two pairs; orbitals one (upper) reclinate and two proclinate pairs; frontal bristles about seven in the row, lowermost bristle situated at middle of parafacial about on level with base of third antennal segment, the upper bristle largest and about the size of the reclinate orbital; parafacial bare, with dense silvery pollen, gradually narrower downward; face gray pollinose, rather flat with the front edge of mouth moderately protuberant; the ridges flattened bearing three or four bristles on lower extremity; vibrissae situated slightly above the mouth; antennae hardly exceeding two-thirds the length of face, red except the anterior apical border of third segment which is blackish, second segment fully one-half the length of third; arista black, moderately thickened on basal two-fifths and evenly tapering, penultimate segment short; proboscis shorter than height of head, the apical segment rather slender, labella not very large but apparently fleshy; palpi brown at base paler apically, hardly at all thickened beyond the middle and but weakly bowed upward; cheek gray pollinose, clothed with black hairs which are coarser below, about one-fifth the eye height; eyes bare; back of head gray pollinose and clothed with pale hairs.

Thorax black, gray pollinose; mesonotum marked with four black stripes in front and five behind the suture, the outer ones

broadest and extending almost to base of scutellum; the latter red sprinkled with changeable gray pollen. Chaetotaxy as in *oterocusis*, except that there are only two postbumerals developed and the apical scutellar bristles are decidedly smaller than the hindmost lateral pair; posteutellum normal, gray pollinose; calypters opaque, white, the rims faintly tawny.

Abdomen red with a blackish median stripe on the intermediate segments above; last three segments with gray pollen which becomes thinner beyond the basal third of the second segment above but extends rather uniformly to the apical third of the following one, the fourth pollinose on basal half; first segment with a pair of median marginals; second bearing one stout pair, a weaker one next to these and two at the sides; third with a marginal row of about 12; fourth with numerous bristles on the upper surface which become smaller toward the apex; genital opening moderately large, roundish, ovipositor retracted with a blunt tip.

Legs black; claws and pulvilli shorter than the apical tarsal segment; hind tibia unevenly ciliated; middle tibia with two stout bristles on the outer front side near the middle.

Wings gray hyaline; first vein bare, third with five coarse hairs at base; fourth vein with an obtuse stumpless bend, beyond straight and approaching costa in a diagonal direction; first posterior cell open far before the tip of wing; hind cross vein oblique to fourth which it joins much nearer the bend than small cross vein; costal spine small.

Length, 9 mm. Male.—Unknown.

Described from one female specimen received from C. H. Martin labeled, Monrovia Canyon, CALIFORNIA, July 26, 1931, (C. H. and D. Martin). The type is in my collection.

This species has the fourth abdominal segment less broadly truncate at the apex than the female of *phyciodis*. In the other known forms the anal segment of the female is conical or pointed at the tip.

SIPHOSTURMIOPSIS PHYCIODIS Coquillett

*Sturmia phyciodis* Coquillett, Revis. Tachin., 1897, p. 109.
*Siphosturmiopsis phyciodis* Coquillett, Reinhard, Proc. U. S. N. M., vol. 79, 1931, p. 11.

This common and well-known form requires no further description. The type series, consisting of one male and one female from Massachusetts and Maryland, is in the U. S. National Museum. The male specimen was reared October 7, 1889, from a species of *Phyciodes*.

## 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.
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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.
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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. národního 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., Acadêmie 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.
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista Entomologia, São Paulo, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Stylops: a Journal of Taxonomic Entomology, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.

## New Name of Cypselopteryx T. T. (Dipt.: Anthomyiidae.)

On pages 15 and 16 of the *Supplementa Entomologica,* volume XIV (1926), I published the above generic name, which I find to be preoccupied and for which the new name **Cypselodopteryx** is herewith proposed.

Genotype, *Cypselopteryx mima* T. T., l.c., from Kurintji Peak, Sumatra.

The fly in question is one of the aberrant anthomyioids with hypopleural bristles.—CHARLES H. T. TOWNSEND.

## Pelecinus polyturator Male (Hymen.: Pelecinidae).

On Sept. 3, 1933, while collecting coleoptera a half mile up Darby Creek from the Sproul Road at a woods called "The Hunt," Delaware County, Pennsylvania, I captured a male *Pelecinus polyturator.* It was on a leaf of *Eupatorium urticaefolium* near the water.—MARK ROBINSON, 1533 So 56th St., Philadelphia.

# Entomological Literature

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

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.—Anon.**—Nachschrift der redaktion. [17] 50: 274-280. **Bishopp, F. C.**—Medical entomology—Its field and function. [10] 35: 144-158. ***Carpenter, F. M.**—The lower Permian insects of Kansas. Part 6. [Pro. Amer. Acad. Arts & Sci.] 68: 411-508, ill. **Criddle, N.**—Obituary. By Gibson & Crawford. [4] 65: 193-200, ill. Obituary.

By H. Lloyd. [Can. Field Nat.] 47: 145-147, ill. **Smith, R. C.**—Publications of the late Professor James Walker McColloch (1889-1929). [103] 6: 137-142.

**ANATOMY, PHYSIOLOGY, ETC.**—Bliss and Gill—The effects of freezing on the larvae of Aedes aegypti. [Jour. Tenn. Ac. Sci.] 8: 418-423. **de Boissezon, P.**—De l'utilisation des proteines et due fer d'origine vegetale dans la maturation des oeufs chez Culex pipiens. [77] 114: 487-489. **Brittain & Newton.**—A study in the relative constancy of hive bees and wild bees in pollen gathering. [Canadian Jour. Res.] 9: 334-349. **Chudoba, S.**—Sur la relation entre les résidus fusoriaux et les fibrilles plasmatiques d'une certaine catégorie dans la spermatogenèse chez Tenebrio molitor. [77] 114: 343-346, ill. **Fernando, W.**—The development and homologies of the mouthparts of the head-louse. [53] 76: 231-241, ill. **Greb, R. J.**—Production of Gynandromorphs in Habrobracon. [Pro. Penna. Acad. Sci.] 7: 117-118. **Hecht & Wald.**—The influence of intensity on the visual functions of Drosophila. [Proc. Nac. Acad. Sci. U. S. A.] 19: 964-972, ill. **Horn, C. A.**—Mitochondria of insect intestinal tract. [Pro. Penna. Acad. Sci.] 7: 75-78, ill. **Miller, F. W.**—Variations in the wing venation of Aphis feminea (Aphididae). [Pro. Penna. Acad. Sci.] 7: 69-71. **Oka & Furukawa.**—Regulationsvermögen der Libellenmyphen. Eine vorläufige mitteilung. [Proc. Imp. Acad., Tokyo] 9: 124-127, ill. **Pilawski, S.**—Les structures fibrillaires osmiophiles dans la spermatogenèse chez Cicindela hybrida. [77] 114: 346-348, ill. **Pyenson, L.**—The shielding effects of various materials when insects are exposed to the lines of force in a high frequency electrostatic field. [6] 41: 241-264. **Speicher, B. R.**—The demonstration of muscle contraction in insects. [Pro. Pennsylvania Acad. Sci.] 6: 152-153, ill. **Speicher & Miller.**—The mechanics of antennal movement in Habrobracon. [Pro. Penna. Acad. Sci.] 7: 66-69, ill. **Whiting, A. R.**—Variegated eyes in Habrobracon. How we draw Habrobracon. [Pro. Penna. Acad. Sci.] 7: 118; 111-119. **Whiting, P. W.**—Selective fertilization and sex-determination in Hymenoptera. [68] 78: 537-538. **Whiting, P. W.**—The parasitic wasp, Habrobracon juglandis as laboratory class material. Reproductive reactions of Gynandromorphs. [Pro. Penna. Acad. Sci.] 7: 116: 117. **Wigglesworth, V. B.**—The physiology of the cuticle and of ecdysis in Rhodnius prolixus; with special reference to the function of the oenocytes and of the dermal glands. [53] 76: 269-318, ill.

**ARACHNIDA AND MYRIOPODA.**—*Beier, M.—Revision der Chernetidae. [89] 64: 509-548, ill. **Savory, T. H.**—Hot spring spiders. [31] 133: 712. *Schulze, P.—Neue Ixodiden aus den gattungen Amblyomma und Aponomma. (S) [34] 104: 317-323, ill.

**THE SMALLER ORDERS OF INSECTS.**—*Bird, R. D.—Somatochlora ozarkensis, a new species from Oklahoma (Cordulinae). [Occ. Pap. Mus. Zool. Univ. Michigan] No. 261: 7 pp., ill. **Calvert, P. P.**—The rates of growth, larval development and seasonal distribution of dragonflies of the genus Anax (Aeshnidae). [Pro. American Philo. Soc.] 73: 70 pp., ill. *Gloyd, L. K.—A new Corduline dragonfly, Tetragoneuria sepia, from Florida. [Occas. Pap. Mus. Zool. Univ. Michigan] No. 274: 5 pp., ill. *Hood, J. D.—Three new Urothripidae from Panama. [Pro. U. S. Biol. Sur.] 46: 213-216. *Jordan, K.—Records of Siphonaptera from the state of New York. Descriptions of Siphonaptera. A survey of the classification of the American species of Ceratophyllus. [Nov. Zool.] 39: 62-65, 66-69, 79, ill. *Moulton, D.—The Thysanoptera of South America. [105] 3: 227-262, ill. **Neave, F.**—Some new stoneflies from western Canada. [4] 65: 235-238, ill. **Spieth, H. T.**—The phylogeny of some mayfly genera. [6] 41: 327-388, ill. **Steinweden, J. B.**—Key to all known species of the genus Taeniothrips (Thripidae). [1] 59: 269-293, ill. **Stewart, M. A.**—Revision of the list of Siphonaptera from New York State. [6] 41: 253-262. **Sumner, E. S.**—The species of the termite genus Zootermopsis. [67] 6: 197-230, ill. **Sumner, E. C.**—The species of the termite genus Zootermopsis (=Termopsis). [67] 6: 197-229, ill. **Walker, E. M.**—The nymphs of the Canadian species of Ophiogomphus Odonata, Gomphidae. [4] 65: 217-229, ill. *Watson, J. R.—Two new species of Oedaleothrips with notes on other species. [39] 17: 48-50, cont. *Werneck, F. L.—Duas especies novas de Mallophaga (Gyropidae). [Mem. Inst. Oswaldo Cruz] 27: 339-348, ill. (S). **Williamson, E. B.**—The status of Sympetrum assimilatum and Sympetrum decisum (Libellulinae). [Occ. Pap. Mus. Zool. Univ. Michigan] No. 264: 7 pp., ill. *Williamson & Gloyd.—A new Somatochlora from Florida (Cordulinae). [Occ. Pap. Mus. Zool. Univ. Michigan] No. 262: 7 pp., ill.

**ORTHOPTERA.**—**Hansen, H. J.**—External organs in Dermaptera, especially Forficulidae. [102] 18: 349-358.

**Zolotarevsky, B. N.**—Contribution a l'etude biologique du criquet migrateur (Locusta migratoria capito) dans ses foyers permanents. [Ann. Epiphytes] 19: 47-142, ill.

**HEMIPTERA.**—***Hungerford, H. B.**—(Hemiptera-Hydrometridae). [103] 6: 142-143. ***Jaczewski, T.**—Corixidae collected during the winter voyage 1931-32, of the Polish Training ship "Das Pomorza". [An. Mus. Zool. Polonici] 10; No. 1: 6 pp., ill. (S). ***Thomas, R. L.**—The genera Stirellus and Commellus (Cicadellidae). [103] 6: 126-136, ill. ***Tissot, A. N.**—Additions to the aphid fauna of Florida. [39] 17: 37-45, ill. **de la Torre-Bueno, J. R.**—Long Island records of Heteroptera. [19] 28: 180.

**LEPIDOPTERA.**—***Bell, E. L.**—Studies in the Pyrrhopyginae, with descriptions of new species (Hesperiidae). [6] 41: 265-295, cont. **Braun, A. F.**—Pupal tracheation and imaginal venation in Microlepidoptera. [1] 59: 229-268, ill. **le Doux, C.**—Eine neue doppelfärbung für sexualarmaturen der Lepidopteren. [Mitt. Deutschen Ent. Ges.] 4: 103-104. **Engelhardt, G. P.**—The fall canker worm Alsophila pometaria in Westchester County, N. Y. [19] 28: 172-173. ***Gehlen, B.**—Neue Sphingiden. [14] 47: 115-116, ill. (S). ***Hall, A.**—On the distribution and synonymy of the Adelpha of Pará. [Nov. Zool.] 39: 10-11. **Hoffmann, F.**—Beiträge zur naturgeschichte brasilianischer schmetterlinge. [11] 1932: 97-148. **Hutchins, R. E.**—Annotated list of Mississippi Rhoplocera. [4] 65: 210-213. **Krüger, E.**—Verbreitung und ableitung einiger tagfalterfamilien des tropischen Amerikas. [11] 1932: 149-194. **McDunnough, J.**—Notes on the biology of certain tortricid species with structural details of the larvae and pupae. [Canadian Jour. Res.] 9: 502-517, ill. ***McDunnough, J.**—Notes on North American lepidoptera with descriptions of new species. [4] 65: 200-208. **Moss, A. M.**—Some generalizations on Adelpha, a neotropical genus of nymphalid butterflies of the group Limenitidi. [Nov. Zool.] 39: 12-19. ***Prout, L. B.**—On the geometrid genus Phrygionis. [Nov. Zool.] 39: 1-9. ***Schaus, W.**—New species of Heterocera in the National Museum, Washington. [75] 12: 479-496. ***Vogeler, B.**—Neue Rothschildia betis-rassen und Rothschildia lebeauina rectilineata. [14] 47: 120-122, ill. (S).

**DIPTERA.**—**Aldrich, J. M.**—Correction to my note on Meigen's 1800 paper on Diptera. [8] 69: 255. **Aubertin, D.**—Revision of the genus Lucilia (Calliphoridae). [Jour. Linn. Soc. Lond. Zool.] 38: 389-436. **Bates, M.**—Notes on

West Indian Trypetidae. [19] 28: 160-172, ill. **Bequaert, J.**—Notes on Hippoboscidae. A tentative key to the species of Olfersia (Feronia; Pseudolfersia). [5] 40: 101-105. **Borgmeier, T.**—Apodicrania, um novo genero da familia Phoridae. [105] 3: 384-385. ***Brues, C. T.**—A new genus of Phoridae from Peru. [5] 40: 106-111, ill. ***da Costa Lima, A.**—Notas sobre trypetidas brasileiras. [105] 3: 382-384, ill. **Curran, C. H.**—The North American species of Anormostoma (Helomyzidae). [40] 676: 9 pp. ***Curran, C. H.**—New North American Diptera. [40] 673: 11 pp. ***Gerry, B. I.**—Four new species of Chironomidae from the Greater Antilles. [5] 40: 94-97. ***Kröber, O.**—Das subgenus Neotabanus der tabanidengattung Tabanus s. lat. [105] 3: 337-367. **Sámal, J.**—The description of the larva of the Chilean stone-fly Diamphipnoa virescentipennis. [Casopis] 29: 59-62, ill. **Shannon, R. C.**—Anophelines of the Amazon Valley. [10] 35: 117-143, ill. **Smith, C. N.**—Notes on the life history and molting process of Sarcophaga securifera. [10] 35: 159-164, ill. **Vimmer, A.**—Einige ergänzungen zur anatomie der larve von Vermileo, nebst bermerkungen über die mundwerkzeuge der larven der Rhagionidae im allgemeinem. [Casopis] 28: 47-53. [German Abst.].

**COLEOPTERA.**—***Bänninger, M.**—Ueber Carabinae, ergänzungen und berichtigungen. [11] 1933: 81-124. ***Brown, W. J.**—Two undescribed species of the old family Silphidae with notes on some characters that have been used to divide the group. [4] 65: 213-215. ***Bruch, C.**—Nuevos estafilínidos ecitófilos de Tucumán. [105] 3: 205-213, ill. ***Bruck, C. R.**—A new bark beetle from southern California. [4] 65: 239-240. ***Fall, H. C.**—New Coleoptera. [4] 65: 229-234. **Frost, C. A.**—Hister semisculptus. [19] 28: 159. ***Gaines, J. C.**—Notes on Coccinellidae with a description of a new subspecies. [6] 41: 263-264. **Günther & Zumpt.**—Coleopterorum Catalogus. Pars 131: Curculionidae: subfam. Tanymecinae. 131 pp. ***Hustache, A.**—Deux nouveaux Curculionides depredateurs [Bull. Mus. Nac. Nat. Paris] 5: 376-380. (S). **Keifer, H. H.**—Some Pacific Coast Otiorhynchid weevil larvae. [70] 13: 45-84, ill. **Lindquist, A. W.**—Amounts of dung buried and soil excavated by certain Coprini (Scarabaeidae). [103] 6: 109-125, ill. **Löding, H. P.**—Alabama Coleoptera not generally listed from the gulf coast states east of the Mississippi River, Fla., Ga., Ala., and Miss. [19] 28: 139-151. ***Lutshnik, V.**—Novae Stominorum formae e America meridionall. [Casopis] 28: 101-108. ***Melzer, J.**—Cerambycideos neotropicos, novos ou

pouco conhecidos. [105] 3: 367-382. *Obenberger, J.—Buprestidae regionis neotropicae. [Casopis] 29: 138-164. *Saylor, L. W.—A new Mexican Copris (Scarab.) [4] 65: 238-239. Schaeffer, C.—Short studies in the Chrysomelidae. [6] 41: 297-325. *Schedl, K. E.—Descriptions of a few new species of American Platypodidae in the British Museum of Natural History. [75] 12: 396-403. (S). Scheerpeltz, O.—Coleopterorum Catalogus. Pars. 129: Staphylinidae VII: Supplementum I. 989-1500. *Stirrett, G. M.—A new flea-beetle from Iowa (Halticinae, Chrysomelidae). [4] 65: 208-210, ill. *Wallis, J. B.—Revision of the North American species (north of Mexico), of the genus Haliplus. [Trans. R. Canadian Inst.] [19] 1-76, ill.

HYMENOPTERA.—*Cockerell, T. D. A.—A new bee of the genus Perdita from Colorado. [4] 65: 234-235. Creighton, W. S.—Cyathomyrmex, a new name for the subgenus Cyathocephalus. [5] 40: 98-100. Donisthorpe, H.—On a small collection of ants by Dr. F. W. Edwards in Argentina. [75] 12: 532-538. *Forbes, W. T. M.—Two wasp-guests from Puerto Rico. [5] 40: 89-92, ill. Janvier, H.—Etude biologique de quelques hymenopteres du Chili. [Ann. Sci., Paris] Zool. 16: 209-356, ill. *Malloch, J. R.—Review of the wasps of the subfamily Pseninae of North America (Aculeata). [50] 82: 60 pp., ill. Wasmann, E.—Beschreibung von Labidopria longicornis (Diapriidae). [34] 104: 228-231, ill. (S). Will, H. C.—A list of the sawflies of the Tenthredininae of Pennsylvania. A list of the synonymy of the Tenthredininae of America north of Mexico. Wing-venation variations in the rose sawfly, Emphytus cinctipes. The genus Tenthredopsis of America, north of Mexico (Tenthredinidae). [Pro. Pennsylvania Acad. Sci.] 6 & 7: 38-42; 42-46; 30-32; 32-34, ill.

SPECIAL NOTICES.—The Fauna of British India.—Diptera IV. Culicidae. Anophelini. By S. R. Christophers. Students of this group should be acquainted with this work.

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Bibliography of Australian Entomology 1775-1930, with biographical notes on authors and collectors, by Anthony Musgrave, Entomologist of The Australian Museum at Sydney.—This publication of the Royal Zoological Society of New South Wales bears the date of September, 1932. It consists of 380 large octavo pages crowded with thousands of entries, and an almost incredible amount of valuable information, clearly printed, with every citation beginning a new line and therefore

easy to find and very easy to read. Fully 10,000 titles are given in full with not only the customary details of date, volume and pagination but also information about the plates which so often, for some incomprehensible reason, is omitted. The author has sought to include all works in which any Australian Insects are described; in cases where a single, or only a few, Australian species are involved, the names of these species are given, with page references.

One finds of course extended bibliographies of the principal students of Australian Insects, such as Blackburn, Broun, Carter, Dodd, Ferguson, Froggatt, Hardy, Lea, Lower, Meyrick, Maskell, Pascoe, Sloane, Taylor, Turner, etc. But this information is supplemented with other facts giving the important general works of such authorities as Bigot, Butler, Candeze, Dalla Torre, Gemminger and Harold, Hampson, Lacordaire, Macquart, Marseul, Sherborn, Walker, as well as Genera Insectorum, the various British Museum Catalogues, etc.

There are brief biographies of both writers and collectors, with references to their sources: there is information about the various scientific expeditions which have visited Australia, and concerning the entomological collections and types contained in the various Australian Museums.

One biographical error has crept in. We are certainly glad that our good friend Dr. Walther Horn, Director of the Deutsches Entomologisches Institut, still lives and continues to help many friends with his unfailing store of knowledge and efficient aid of all kinds.

For the student, for the librarian, for the book-dealer, and most certainly for every entomologist interested in any group or family of Insects, this up to date work is an invaluable book of reference.

One wonders at its low price. My own copy, purchased from Angus and Robertson, Ltd. of Sydney, cost less than three dollars, postage included.

JOHN D. SHERMAN, JR.

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SHIRAKI, TOKUICHI: A SYSTEMATIC STUDY OF TRYPETIDAE IN THE JAPANESE EMPIRE. Memoirs of the Faculty of Science and Agriculture, Taihoku Imperial University, Vol. VIII. 509 pp., 92 textfigs., 14 col. pl.—165 species, placed in 75 genera, are treated in this volume; of these species, about half are described as new. Keys to all genera and species are included, and detailed descriptions of both structure and pattern are given, supplemented by numerous figures in the text, and

fourteen beautiful colored plates. The classification adopted is in the main that of Hendel's 1927 paper on the palaearctic although numerous departures are noticeable. The family is divided into three subfamilies—Dacinae, Trypetinae and Tephritinae—but no tribal names are used. Perhaps the most notable of the novelties is a new genus and species with stalked eyes, similar to *Pelmatops*.

The introductory section on the structure of these flies is the most comprehensive that has so far appeared; the morphological terminology seems entirely in accord with that used by most present day Dipterists. It is notable that abbreviations are rarely used in the text, except for wing veins. The early stages are not considered in any detail, although the host of each species is mentioned, where known.

In scope and careful workmanship this volume by Shiraki surely ranks with the papers by Hendel on South America and Europe, and by Bezzi on India and Africa. The East Indies, Australia and North America are now left as the only large areas whose Trypetid faunas have not been monographed. It is only after this faunal work has been done that we can hope, by a process of synthesis, to build a rational classification for the whole family; toward this task, Dr. Shiraki has made a generous contribution.—Marston Bates.

## OBITUARY.

William Sherman Wright,[1] curator of insects and county supervisor of nature study of the Natural History Museum, San Diego, died of a brief illness at Laguna Beach, California, enroute home, on July 8, 1933. He was born at Hardin,[2] Illinois, April 23, 1866. He prepared for educational work and graduated from the San Diego Normal School in 1902 and spent a year at Columbia University, 1917. He taught in Nebraska, 1889-1894, and in California, 1902-1928, and received his present appointment in 1923. The study of entomology was pursued as a hobby and he also spent three days a week for one year working on the Lepidoptera in the American Museum of Natural History as an assistant in the department of entomology. Collecting trips were made along the Mexican border in 1906; to Ensenado, Mexico in 1925; Laguna Mountains, 1926; Yosemite Valley, 1920, 1921; Lake Tahoe region, 1926; Grand Canyon, Arizona, 1925. He was specially interested in Lepidoptera and amassed a large collection of 40,000 specimens which was donated to the San Diego Society of

Natural History in 1924. It now aggregates 100,000 specimens of all orders.

He has published a number of valuable papers in various periodicals, the more important ones being:

Notes on the life history of *Datana robusta* Strecker, Jour. N. Y. Entom. Soc., vol. 16, pp. 1-6 (1908).

Annoted list of the diurnal Lepidoptera of San Diego County, California, Ibid., vol. 16, pp. 153-167 (1908).

Notes on certain California Lepidoptera. Insect. Insci. Menst., vol. 2, pp. 6-8 (1914).

Phyctinae of San Diego County, California and vicinity, with descriptions of new species. Entom. News, vol. 27, pp. 24-30 (1916).

Some new California Geometridae. Ibid., pp. 457-460 (1916).

Notes and descriptions of Geometridae. Jour. N. Y. Entom. Soc., vol. 25, pp. 23-125 (1917).

Report of the Lepidoptera of the American Museum Expedition to Arizona. Am. Mus. Nat. Hist., Bull., vol. 42, art. 14, pp. 483-490 (1920).

Descriptions of new species of *Pero* from California. Calif. Acad. Sci., Proc., vol. 11, pp. 109-110 (1921).

A new *Pterophorus*. Entom. News, vol. 32, pp. 6-7 (1921).

The geometrid moths of the Expedition of the California Academy of Sciences to the Gulf of California. Calif. Acad. Sci., Proc., vol. 12, pp. 113-115 (1932).

Lepidoptera, Geometridae: notes and descriptions. Entom. News, vol. 35, pp. 91-96 (1924).

Geometrid notes and descriptions. Lepidopterist, vol. 3, pp. 125-127 (1920).

Two new Geometridae from San Diego County, California. San Diego Soc. Nat. Hist., Trans., vol. 5, pp. 41-44 (1927).

The honey bee, *Apis mellifica*. Western Honey Bee, vol. 14, no. 3, pp. 20-21; no. 4, pp. 15-18 (1926).

Celluloid containers. Am. Assoc. of Museums, Pub. n.s. no. 3, pp. 14-15 (1927).

An annotated list of the butterflies of San Diego County, California. Trans. San Diego Soc. Nat. Hist., vol. 6, no. 1, pp. 1-40, 1930.

E. O. Essig.

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The number of Entomological News for December, 1933, was mailed at the Philadelphia Post Office on December 27, 1933.

[1] Gunder, J. E., Ent. News, vol. 40, pp. 34-35, portrait, (Plate II) February, 1929.

In Memoriam, Bul. So. California Acad. Sci., vol. 32, p. 129, 1933.

[2] Mr. Wright furnished much of these data in 1930.

# EXCHANGES

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

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

**Wanted**—Names and addresses of those desiring insects from Wisconsin. Will collect in all orders from May to October. Correspondence invited. George Kettler, Platteville, Wis.

**Wanted**—Names and addresses of those desiring Coleoptera, Lepidoptera and Hymenoptera of Pennsylvania and New Jersey. R. C. Casselberry, 71 E. Price Ave., Lan downe, Pa.

**Exchange**—Texas Orthoptera. F. B. Isely, Trinity University, Waxahachie, Texas.

**Wanted**—Names and addresses of those desiring insects from Colorado. Charles H. Hicks, P. O. Box 262, Boulder, Colorado.

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Vol. XLV No. 2

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1866-1929.

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, Sc.D., John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

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# ENTOMOLOGICAL NEWS

VOL. XLV. FEBRUARY, 1934 No. 2

## October Bee-collecting in Colorado (Hymenoptera : Apoidea).

By T. D. A. COCKERELL, University of Colorado, Boulder, Colorado.

The season being unusually fine and warm, on October 1, 1933, we (Mr. and Mrs. Chas. Wagner, Mr. and Mrs. Cockerell) went to Hudson, Colorado, in search of bees. The locality is out on the plains, in Weld County, at an altitude of 5000 feet. We obtained a good series of bees, all at *Grindelia*, except a single *Dianthidium* on *Helianthus petiolaris*. The collection is sufficiently interesting to be worth recording.

APIS MELLIFERA CARNICA Pollm., one.

APIS MELLIFERA LIGUSTICA Spin., common.

MEGACHILE BREVIS Say, one female, no pollen collected.

DIANTHIDIUM SAYI Ckll., both sexes.

EPEOLUS PUSILLUS Cresson. One female, with axillae red at end. Either this species is very variable, or as now accepted, it includes more than one thing. I have not sufficient material to reach a definite decision.

AGAPOSTEMON ANGELICUS Ckll. Described from Angel de la Guarda Island, Lower California, but it proves to be widespread in the west. I recently found it nesting on the outskirts of a colony of *Diadasia australis* Cresson, near Denver. Two males were taken at Hudson.

HALICTUS PARALLELUS Say. One female, a variety with black femora. This species is common in Kansas, but rarely taken in Colorado.

HALICTUS LIGATUS Say (ARMATICEPS Cresson). Two males.

**Halictus (Evylaeus) grindeliae** sp. n.

♀. Length about 6 mm., anterior wing 4.7; pure black, including legs and antennae, the last three joints of flagellum obscurely brownish below; hair of head and thorax scanty, greyish white; head broad but rather elongate, the orbits converging below; clypeus with lower half highly polished, with a strong median depression, upper half dull; supraclypeal area shining; sides of face with thin dull white hair; vertex shining;

mesothorax bare and highly polished, with excessively fine punctures; region of tubercles very hairy; scutellum shining, not depressed in middle; postscutellum not covered with tomentum; area of metathorax large, dullish, with a narrow shining margin; the microscope shows the area to be covered with very irregular, not dense, wrinkles, which reach the margin, while the apical margin is broadly truncate (not angulate as in *H. pectoraloides*); rim of posterior truncation of metathorax failing above; tegulae rather large, elongate, shining black, not punctured, except for a few weak piliferous punctures in front; wings clear hyaline, iridescent; stigma large, dark reddish brown; nervures light brown, outer ones evanescent as usual in the subgenus; first recurrent nervure meeting intercubitus; legs with greyish-white hair; spurs light red, hind spur with about five strong spines; abdomen broad, highly polished, the margins of the tergites not at all pallid; first tergite not evidently punctured; no hair-spots on first tergite; second and third with elongated patches of white tomentum at each side of base; apex with thin white hair. Under the microscope the mesothorax and scutellum show scattered punctures of different sizes. There is no deep median groove in mesothorax, such as exists in *H. macoupinensis* Rob., to the vicinity of which it runs in Crawford's table. It is more like *H. divergens* Lovell in the shape of head (but head is broader than in *divergens*), but that differs at once in the area of metathorax, which has the very delicate plicae confined to the basal part except at sides. *H. pectoraloides* Ckll. is a very similar species, but with a much lighter stigma, and different metathorax. The area of metathorax is quite different from that of *H. glabriventris* Crawf.

*Type*. From Hudson, Colorado, October 1, 1933. In the author's collection.

Xenoglossodes excurrens Ckll. One female; eyes in life blue-grey.

**Melissodes octobris** sp. n.

♀. Length about 10.5 mm., anterior wing 8.2; black, with pale, faintly tawny hair, sooty or black at end of abdomen, and black on inner side of hind tarsi, but white on inner side of hind tibiae; flagellum red beneath except basally, the ends of the joints dusky; tegulae very dark brown, with light hair; wings hyaline, suffused with reddish; eyes pure black, but drying to pale grey. This is a species with a very broad short head and very wide face, like *M. pallidicincta* Ckll., of which I should consider it a

variety, but for the fact that the first tergite (except the depressed apical portion) is very distinctly though finely punctured, as seen under a lens, and is also moderately shining, whereas in *M. pallidicincta* (and also its var. *erythrina* Ckll.) this part is dull and not distinctly punctured. The clypeus is dull and very densely punctured all over, not shining in middle as in *pallidicincta*. The punctures are dense and more regular than in *erythrina*, but it agrees with that form in having a distinct though delicate median raised line. Sides of face rather dull, very hairy; supraclypeal area smooth and shining; each side of vertex with a broad shining basin; no dark hairs on head or thorax above; disc of mesothorax posteriorly polished and sparsely but strongly punctured; scutellum shining, but more punctured than in *erythrina;* posterior truncation of metathorax dull, but with a pair of shining foveae at lower end (in *erythrina* represented by narrow shining bands, and about the same in *pallidicincta*); venation as in *pallidicincta;* scopa of hind legs very large, full of the bright orange *Grindelia* pollen (the type of *erythrina* has collected red pollen); abdomen broad, hind margins of tergites brownish; declivity of first tergite with white hair; bands at base and middle of second tergite, and middle of third and fourth; depression of second tergite broader (antero-posteriorly) than the raised part above. The rather broad whitish margin of first tergite of *pallidicincta* (and *erythrina*) is replaced by a mere line. The abdominal bands appear to be feebly developed, but they would doubtless appear stronger in a freshly-emerged specimen, though surely not as in *pallidicincta*. The hair of sides and under parts of thorax is all light. In Robertson's (1905) table this runs out at 16. It is easily distinguished from the superficially similar *M. confusiformis incondita* Ckll. by the reddish wings, highly polished disc of mesothorax and distinctly punctured first tergite. From *M. glenwoodensis* Ckll. it is known by the shape of head, light hair on inner side of hind tibiae, and other characters. In my table of 1906 (Trans. Am. Ent. Soc.) it runs to group K, and under this to 6.

*Type*. From Hudson, Colorado, October 1, 1933. In the author's collection.

Also at Hudson, we took the coccid *Amonostherium lichtensioides* (Ckll.) on *Artemisia;* and galls of *Aylax pisum* Walsh on *Lygodesmia juncea*. An asilid fly taken has been determined by Mr. M. James as *Erax bicaudatus* Hine.

## Records of Ampulicidae (Hymenoptera : Sphecoidea).

By J. Chester Bradley, Cornell University, Ithaca, New York.

As definite records of capture of species of Ampulicidae are not frequent in literature, it has seemed worth while to record some species which I have recently had occasion to determine for the collection of Cornell University.

Ampulex canaliculatus Say.

1823. *Ampulex canaliculatus* Say. Western quarterly reporter, 2:76.

1844. *Rhinopsis abbottii* Westwood, ♀. Arc. entomol. vol. 2, p. 68, fig. 5.

1849. *Ampulex pennsylvanicus* Haldeman. Proc. Acad. Nat. Sci. Phila. 4:203.

1912. *Rhinopsis melanognatha* Rohwer, stated as ♀, but actually ♂. Proc. U. S. Nat. Mus. 41:464.

1929. *Rhinopsis caniculatus* Williams. ♀ ♂, Proc. Haw. Ent. Soc. 7:318-29, Figs. 2-5.

Williams, (*loc. cit.*) considers that *melanognathus* Rohwer, actually described from the male sex, is identical with reared males of *canaliculatus*. *Abbottii* and *pennsylvanicus* are usually considered synonyms, and probably are so, but specimens are exceedingly rare, and so far as I am aware no one has ever assembled any considerable number from various localities for careful comparison in order to see whether we have more than one species or not. Say's description of 3 frontal carina does not agree with my specimen, but the difference may be sexual. Williams bred both sexes, and figures the clypeus of each, but he does not otherwise describe characters that might be diagnostic.

Williams, (*loc. cit.*) gives a very valuable account of the habits of the species.

*Abbottii* is the type of Westwood's genus *Rhinopsis*, based on the single character of possessing 2 instead of 3 closed cubital cells. Kohl, besides pointing out the variability of this character, believes that several of the species normally with 2 submarginals have their closest relations not with each other but with species with three cells. Of course, if this is a fact, *Rhinopsis* is not tenable even as a subgenus.

*Habitat:* According to Williams, generally distributed in the United States west of the Mississippi, ranging into Canada. I expect that it is an austral form, and that if it ranges into Canada, it is probably only in the Carolinian area along Lake Erie. Actual records known to me are as follows:

CONNECTICUT: Manchester, 1 ♂, Sept. 13, '10 (A. B. Champlain, type of *melanognathus*). NEW YORK: Long Island, Central Park and Yaphank. PENNSYLVANIA: (type of *pennsylvanicus*). VIRGINIA: Falls Church, 1 ♂, May 10, '24 (Kearney—C. U.). GEORGIA: (type of *abbottii*). MISSOURI: (type locality); Webster Groves, 1 ♀, June 12, '28 (F. X. Williams).

AMPULEX LAEVIGATA Kohl, PHILIPPINE IDS.: Saman, 1 ♀, June 21, '24 (R. C. MacGregor—C. U.).

AMPULEX NEOTROPICA Kohl, COSTA RICA: Tres Rios, in extreme southeastern part, 1 ♀, 3 May 1924 (the author—C. U.).

AMPULEX DUBIA Kohl, TRINIDAD: Port of Spain, 1 ♂, 1 Oct. 1920, (W. T. M. Forbes—C. U.).

AMPULEX ERYTHROPUS Kohl, SARAWAK: Kutching, 1 ♀, (F. W. Foxworthy—C. U.).

AMPULEX PILIPES Kohl

Described from Guinea, and evidently unknown to Arnold who (the Sphegidae of South Africa, part 9. Ann. Transvaal. Mus. 1928. 12:2) quotes Kohl's description. PORTUGESE EAST AFRICA: Lourenço Marques, 1 ♂, May 1915 (H. Junod—C. U.).

AMPULEX SAGAX Kohl. Described without knowledge of the region which it inhabits. BRITISH GUIANA: Bartica, 1 ♀, 4 March, '13 (H. L. Parish—C. U.).

AMPULEX SURINAMENSIS Sauss. BRITISH GUIANA: Bartica, 1 ♀, 23 Jan., '13, and Demerara River, 1 ♀, 18 March, '13 (H. L. Parish—C. U.).

DOLICHURUS GREENEI Rohwer

1916. Proc. Ent. Soc. Wash. 18:212-13.

♂. Black; clypeus and rim of frontal platform, mandibles except tips, and pronotal tubercles whitish testaceous; tibiae and tarsi testaceous; antennae brown, paler beneath. Vestiture silvery. Wings nearly hyaline. Length 5.5 mm.

Clypeus but slightly, broadly convex, (not strongly swollen as in *corniculus*), its end broadly rounded, almost truncate with a slightest suggestion of a median tooth, without lateral teeth

or tubercles, (in *corniculus* with a median tooth, and on each side a tubercle), its disc without a median carina (present and sharp in *corniculus*); frontal platform horse-shoe shaped, prominently overlying the bases of the antennae, depressed medially at base, its arms not extending upwards as carinae; no median facial carina (present in *corniculus*); front to the height of the ocelli closely shallowly and rather finely reticulate-punctate, vertex smooth, polished, with few sparse, small punctures; cheeks shining with only a groundwork of minute setigerous punctures, except toward the mandibles where they are more coarsely punctate; mandibles broad, short and with a broad inner tooth. Antennae exceptionally long and slender, the scape angularly subcylindrical or somewhat clavate (not strongly expanded and flattened as in *corniculus*), third segment a little shorter than the fourth.

Dorsal surface of collar short and very transverse (much more so than in *corniculus*), with two prominent, transverse white tubercles at the middle of each side, interrupted medially by a weak depression (in *corniculus* the lateral prominences are placed more posteriorly and slant obliquely backward, most pointed at their apices, and otherwise differently shaped, and the dorsal surface of the collar shapes less abruptly into the anterior); anterior and dorsal surfaces of collar with some fine transverse striae, replaced by punctures on the tubercles; mesonotum shining and with scattered fine punctures, with a median longitudinal furrow (absent in *corniculus*) between the deep parapsidal furrows; scutellum with somewhat denser, small punctures; mesopleura shining, with evenly spaced, fine punctures, above with an irregular slightly sunken, sharply delimited area (replaced in *corniculus* by a convex area crossed longitudinally by a groove); no trace of an episternal suture (present in *corniculus*); anterior and posterior surface of propodeum irregularly reticulate.

Abdomen with three exposed segments, highly polished and evenly very sparsely minutely punctulate, the sutures strongly constricted.

*Allotype*—Cornell University number 1113.1.

*Distribution*—ONTARIO: Gull Lake, Muskoka District, 1 ♀, July 21, (H. L. Parish—Cornell University. PENNSYLVANIA: Lehigh Gap, 1 ♂ (allotype) July 25, 1903 (the author). VIRGINIA: Falls Church, 1 ♀, 18 Aug. (N. Banks—Mus. Comp. Zool.) also 1 ♀, Sept. 15 (holotype). GEORGIA: Toccoa, 1 ♂, 18 Aug. '09 (the author—Cornell University). FLORIDA: Palatka, 1 ♂, (the author).

## Lepidoptera from a Maine Bog.

By L. P. Grey, Lincoln, Maine.

The Lepidopterist who resorts to Maine for his summer's recreation should by all means contrive to pay a visit to the Passadumkeag Bogs. This grand collecting territory lies in Penobscot County, forty miles north of Bangor, near the Aroostook Trail; the bogs are one mile from Passadumkeag on the forest road between that town and Enfield.

I have collected in Maine for over ten years, and have found no other place where, in the proper season, there is such a concentration of insect life. Many of the species found there are rare in other localities, or at least not very common. I append a few records by way of example.

*Oeneis jutta* has been largely a myth in Maine since Fernald made his records many years ago. With the draining of the Orono-Stillwater Bog, to provide the University of Maine with an athletic field, the insect was deprived of its natural habitat, and is presumably extinct in this, a once-famous locality. I tried many times to rediscover this species, but without success until in 1929 an early June trip to Passadumkeag yielded two males. June 19, 1932, found me again on the bogs, and the day's chase was rewarded by over a dozen pairs, many of which I confess were battered. *Jutta* is a very active insect, and its structural fragility makes it a species that must be taken soon after emergence if one is to procure good specimens. I believe that anyone visiting these bogs the second week in June would be fairly sure of a few good pairs.

By the second week in July the place is covered with swarms of butterflies. *Chrysophanus epixanthe*, *Colias interior*, *Argynnis cybele* and *atlantis*, *Basilarchia arthemis*, *Satyrodes eurydice*, and *Atrytone bimacula* are common; many bog-loving Geometrids such as *Isturgia truncataria*, *Ematurga amitaria*, *Metarranthis obfirmaria*, and many others, are present in quantity. A great carnival of Microlepidoptera flutters at the lower levels.

I took one male *Samia columbia*, in the daytime, June 19,

1932. The bogs are more or less covered with stunted larch growth, and doubtless *columbia* is well established there.

Theclas are a great rarity in Maine, but diligent search early in the season will uncover a few species. There is an *Erora laeta* record, made a few miles from the bogs, in similar territory, and it is to be expected that some day another of this almost fabulous species may be captured here.

Night work, with "sugar" and light should yield fine catches in the nocturnals; for instance, *Sphinx canadensis* and *Proserpinus flavofasciata* both have been taken near Passadumkeag. I have found the larvae of *flavofasciata* there on *Epilobium*.

While I cannot guarantee that a casual visitor would take all these fine things, yet, given favorable weather, a few days spent in and around this bog should yield good catches. As previously stated, it is the best collecting ground that I have discovered. I have many good records from western Maine, and other parts of the state, but none of the other places seem to offer such a variety and *quantity* as may be secured from the Passadumkeag Bog region.

A warning to prospective visitors: Before packing a net, first be sure that you have put in a pair of knee waders and a goodly supply of "fly-dope." These two items are the most important part of one's outfit.

## A Calendar of Ozark Butterflies, Lake Taneycomo Region, Missouri.

By Mrs. Vitae Kite, Hollister, Missouri.

It has been suggested by some of my entomological friends that I add my bit of observation regarding the butterflies of the Ozarks, in the Lake Taneycomo region, at Hollister, Missouri.

The following is a kind of calendar, taken from my note book kept during the past twelve years. The records show some variations in different years, yet average about the same except for 1932. The season of 1932 was preceded by an abnormally warm winter and a majority of our native species developed in

January and February, before the plant food appeared, resulting in no succeeding broods, as the larvae of course perished. From May until August we had practically *no* butterflies. After August, some late summer species came, but of *Dione vanillae, Danaus berenice* and *Aglais antiopa*, none at all.

My names are taken from Holland, except where otherwise mentioned from Comstock. The arrangement of genera is alphabetical.

ACHALARUS LYCIDAS hovers over the Zinnias in June and all through the late summer.

AGLAIS ANTIOPA is found early in March and again in August. They are not common as one seldom sees more than half a dozen during a season.

ANAEA ANDRIA is one of the earliest, appearing any sunny day through the winter, and like other hibernating species, is on the wing in early March. They are again numerous in late fall under the wild grape vines, and about persimmons on which they feast.

ANTHANASSA TEXANA appears in August, and I have taken them in October. Some were seen in early March, 1932.

ARGYNNIS CYBELE arrives in April; rather small at first but much larger specimens are found as summer advances. Not many after September.

A. BREMNERI comes in late June. Found them in February, 1932, but no more that season.

A. DIANA appeared in August, 1925. After taking a dark female, the third day thereafter the male appeared. This species is very rare.

ASTEROCAMPA CLYTON is seen in June, basking in the sun, with wings spread wide. It is scarce after August.

A. MONTIS appears in May and continues through October.

ATALOPEDES CAMPESTRIS is with us from June until late October.

BASILARCHIA ARCHIPPUS appears about May 20. It is with us until late October.

B. ASTYANAX was very rare in 1924 as I saw one only in June. Each year they have increased in numbers and now I find them until late October. They come to over-ripe bananas in numbers.

CALLIDRYAS EUBULE is on the wing from June until November.

CALLIDRYAS PHILEA appeared September 20, 1928, also October 1929.

CATOPSILIA THALESTRIS on October 10, 1929. Again in September, 1930.

CERCYONIS ALOPE are found in early June and continue until October.

C. NEPHELE appears in June and until October.

COLAENIS CILLENE was taken September 17, 1928. Very rare.

COLIAS EURYTHEME appears early in March and persists until November.

CYANIRIS LADON (Comstock) is a March visitor. Another brood, and in different coloring, persists until October.

DANAUS BERENICE is also a July visitor. Rather scarce.

DANAUS PLEXIPPUS is seen in early April. A scattering few through summer, and in large numbers during September and October.

DIONE VANILLAE comes in July, and I have taken them on November 28.

ENODIA CREOLA is found in August and late in September.

ENODIA PORTLANDIA is found in April and until late October.

EPARGYREUS TITYRUS appears in late April and through the summer.

EUCHLOE GENUTIA is a March visitor. Specimens occur for a few weeks then no more, being single brooded.

EUPTOIETA CLAUDIA appears in June and continues until late November.

EUPTYCHIA EURYTA comes in May, continuing until October.

EUREMA NICIPPE comes in early June, continuing until late October.

E. LISA was found March 8, 1931. It is most abundant in September and until November.

E. MEXICANA is found in July and continues until late October, when it increases in size and takes on a deeper yellow under wing, marbled with brown.

EVERES COMYNTAS (Comstock) appears early in April and until October.

HESPERIA COMMUNIS appears in June and continues until late September.

JUNONIA GENOVEVA first seen in early July; they continue until November.

LIBYTHEA BACHMANI taken May 19; they continue until late September.

MELITAEA PHAETON appears in July. Very rare. Have never seen one after August.

M. HARRISI is found April 1, but more plentiful in August.

NATHALIS IOLE is abundant from August until November.

PAPILIO AJAX. The spring form appears March 20, the summer form follows in June. Very rare after September.

P. CRESPHONTES comes in July, disappearing after September. One was taken on April 3, 1932, but no more that summer.

P. PHILENOR is an early March visitor and continues through November, or until freezing weather.

P. POLYXENES comes in early March. It appears again in August and September.

P. TROILUS appears in April and continues all through summer until late September.

P. TURNUS appears in early March, becoming scarce through June and July. Again in August we have a larger, more beautiful brood, with many black dimorphic females in evidence. A few in September.

PHOEBUS AGARITHE taken September 20, 1928. Very rare.

PIERIS PROTODICE was taken February 4, 1931. It was the first butterfly of the spring that year. Other years it appeared in March, but is rather rare at all times throughout the summer.

P. RAPAE is a March butterfly. Comes early and stays late. It occurs until late November, or until freezing weather.

POLYGONIA FAUNUS found June 21, 1929. Not many seen.

P. COMMA comes in early March, then again from July to October.

P. HYLAS appears in June and remains until October.

P. INTERROGATIONIS, both light and dark forms appear in March and persist until November.

P. PROGNE (Comstock) was taken April 15. Very scarce from June until August; abundant from August to November.

RUSTICUS SCUDDERI (Comstock). An early April blue, rather scarce after June.

THANAOS MARTIALIS appears in early March and continues throughout the summer.

THECLA MELINUS (Comstock) is seen through August and until October.

VANESSA ATLANTA comes March 2 and continues all summer until November.

V. CARDUI appears June 1 and is common until November.

V. VIRGINIENSIS is on the wing from April until November.

ZERENE CAESONIA is found in early March but is scarce until June, when it becomes numerous and remains until late November. This butterfly undoubtedly hibernates, as for years I have seen them throughout the winter on sunny days, like *Anaea andria* and others.

## A New Species Related to Agromyza virens Loew (Dipt.: Agromyzidae).

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

**Agromyza angelicae** n. sp.

A medium to large size species, 2.5 to 3 mm.

♂ : front, face, cheeks, palpi, antennae, mesonotum, scutellum and halteres largely black or dark brown.

Front and orbits concolorous subshiny black, front together with orbits distinctly wider than either eye, front scarcely twice as wide as either orbit, orbits therefore broad and only slightly narrowed below; six strong pairs of fronto-orbitals, orbital hairs abundant and arranged in several rows extending below the lower pair of fronto-orbitals; frontal lunule large and deep, reaching nearly half-way to the vertex of the head; antennae separated by a carina, a distinct ridge between the eye and the base of the antennae almost equal in width to the length of the third antennal segment; this ridge continues around the lower margin of the eye and onto the cheek; cheeks brown, less than one-fourth the eye height, narrowed in front and behind; ocellar triangle scarcely discernible, a faint triangle extends to the frontal lunule, a few minute hairs between the ocellar bristles; antennae entirely brown, second segment with a dorsal bristle, third segment rounded and about as long as broad, tipped with sparse whitish pile; arista nearly bare, about four times as long as the third antennal segment, distinctly thickened on the basal fourth; palpi black normal in shape, beset with black hairs; proboscis and hairs brown; one strong pair of oral vibrissae, accompanying setae along the edge of the cheek distinctly smaller; occiput shiny black, setae about edge small and arranged in several rows; eyes distinctly hairy above especially near the margin of the orbits.

Mesonotum, scutellum and pleurae subshining black, pleural sutures and base of wings only narrowly brown; two pairs of dorso-central bristles; one strong presutural, one strong intraalar; acrostichals numerous, arranged in six or eight rows and extending almost to the scutellum; intraalar hairs also numerous and in three or four rows; one strong propleural bristle, one strong mesopleural with smaller accompanying setae, one strong sternopleural bristle with smaller accompanying setae; scutellum with four bristles.

Legs shiny black, knees not at all yellow or lighter in color, mid tibia with a distinct pair of posterior bristles located near the middle.

Abdomen shining green, setae black.

Wings elongate, rounded at the tip, auxiliary vein terminating in vein one, costa thickened at this point, costa reaching to the fourth vein, third and fourth sections of the costa about equal, anterior and posterior cross-veins nearly parallel, the posterior crossvein about its length from the anterior crossvein, anterior cross-vein distinctly before the middle of the discal cell, the last two sections of the fifth vein as 1 :¾ ; halteres brown; calypteres grey, margin and fringe pale brown.

♀ : resembles male but the orbits are slightly broader and more hairy; eyes feebly hairy above, setae on the posterior margin of the last abdominal segment are long and conspicuous, ovipositor shiny black with faint transverse ridges and minute hairs above and below, hairs at the tip of the basal segment of the ovipositor long but slender, ovipositor when extended about one and a half times as long as the last abdominal segment.

*Holotype* ♂, reared as a stem miner on *Angelica atropurpurea*, Ithaca, New York, A. S. Mills. 54 paratypes as follows: 5 ♂ and 4 ♀ Pacific Grove, California, 1906, J. M. Aldrich, 17 ♂ and 28 ♀ Ithaca, New York, 1906, A. S. Mills reared as a stem miner on *Angelica atropurpurea*. The holotype will be deposited in the United States National Museum at Washington, D. C., some paratypes in the Academy of Natural Sciences at Philadelphia.

This species runs to *virens* Loew, in Malloch's key (1913) but may be separated by the six strong fronto-orbitals and the large frontal lunule.

## New Species of Wasps from North Carolina (Hymenoptera, Psammocharidae).

By C. S. Brimley, Entomological Division, North Carolina Department of Agriculture, Raleigh.

**Ageniella adara** n. sp.

♂. Black, silvery sericeous; antennae reddish below; last abdominal segment white at base with heavy white pile; legs mostly black, the front tibiae within, middle femora at apex, and hind femora except at base and extreme apex, rufous; wings hyaline definitely tipped with dusky; third cubital cell longer than high; length 7 mm. Two paratypes have a little less red on the legs.

*Type*, male, Raleigh, North Carolina, September 1, 1930, C. S. Brimley; *paratype* males, September 6, August 24, 1930, same locality and collector.

Resembles *aludra* Brimley but has front wings tipped with dusky (evenly hyaline in *aludra*), has more red on the legs, and the third cubital is longer than high and larger than the second, (in *aludra* higher than long and smaller than second). In Banks' key runs to *petiolata*, but differs from Cresson's description by having the legs partly red.

**Ageniella julia** n. sp.

♂. Black, silvery sericeous, the first two segments of the abdomen and the greater part of the legs reddish yellow. Hind tibiae and four hind tarsi dark brown and a black stripe on outer side of four hind coxae; all tibial spurs white. Wings hyaline slightly but not sharply dusky at tip. Second and third submarginals little if at all wider than high, only slightly narrowed above, the third distinctly the longer. Second submarginal receiving first recurrent a little before middle, third receiving second recurrent in middle; longest spur of hind tibiae more than three-fourths length of its metatarsus.

Runs in Banks' key to couplet 6, and in that couplet agrees best with *apicipennis* Bks, but differs in the face and antennae being wholly black, in lacking the black tip to the wings and in the third submarginal cell being distinctly longer than the second.

*Holotype*, male, Raleigh, North Carolina, June 21, 1932, C. S. Brimley, collector.

**Ageniella subra** n. sp.

♂. Black, silvery sericeous, all spurs and spot on last abdominal segment, white; wings hyaline tipped with dusky. Second and third cubital cells about twice as long as high, the third receiving the second recurrent before the middle; in forewing nervulus slightly beyond cubitus, in hind wing nervellus much before cubitus. Length 5 mm. A paratype male lacks the white spot on the last abdominal segment.

*Type*. Male, Raleigh, North Carolina, September 23, 1930, *paratype* male, Raleigh, September 14, 1931, both taken by myself.

In Banks' key runs to *virginica*, but differs in having second recurrent vein received by third cubital before, not beyond,

middle and in having a fine impressed line from antennae to ocelli.

**Priocnemis gomelza** n. sp.

♀, black, first, second and third abdominal segments rufous above, and the second also below, their apices more or less darkened; legs, antennae and wings black. Pronotum strongly angulate behind; nervulus nearly twice its length beyond basal vein, nervellus well before cubitus; second and third cubital cells about equal, longer than high; hind tibiae with about ten serrations, the hairs about as long as the serrations, the numerous spines overtopping both. Length 12mm. (abdomen curved under). Another female is similar but the hind tibiae have only four serrations near the base and another at about apical three-fourths.

*Type*, female, Raleigh, North Carolina, early April, F. Sherman collector; *paratype* female, Raleigh, April 5, 1929, T. B. Mitchell.

Of those in Banks' key, this species is nearest to *validus* Cr., but differs in smaller size, wholly black antennae, and wing venation.

The types of the new species described in this paper are in the collection of the North Carolina Department of Agriculture, at Raleigh, N. C.

## A Tropical Moth in Connecticut (Lepid.: Sphingidae).

On August 25, there was brought to my laboratory a large sphinx moth caught by Mr. A. F. Hooghkirk, an attendant at a gasoline filling station in New Haven. He had never before seen one like it and was anxious to have it identified. It proved to be *Pseudosphinx tetrio* Linn., a species occurring in South and Central America, the West Indies and southern Florida. Just how this moth reached Connecticut is a matter of speculation. For two or three days before it was caught, there had been a heavy storm with strong southerly and easterly winds having a velocity of between 30 and 40 miles an hour. Yet the specimen was fresh and not battered as wind-borne moths are apt to be. I am told that these moths sometimes hide in cargoes of bananas and may be transported long distances before they leave the ship. Possibly this may explain the presence of this moth in Connecticut. Dr. William Schaus of the United States National Museum writes that he believes this to be the northernmost record for this tropical species.—W. E. Britton, Agricultural Experiment Station, New Haven, Conn.

## The Emergence and Nymph of Gomphus militaris (Odonata, Gomphinae).[1]

By R. D. Bird.

*Gomphus militaris* Hagen is a common species in western Oklahoma. Its favorite habitat is about small muddy ponds and stagnant pools of streams. The nymphs are burrowers in the mud which often becomes so thickly encrusted on their skins that it completely hides them. About the water the males are more abundant than the females. They usually fly close to the shore line about six inches above the water, frequently alighting on the muddy banks holding the abdomen slightly elevated and wings horizontal. The female oviposits unattended, by tapping in shallow water with the tip of her abdomen. While so occupied she is usually found by a male who grabs her and they fly off copulating in flight to alight in the grass a short distance back from the pond.

The main emergence in 1932 in Oklahoma was in the middle of May. On the tenth I observed and photographed all the stages of emergence of a female nymph. At 9:46 A. M on a warm clear morning the nymph was seen to crawl from deeper water to the shore. It was restless and seemed to find difficulty in getting a satisfactory place to emerge, sometimes coming out of the water completely and then going back. It finally came to rest at the very edge with only its back above water. Here it rested for ten minutes before there was a twitching of the wing pads which caused the skin to split. A minute later the head appeared through the slit and in four minutes the thorax and first half of the abdomen. The fore part of the abdomen was bent vertically, thorax slightly forward and legs folded. After resting for four minutes it reached down and with one motion pulled out the rest of the abdomen and stood erect on the exuviae. The abdomen and wings grew rapidly. The wings were at first milky and wrinkled, then they were observed to slowly unfurl from the base outward. They grew more rapidly than the abdomen which they exceeded in length by one-quarter of an inch at 10:28, six minutes after the abdomen was pulled free. By 10:31 they were completely

[1] Contribution No. 116, Department of Zoology, University of Oklahoma, Norman.

unfolded. The abdomen continued to grow and by 10:35 was one-sixteenth of an inch longer than the wings. The teneral now rested with wings folded over the back for twenty-seven minutes. At intervals a drop of clear liquid was exuded, eighty-nine in all. At 11:03, one hour and seventeen minutes after the nymph left the water, the teneral suddenly flew into the vegetation on the bank without any warning or spreading of wings and was lost. The photographs and notes however were sufficient to identify it without doubt.

As the nymph is apparently undescribed, the following description was drawn up from the exuviae.

The drawings accompanying this paper were made by Mr. O'Reilly Sandoz.

GOMPHUS MILITARIS nymph (described from female exuviae): Length 34 mm. General color grey-brown, darker on wing pads and head, but so obscured by mud as to be scarcely visible.

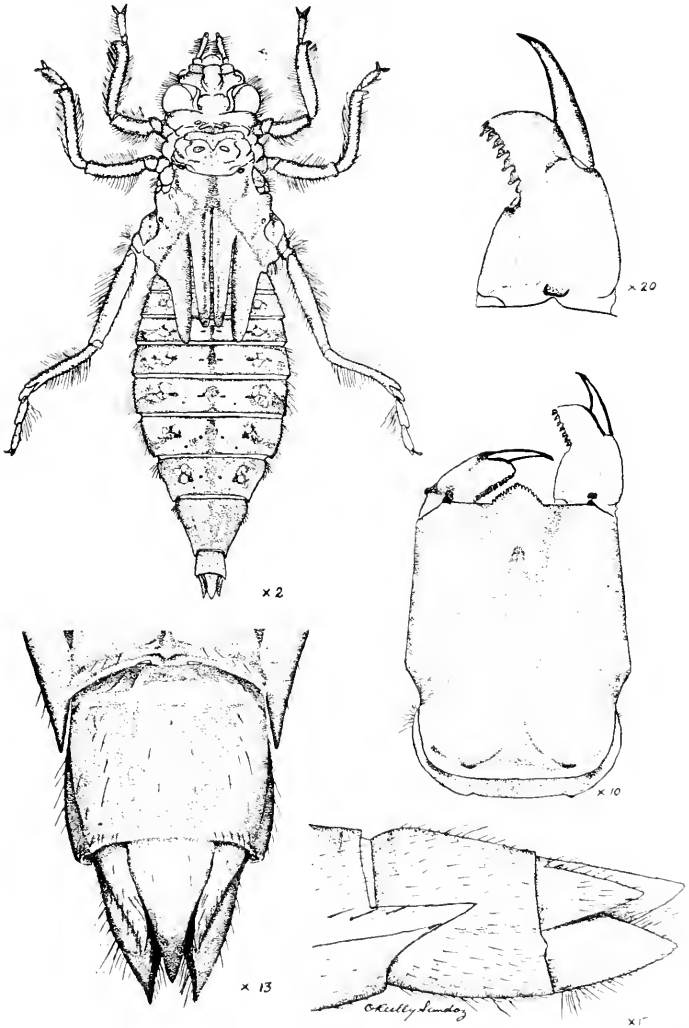
*Head* slightly concave behind, postero-lateral corners rounded, eyes not prominent, twice as wide as long. Third joint of the antenna one and one-half times as long as the first two joints together, slightly enlarged distally, proximal half fringed on the outside with hairs two-thirds as long as the joint, fourth joint rudimentary. Long hairs fringing the eyes antero-ventrally. Mentum of labium a third longer than wide, constricted in its basal one-third beyond which it is parallel-sided, hinge scarcely reaching to the hind margin of the precoxae. Median lobe about one-quarter as wide as the entire distal margin, rounded and with a short spine at the apex. Labial palpi but little curved, the inner margin slightly curved and with six well-developed teeth.

*Thorax*. Inner wing pads reaching to the middle of fourth abdominal segment, the outer a little longer. Lateral margins of legs and thorax fringed with long hairs.

*Abdomen* broadest at segment 4, barely narrower at 5, tapering evenly to 10, which is parallel-sided. Tergal surface with a median ridge but with no dorsal teeth. Measured mid-dorsally, segment 9 is about one-third longer than 8, its apical width about one-half the basal width. Lateral spines on 9 only, but reaching almost to the middle of 10. Segment 10 about two-thirds the length of 9. Anal pyramid a little shorter than 10; epiproct (median appendage) a little shorter than paraprocts (inferior appendages) and a little longer than the cerci.

*Measurements.* Total length, exclusive of antennae, 34 mm.; antennae 2; abdomen 22.5; hind wing 8; hind femur 7; width of abdominal segment 5, 9.4.

The specimen from which this description is made is deposited in the Museum of Zoology, University of Oklahoma.




Female nymph last instar; left labial palpus; labium, ventral view; dorsal view of abdominal segment 10 and anal pyramid female nymph; lateral view of abdominal segment 10 and anal pyramid female nymph.

# ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., FEBRUARY, 1934.

## ENTOMOLOGY AT THE CONVOCATION WEEK MEETINGS, DECEMBER 27, 1933, TO JANUARY 2, 1934.

Our annual summary of the entomological items of the programs of the American Association for the Advancement of Science and Associated Societies, held at Boston and Cambridge, Massachusetts, follows:

The number of papers bearing on insects, including those in symposia and non-duplicating demonstrations were:

| | |
|---|---|
| *Entomological Society of America | 42 |
| American Association of Economic Entomologists | 128 |
| *American Society of Zoologists | 23 |
| *American Society of Parasitologists | 7 |
| American Phytopathological Society | 2 |
| *Genetics Society of America | 23 |
| American Society for Horticultural Science | 1 |
| Potato Association of America | 1 |
| *Total | 227 |

These papers were distributed in subject as follows:

| | | | |
|---|---|---|---|
| General Entomology | 4 | General Economic Entomology | 13 |
| Collecting and Rearing Methods | 1 | *Insecticides | 37 |
| *Entomological Instruction | 7 | Apiculture | 12 |
| *Cytology | 8 | *Insects Affecting Man | 2 |
| *Embryology and Life History | 6 | * do. Other Animals | 3 |
| *Anatomy | 8 | * do. Cereals and Field Crops | 16 |
| *Physiology | 29 | * do. Truck Crops | 18 |
| *Ecology | 11 | do. Ornamental and Greenhouse Plants | 3 |
| Behavior | 1 | do. Fruits and Fruit Trees | 18 |
| Geographical Distribution | 5 | * do. Forest and Shade Trees | 13 |
| *Variation | 3 | * do. Stored Products | 1 |
| *Genetics | 18 | *Insects Carrying Plant Disease Germs | 5 |
| Evolution | 2 | | |
| Taxonomy | 2 | | |
| *Parasites of Insects | 13 | | |

ii

Acarina ..... 2
*Myriopoda ..... 2
*Thysanura ..... 1
*Orthoptera .....20
*Dermaptera ..... 1
*Isoptera ..... 3
*Odonata ..... 2
*Homoptera .....16
Heteroptera ..... 1
Thysanoptera ..... 5
Neuroptera ..... 1
Trichoptera ..... 1
*Coleoptera (excluding Japanese Beetle) .....23
Japanese Beetle ..... 1
Hymenoptera (excluding Honey Bee) .....13
*Honey Bee .....14
Lepidoptera (excluding Codling Moth, Oriental Fruit Moth and Corn Borers) .....17
Codling Moth .....11
Oriental Fruit Moth .... 2
*Corn Borers ..... 7
Diptera (excluding *Drosophila*) .....20
**Drosophila* .....19

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

The total number of papers at Cleveland, 1930, was 180, at New Orleans, 1931, 185, at Atlantic City, 1932, 212. Increases in numbers of papers over the corresponding figures for 1932 are starred (*).

The Entomological Society of America met on December 28 and 29, in Austin Hall, Harvard University, under the presidency of Mr. R. E. Snodgrass, U. S. Bureau of Entomology, Washington, D. C., Prof. H. B. Hungerford, University of Kansas, Secretary. The annual symposium was on Biological Control.

The Plant Quarantine and Inspection, Apiculture and Extension sections of the American Association of Economic Entomologists met December 27 at the Hotel Bradford, Boston. Sessions of the Association on December 28 and 29 were held in Austin Hall, Harvard University, thus making it possible to pass from one to the other entomological society with little loss of time, a most commendable arrangement. Dr. W. E. Hinds, Baton Rouge, Lousiana, was President; Mr. A. I. Bourne, Amherst, Massachusetts, Secretary; the president's address was on "Some Achievements in Economic Entomology." On December 29 a symposium on the Spray Residue Problem took place.

The Entomologists' Dinner, Thursday evening, December 28, in the ballroom of the Hotel Bradford, Boston, was presided over by Dr. Hinds, who called Dr. W. E. Britton, of New Haven, Connecticut, to act as toastmaster. Dr. C. L. Marlatt, ex-chief, and Mr. L. A. Strong, present chief, of the U. S. Bureau of Entomology, expected to address the diners, but were, regrettably, unable to attend. Dr. W. C. O'Kane and Dr. E. F. Phillips spoke. Dr. Hinds called Mr. Snodgrass to the chair and the latter introduced Dr. F. E. Lutz, American Museum of Natural History, New York, who wittily delivered the annual public address of the Entomological Society of America, entitled "What's the Use." Special mention should be made of the unnamed philologists who produced the trilingual menu and program in parallel columns, Greek, Latin and English.

## An Observation on the Activity of Laccophilus maculosus Say (Coleoptera-Dytiscidae).*

During the summer of 1929, while collecting aquatic beetles on Presque Isle State Park at Erie, Pennsylvania, the following interesting observations were made:

In one of the temporary beach pools numerous small Dytiscidae (*Laccophilus maculosus* Say) were noted. These beetles were most active along the shore margins of the pool in the emergent aquatic vegetation. Approximately sixty beetles were observed feeding upon a small, dead frog. A number of these were collected and thirty were placed on the beach at a distance of about ten feet from the edge of the pool. This was done with the idea of determining whether the attempts of the beetles, to get back to the water, would be aimless or definite. The beetles moved over the hard sand with a crawling and springing type of locomotion that is characteristic of that particular group of Dytiscids. Two of the beetles moved parallel with the shore of the pool and in the direction of the prevailing wind. The other twenty-eight moved directly toward the pond. Although their method of locomotion was somewhat slow,—the last of the beetles reached the water within about five minutes. It was interesting to note that none of these beetles moved away from the water.—JOHN T. GAMBLE, Thiel College, Greenville, Pennsylvania.

* Contribution from the University of Pittsburgh Lake Laboratory.

### Change of name (Odonata: Agrionidae).

Dr. Paul H. Oehser has kindly called my attention to the fact that the name *Rima* used by me recently (Amer. Mus. Novitates No. 664, p. 3, 1933) for a new genus of Odonata—Zygoptera—is preoccupied by Paul Pellary for a new subgenus of mollusks (Abh. Senckenberg Nat. Gs., 30:110, 1910). I therefore change it to the diminutive form **Rimanella.**

J. G. NEEDHAM.

### Another Case of Odonate Migration (Aeshnidae).

On August 28, 1932, I returned to Presque Isle, Pennsylvania, for some late observation and collecting. This day was very cloudy, cool and rainy, but I noticed as I walked through what is called the prairies (sandy section with small bushes) many large dragonflies darted up ahead of me out of the bushes. Some had hidden quite deep in the bushes and when startled, made quite a rustle, so some of these were captured. They were all *Anax junius*. After a short flight they would alight and hide. Nothing was thought of this or the following day (Monday) which was still misting and windy. On Tuesday the sun came out bright, so I was afield early. When I reached the prairies, after visiting several ponds, the air was swarming with dragonflies. They were there in the thousands, flying about 15 to 25 feet above the ground, so it was impossible to capture any just then. They seemed to be flying in a circle, over quite a large area, as if feeding, for soon they would move to another place. I kept following and watching, continuously trying to capture some, but without results. Finally I found a place where they were swooping down past a large bush. I concealed myself here and caught them with ease. As a matter of fact I captured seven *Anax* with one swoop of the net. Probably this lasted for 15 or 20 minutes, then they moved on. Those captured were of both sexes.

I left this wonderful sight to see if there was any activity on the various ponds, but found there was not an *Anax* to be seen.

I had found numerous *Anax* nymphs in Niagara Pond while collecting during the summer, so I thought I would see if these had emerged, but on examination I found them to be as plentiful as ever and not an *Anax* to be seen over this pond.

After watching this scene from 8 A. M. to 12.30 P. M. I had to leave and head my car for Pittsburgh as the Pittsburgh Schools opened the next day.—R. G. EMERY, JR., Pittsburgh, Pennsylvania.

**Thecla siva Edwards** (Lepid.: Lycaenidae).

On June 17, 1933, I had the pleasure of taking a number of specimens of *T. siva* at flowers of *Pentstemon,* at Swissvale, on the Rio Grande, in Fremont County, Colorado. The country is open and dry, and there are many juniper trees (*Sabina*) on which the larvae undoubtedly live. This beautiful little butterfly was described by W. H. Edwards in 1874, the locality being given as Fort Wingate, Arizona, the collector H. W. Henshaw. Fort Wingate is actually in New Mexico. J. A. Comstock has discovered a small and rather pale form in Southern California, *T. siva juniperaria* Comst., and has found the larva on juniper. Holland gives *T. rhodope* Gr. and Rob. (it should be Godman and Salvin) as a synonym of *T. siva,* but Capt. N. D. Riley of the British Museum informs me that this insect (from Sonora) appears to be a good subspecies, *T. siva rhodope.* It is "uniformly pale greyish-brown on the upperside, except for a little fulvous toward the anal angle of the hind wing." *T. blenina* Hewitson, from Mexico, which has been regarded as identical with *T. siva,* is (Capt. Riley tells me) definitely distinct, and is identical with *T. xami* Raekirt as stated by Holland. The various references to *T. siva* in the literature are curiously confused, both as to distribution and synonym.

T. D. A. Cockerell, Boulder, Colorado.

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**Revista de Entomologia.**

I would like to call attention again to the Revista de Entomologia, a South American journal, now in its third year, edited by Fr. Thomaz Borgmeier, O. F. M. This journal is maintaining a very high standard in every respect and deserves support. The editor writes me:—

> "The financial side of my undertaking makes me a great deal of worry. I receive not a particle of state support and unfortunately have not enough subscribers to cover the outlay. The Revista is a crying necessity and I receive all the time more manuscripts that I can print. I have scarcely 200 subscribers and I am printing 500 copies in each edition. If I could get 50 subscribers in the United States, it would help my project greatly."

A unique and very valuable feature is his quarterly review of South American publications in entomology. Without such

a review it is almost impossible for entomologists in the United States to learn what is being published in South America.

The subscription price is $3.00 in U. S. money, which may be sent to the editor, whose address is:—

Thomaz Borgmeier, O. F. M., Convento S Antonio, Rio de Janeiro, Brazil, S. A.

J. M. ALDRICH.

# Entomological Literature

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

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**GENERAL.—Agassiz, R. G.**—Notes on the life history of the Entomological Society of British Columbia. [Pro. Ent. Soc. Brit. Col.] No. 30: 3-7. **Buckell, E. R.**—A convenient method of storing entomological specimens in alcohol, with particular reference to dragonflies. [Pro. Ent. Soc. Brit. Col.] 30: 23-24. **Chapman, R. N.**—The causes of fluctuations of populations of insects. [37] 8: 279-292, ill. **Ingles, L. G.**—The succession of insects in tree trunks as shown by the collections from the various stages of decay. [13] 25: 57-59. **Kuwana, S. I.**—Obituary. By E. O. Essig. [12] 26: 1185-1188, ill. **Ruediger, E.**—Das gleichgewicht in der natur. [17] 50: 297-299. **Scheibert, J.**—Das photographieren freilebender schmetterlinge. [17] 50: 313-316. **Van Cleave, H. J.**—An index to the International Rules of Zoological Nomenclature. [Trans. American Micro. Soc.] 52: 322-325.

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**ARACHNIDA AND MYRIOPODA.** — ***Canals, J.**—Curiosa araña argentina del género Trochanteria. [Physis] 11: 233-237, ill. (S). ***da Fonseca, F.**—Notas de Acareologia. [Mem. Inst. Butantan] 7: 127-158, ill. (S). **Jacot, A. P.**—Earliest genera of mites and their types. [10] 35: 206-208. **Olenev & Rozhdestvenskaja.** — A pathological condition observed in ticks (Ixodidae). [Parasitology] 25: 478-479, ill. ***Roewer, C. F.**—Ergebnisse der österreichischen biologischen Costa-Rica-Expedition 1930. Opiioniden. [Ann. Naturhist. Mus. Wien] 46: 275-295, ill.

**THE SMALLER ORDERS OF INSECTS.—Ebeling, W.**—Some differences in habits and structure between citrus thrips and flower thrips. [Mo. Bull. Dept. Agric. Calif.] 22: 381-384, ill. ***Gloyd, L. K.**—A new Corduline dragonfly, Tetragoneuria sepia, from Florida. [Occ. Pap. Mus. Zool. Univ. Michigan] No. 274: 5pp., ill. ***Hood, J. D.**—Nototrips folsomi, a new genus and species of Thysanoptera from the United States. [10] 35: 200-205, ill. ***Mosely, M. E.**—A revision of the genus Leptonema (Trichoptera). [Brit. Mus. Nat. Hist.] 1933: 69pp., ill. (S).

**ORTHOPTERA.—Chopard, L.**—Ergebnisse einer zoologischen sammelreise nach Brasilien, insbesondere in das Amazonasgebiet. Gryllodea. [Ann. Naturhist. Mus. Wien] 46: 243-253, ill.

**HEMIPTERA.**—***Miller, F. W.**—Three new species of aphids from Idaho. [4] 65: 249-253, ill. **Oman, P. W.**—Phlepsius ishidae in North America. [10] 35: 205-206. ***Poos, F. W.**—Four new species of Empoasca (Cicadellidae). [10] 35: 174-179, ill. **Walton, W. R.**—Correction [on Poos' paper on Empoasca] [10] 35: 212.

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**COLEOPTERA.—Bedard, W. D.**—The number of larval instars and the approximate length of the larval stadia of Dendroctonus pseudotsugae with a method for their determination in relation to other bark beetles. [12] 26: 1128-1134, ill. ***Blake, D. H.**—Two new species of Systena, with notes on differences in sexual coloration in the genus. [10] 35: 180-183, ill. **Blake, D. H.**—Revision of the beetles of the genus Disonycha occurring in America north of Mexico. [50] 82, Art. 28: 66pp. **Bruch, C.**—Notas biológicas sobre tres hispidos. [Physis] 11: 213-224, ill. ***Fisher, W. S.**—New species of buprestid beetles from Mexico and Central America. [50] 82, Art. 27: 47pp. ***Jeannel, R.**—Trois Adelops nouveaux de l'Amérique du Nord. (Catopidae). [25] 38: 251-253. **Knowlton, G. F.**—Ladybird beetles as predators of the potato psyllid. [4] 65: 241-243. **Kuntzen, H.**—Aus den verbreitungstatsachen mitgefolgerte neue auffassungen über das system einiger Scarabaeidengenera vornehmlich der paläarktischen region. [Mitt. Zool. Mus. Berlin] 19: 458-474. **Leng & Mutchler.**—Catalogue of the Coleoptera of America, North of Mexico. Suppl. 2 & 3. 112pp. ***Scott, H.**—The systematic position of the family Hemipeplidae and descriptions of new species. [75] 12: 595-611, ill. **van Emden, F.**—Revision der gattung Cratosomus (Cur C.). [52] N. F. 2: 354-464, ill. ***Wallis, J. B.**—New species of Hypophloeus. [4] 65: 247-249. ***Wallis, J. B.**—Three new species of Hydroporus belonging to the Vilis group. [4] 65: 261-262. **Wolcott, G. N.**—The larval period of Diaprepes abbreviatus. [Jour. Dept. Agric. Puerto Rico] 17: 257-264, ill.

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## OBITUARY.

The untimely death of Dr. Nelson C. Davis (member of the Field Staff of the International Health Division of The Rockefeller Foundation) on October 21, 1933, at Bahia, Brazil, at the age of 41 years, is most unfortunate for medical entomology. Although especially noted for his contributions to the knowledge of yellow fever and malaria of South America, his insatiable interest in anophelines made him an outstanding authority on the biology, taxonomy, and medical importance of the species of this group.

He was the first to verify *A. pseudopunctipennis* as the chief malaria vector in the Argentine, to discover *A. darlingi* in the Amazon region, to demonstrate that this mosquito is one of the most formidable malaria vectors indigenous to Brazil, and to show that the recent African invader of Brazil, *A. gambiae*, possesses a capacity for transmitting malaria in Brazil possibly exceeding that known for the species in its native home.

His contributions on the biology of *Aedes aegypti* and the larvae of the Brazilian species of *Mansonia*, as well as those dealing with the transmission of yellow fever by mosquitoes other than *Aedes aegypti* and a diversity of other arthropods are likewise of outstanding importance.

It is most regrettable that we must lose this remarkably reliable source of information and stimulation as well as a valued friend.—R. C. Shannon.

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**MARCH. 1934**

Vol. XLV No. 3

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D. Associate Editors.

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# ENTOMOLOGICAL NEWS

VOL. XLV. MARCH, 1934 No. 3

## On Protective Adaptations.

By W. L. McATEE, U. S. Biological Survey, Washington, D. C.

There is a question as to the desirability of replying to all criticisms, and in fact I have not followed that policy with respect to the paper challenged by Harold O'Byrne in ENTOMOLOGICAL NEWS for March, 1933. It almost seems that my article on protective adaptations can not be understood by persons who have not had experience in making analyses of the stomach contents of vertebrates.

Mr. O'Byrne says he agrees with me as to the indiscriminacy of predators, considering only the higher groups of their prey, but does not agree as to categories smaller than families. The data as to food items presented by me were built up from computations of the frequency of capture of various kinds of prey by *species* of birds, but were not presented in detail because that would have been impossible from a publication standpoint. There is, however, no logic in rejecting the results for certain taxonomic groups, and not for all, as the basis for them in all cases is the same.

It is not a fair conclusion that my paper concentrates attention upon warning coloration and related adaptations, for upon scanning it again, I find that concealing habits, and cryptic coloration are mentioned in most of the sections devoted to "protective adaptations" of the various groups. Nothing was glossed over as Mr. O'Byrne implies, and if insufficient emphasis was placed upon cryptically adapted prey, it was because of the abundant evidence in all parts of my tabulations that such organisms are freely eaten. It is furthermore a necessary corollary of selectionist doctrine that if some forms are "specially protected" then others must bear the brunt of predatory attack. If the theory were a worthy guide to what happens in nature, it could only be interpreted as meaning that cryptically colored species have an inferior sort of protection. According to theory they must hide, while the others may flaunt themselves.



MAR

My critic continues "if birds consume as many cryptically colored animals, in proportion to their abundance as they do conspicuously colored ones, then they are evidently seeking the former in preference to the more easily found conspicuous animals." The fallacy in this argument from the point of view of the student of bird food is that birds have no difficulty whatever in finding cryptically colored forms. Scores of species of birds feed on scale insects, for instance, creatures as obscurely colored and as immovable as the bark on which they live. As birds can find these ultra-cryptic forms they surely can find any others.

A further remark from my reviewer is "butterflies and many grasshoppers, while, in flight, are among the most conspicuous of all insects. We should, therefore, expect them to be eaten by birds in greater proportion than many other insects." This is an expectation personal to Mr. O'Byrne, as conspicuous insects according to theory are "specially defended" by nauseous or noxious qualities.

"Again, most insects, after they have completed the task of reproduction, become more sluggish and less successful in hiding themselves." This would not seem to follow at all as sluggishness should conduce to quiet which is essential to protection by cryptic coloration. My reviewer adds "It is, therefore, absolutely necessary to know the circumstances of capture in order to judge the effectiveness of protective adaptations." Since the accumulation of any notable body of information complying with this requirement is impossible, the suggestion really is to relegate the study of the effectiveness of protective adaptations to the fields of the unknown and the unknowable, realms selectionists have always preferred to roam.

Mr. O'Byrne says, without warrant, that "Mr. McAtee has considered only a fraction of the resistance of the environment." Admittedly discussion of predators of every kind made up the bulk of my contribution, but parasites are mentioned throughout, and on pages 141-143, parasites, bacterial and fungal diseases, heat, cold, and other climatic factors are evaluated. There is no comfort to the selectionist in contemplating any of these factors of environmental resistance as all of them

are indiscriminate so far as protective adaptations are concerned. Chief attention was given to the only group—predators—that conceivably might exercise the degree of selection necessary for the development of protective adaptations in accordance with theory.

Again my critic says I have not considered all kinds of adaptations. I believe I did consider all kinds coming under the scope of my paper, *i.e.*, the so-called protective adaptations, but even were there some omission, it would have no significance. If it be admitted that predation tends to be in proportion to population (and it is true whether admitted or not), the effect of this practical indiscriminacy is the same in relation to all adaptations of whatever kind and that effect certainly tends to be non-selective. To fulfill the requirements of the theory of natural selection, it would have to be highly selective, and the data I presented in my paper leaves no doubt that it is only feebly if at all selective.

More philosophy from Mr. O'Byrne is "The destruction of animals by predaceous foes may be taken as the resultant of two factors, the defensive adaptations of the animals preyed upon—in structure, color, and behavior—and the aggressive adaptations of the attacking animals. . . . In like manner, the development of protective adaptations in animals preyed upon has been accompanied by improved adaptations for aggression in predators. The *status quo* has been maintained; forms unable to keep up with the procession have been left by the wayside for the paleontologists to ponder over." This implication that species have been exterminated by predators is without foundation. Fossil remains indicate nothing of the kind, and could not in the case of insects or other creatures eaten in their entirety by predators except by evidence from coprolites and that source decidedly is not an important one for our knowledge of fossil animals.

"Mr. McAtee dismisses the supposed difficulty of making identifications of Lepidoptera in bird stomachs by describing the fuzzy appearance of the material due to the presence in it of lepidopterous scales, and he says, further that identifications can often be made from wing venation in cases where none of

the original coloration remains. I wonder how often birds devour butterflies and moths, wings and all, as compared to the frequency with which they pull the wings off, and eat only the body. When they do eat the wings, the difficulty of making determinations would be greatly increased, and in many cases identification would be impossible."

Identification as Lepidoptera probably never fails for lack of evidence, as even if wings are discarded, the scales giving the characteristic appearance referred to are present in abundance as they clothe the entire body of these insects. If Mr. O'Byrne knows from his own observations that birds frequently discard the wings of butterflies, he knows more along that particular line than anyone else on earth. In my paper I expressly stated that "identification to species especially has lagged more in the case of lepidopterous items of food, than in those of any of the other larger orders of insects, due chiefly to poor condition of the remains of adults, and to lack of knowledge of larvae." (P. 55.) Over 70 per cent of the entire number of captures (18, 487) of Lepidoptera were named only to the order. It is very possible, therefore, that *Danais plexippus*, a "warningly colored" form Mr. O'Byrne especially mentions, was present in some of the stomachs but not identified.

The point, however, is of no consequence; the object of my paper was to present as fully as practicable information on the frequency of capture of animal forms by nearctic birds. That the results are damaging to theory should be credited to the facts not to the author. Mr. O'Byrne apparently accepts in the end what he denied in the beginning as he says, "That the food of birds is generally distributed among the taxonomic groups in proportion to the abundance of individuals and their availability to birds only shows that the majority of animals possess some kind of protective adaptation."

I must add that it certainly shows a great deal more. It shows that protective adaptations do not prevent practical indiscriminacy of predatory attack. Indiscriminacy is the antithesis of selection and with it as the guiding principle of predation, theories as to the origin of the so-called protective adaptations through natural selection collapse.

# New Species of Buprestidae[1] (Coleoptera) with Notes Concerning Others.

By Edwin C. Van Dyke, University of California, Berkeley, California.

**Acmaeodera nigrovittata** new species.

Moderately robust, broad and short with disk of elytra flattened; head, prothorax and under surface aeneous, the prothorax sometimes with a small yellow spot in front of the hind angles, the elytra black or faintly aeneous and each elytron with two irregular yellow stripes, the inner extending in width from the second to the fifth stria and in length from near the base to the posterior two thirds where it commences to narrow and to curve inwards in a zigzaz manner towards the apex and unite with the outer yellow stripe, here approaching to within one interval of the suture, the outer stripe commencing near the base at its outer angle and continuing along the margin with a width of from one to three intervals to its union with the inner; the upper surface sparsely clothed with rather long more or less erect white hair and the under surface rather more densely clothed with much inclined white pile.

Head coarsely, closely punctured, somewhat longitudinally impressed at the middle, fifth antennal segment suddenly enlarged but less transverse than sixth.

Prothorax twice as wide as long, widest just back of middle, the sides almost straight and divergent to widest point then straight or slightly arcuate and convergent to anterior angles, the margin narrow and concealed from above, the disk coarsely, somewhat cribrately punctured, with a well defined median longitudinal impression ending in a deeper prescutellar impression and with deep foveae within the posterior angles.

Elytra slightly narrower at base than prothorax at widest point, with sides almost straight and gradually convergent to posterior two thirds thence arcuate and rapidly convergent to apex, the apical margins serrate; the disk with the first and second striae defined by rather small, elongate punctures, the others by very coarse and deep punctures, the inner intervals more or less flat, the outer three somewhat convex and with the striae separating them well defined, certain intervals also more or less punctured. Beneath rather coarsely punctured in

[1] This is the fourth paper of mine dealing with the Buprestidae published in Entomological News, the previous papers having appeared the volumes for 1916, pp. 405-412; 1918, pp. 53-58; and 1919, pp. 151-156, 186-190.

front and quite finely punctured behind. Prosternum emarginate in front.

Last ventral segment with preapical carina in a few specimens, absent in the majority. Length 8-9 mm., breadth 2.5-3.25 mm.

*Holotype* (No. 3756 Mus. Calif. Acad. Sci.) from Selma, Fresno Co., California, June 4, 1929, collected by R. L. Usinger, and several designated *paratypes* from a series of fourteen specimens, eight from Selma, three from Mojave, California, April 10, 1929, E. P. Van Duzee collector, two from Cuyama Valley, Kern County, California, April 10, 1932, E. P. Van Duzee collector, and one from McKittrick, California, April 11, 1932, E. P. Van Duzee collector.

This striped species belongs in the group characterized by the emarginate prosternum. Its peculiar short and wide body will generally enable it to be readily separated from other vittate species. The striped phases of *acuta* have more irregular stripes, generally broken, the pronotal punctures finer and more separated, the prothorax less dilated and the body narrower and more elongate. *Acmaeodera lanata* Horn and *lineipicta* Fall, the latter probably a synonym of *biedermanni* Skinner, are larger, more elongate and with the prothorax less dilated while *quadrivittata* Horn and *gemina* Horn are very much smaller. These species also have a different type of prosternum.

**Acmaeodera varipilis** new species.

Small, subcylindrical and more or less blunt; head and pronotum aeneous, elytra bronzed or bronzed blue, sometimes black in females and with from ten to sixteen yellow spots arranged in rows, two to each elytron, when of the maximum number, two spots midway between base and middle, two at middle, two between middle and apex and two near apex, the inner basal and outer row being the first to disappear as reduction takes place, the underside bronzed; head and pronotum distinctly but not densely clothed with rather long decumbent white hair, changing to long scales on sides of pronotum, the elytral intervals each with a single row of small, much inclined, hooked, elongate white scales arising from fine punctures, the undersurface in males rather densely clothed with closely appressed white scales which have their free ends tuft like or much divided, so-called stellate scales, the vestiture of meta-

pleurae longer and hair like, in the females the vestiture of the prosternum is similar to that of the males but the afterbody except the last three ventral segments is densely clothed with long, silky white pile, the terminal segments with fulvous pile, more erect and curled forwards.

Head coarsely, closely punctured, front longitudinally shallowly sulcate, occasionally with callosities, clypeal margin broadly, shallowly emarginate; antennae with fifth segment suddenly dilated.

Prothorax twice as wide as long, apex slightly lobed in front, base wider than apex, markedly so in females, sides broadly arcuate, rapidly converging towards apex and base in males, almost parallel or but slightly converging towards base in females, the disk convex, coarsely, closely, cribrately punctured and shallowly impressed towards base in median line.

Elytra almost four times length of prothorax, umbones prominent, sides sinuate before middle, margin serrate apically, disk convex, striae with deeply impressed, large, round and approximate punctures, intervals more or less convex throughout in females, apically in males, and somewhat narrower than striae towards base.

Body beneath moderately coarsely, closely and deeply punctured in front, more finely and sparsely behind and also more shallowly in males. Males, length 6 mm. breadth 2; female 8 mm., breadth 3 mm.

*Holotype* male, allotype female (Nos. 3753 and 3754, Mus. Calif. Acad. Sci.) and paratype male and female, the type and one male paratype from Tiburon Island, Gulf of California, July 5, 1921, the allotype from Carmen Island, Gulf of California, May 23, 1921, likewise the female paratype but taken two days earlier, and all collected by Mr. E. P. Van Duzee. Other specimens studied are a male from Finley, Texas, collected June 9, 1930, a second male from Oracle, Arizona, collected July 2, 1924, and a female from Cave Creek, Cochise County, Arizona, June 20, 1929, all collected by Mr. J. O. Martin; besides several specimens collected in Sabino Canyon and near Tucson, Arizona, by Mr. G. Hofer on *Acacia constricta*. These last are a bit more elongate than the others and with the elytral spots reduced in number, the inner basal and most of the outer row having disappeared, but in agreement with the type series in all other regards.

This species is closely related to *guttifera* Lec. (*versuta* Lec. ♂) and *squamosa*[2] Van Dyke, forming with them a small group which is quite characteristic of our Southwest. *Acmaeodera guttifera* Lec. is clothed, both above and beneath with hair, that on the dorsal surface erect; *squamosa* clothed on both surfaces with short, closely attached white scales, stellate beneath, except for the three terminal abdominal segments in the female; while *varipilis* has the elytra in fresh specimens ornamented with rows of fine, short, semierect, hooked scales and the underside clothed like *squamosa*.

Acmaeodera vanduzeei new species.

Elongate, subcylindrical; head and prothorax bronzed with cupreous reflections, elytra deep blue variegated with irregular more or less tortuous yellow maculations, the yellow color slightly dominating, the undersurface aeneous; the vertex and pronotum sparsely clothed with rather short white hairs which are suberect and curved forwards; the elytra with widely separated short white hair arranged in rows along the intervals and somewhat inclined backwards, and the front of head, sides of pronotum and entire underside of body excepting head densely clothed with closely appressed stellate white scales which give it a chalky appearance.

Head rather closely punctured with large, shallow, variolate punctures, feebly longitudinally impressed; the fourth segment of antennae suddenly enlarged.

Prothorax about one third wider than long, apex distinctly bisinuate, sides rather evenly and distinctly arcuate, side margin not evident from above, disk convex, shallowly canaliculate at middle and coarsely, shallowly, rather closely punctured.

Elytra narrower than prothorax, sides almost parallel, a bit sinuate at middle and rounded to apex, margin serrulate; disk convex, striae shallowly impressed and with rows of rather coarse, closely placed punctures, the umbones prominent.

Beneath coarsely, closely punctured in front, finely closely punctured behind, subapical carina not evident. Length 8 mm., breadth 3 mm.

*Holotype* (No. 3755 Mus. Calif. Acad. Sci.), a unique collected by Mr. E. P. Van Duzee on Angel de la Guardia Island, Pond Island Bay, Lower California (Gulf of California).

This species belongs with those having a truncate prosternum

[2] New species of Buprestidae (Col.) from the Western United States, with supplementary notes concerning others, Ent. News, vol. XXX (1919), pp. 186-187.

and should be placed close to the guttifera group. It is in fact but an enlarged and more elongate member of that group.

**Chrysobothris cupreohumeralis** new species.

Small, moderately elongate, not depressed, subopaque, dull blue, the front bronzed, occiput greenish, the elytra tending towards violet and with a cupreous patch in humeral region extending from base along sides to about the middle, the outer portion of middle and hind femora also a brilliant cupreous color, the head conspicuously and pronotum sparsely pubescent and the sides of meso and metathorax and abdomen rather densely clothed with appressed white pile.

Head with front somewhat flattened, distinctly and moderately closely punctured, without callosities, clypeal margin broadly shallowly emarginate at middle and obliquely truncate each side of incision, the eyes large and well separated; antennae quite bronzed, gradually more slender to tip, third segment somewhat triangular and not quite equal in length to the two following segments united, the fourth and succeeding segments transverse.

Prothorax about twice as wide as long, broadest back of middle, apex broadly shallowly lobed, base markedly trisinuate, sides almost straight and slightly divergent to posterior third then arcuate and convergent to base, dorsum evenly convex, rather coarsely, closely and evenly punctured, and with a few strigosities towards hind angles though without callosities, median line or sulcus.

Elytra but little wider than prothorax, sides almost straight and parallel to posterior third thence arcuate and convergent to individually rounded hind angles, margins posteriorly and apex distinctly serrulate, the disk convex, rather densely punctured, more coarsely and cribrately on basal area, broadly transversely impressed at basal third, the basal foveae alone impressed and but faintly, and only the inner costa evident and only posteriorly.

Body beneath rather coarsely, closely punctured in front, more finely on abdomen, lateral margins of last ventral segment distinctly serrulate, prosternum evidently lobed in front, and anterior femora without tooth. Length 6.5 mm., breadth 2.75 mm.

♀. Prosternum rather closely, coarsely punctured and slightly pilose, the apex of last ventral segment broadly shallowly emarginate and anterior tibiae straight and without dilatations.

*Holotype* (No. 3757 Mus. Calif. Acad. Sci.), a unique female,

collected at El Paso, Texas, April 27, 1927, by Mr. J. O. Martin.

This attractive species somewhat resembles *axillaris* Horn in color pattern and like that species belongs in Horn's Group I. It differs, however, by being much narrower, less flattened, color a more intense blue, front without median longitudinal line and callosities, clypeal emargination broader and shallower, the prothorax broadest posterior to middle, not anterior, the elytra more coarsely punctured, the basal impressions of same faint and not cupreous and the apices less coarsely serrate. The anterior femora are also not toothed, markedly so in *axillaris*, and the middle and posterior femorae brilliantly cupreous, not unicolorous with rest of ventral area, and the afterbody beneath densely clothed with white pile. No other species that I know of seems to approach it closely though it undoubtedly belongs in the same small complex with *piuta* Wick. and *carmelita* Fall.

(To be continued)

## Osmia permorata Ckll. the Female of O. abnormis Cresson (Hymenoptera; Apoidea)

In a collection from near Ward, Colorado (June 2-9, 1933, H. G. and H. E. Rodeck) were seven male specimens of *Osmia abnormis* Cresson and two females of *O. permorata* Cockerell. Observations of mating behavior in the field show these to be sexes of the same species, *permorata* becoming a synonym of *abnormis*. The type of *permorata* was a female from Steamboat Springs, Colorado, and that of *abnormis* a male from "Colorado." *O. permorata* differed from *abnormis* in having black rather than red hair on the middle basitarsi.

The male of *abnormis* meets with difficulty in Cockerell's key (Univ. of Colo. Studies, XVI, 116, 1928) because of a spine on the apical margin of the first sternite and a projecting carina at the apical margin of the second, confusing the species with *nifoata* Ckll. in step 1 of the key.

It is of interest to note that in the series of seven males two show the pale yellowish pubescence on the thorax as described by Cresson, four show a reddish tinge on the posterior region of the thorax, and one has this posterior portion almost as bright fox red as is found in the female.

I am indebted to Professor Cockerell for the identification of these specimens.—Hugo G. Rodeck, University of Colorado Museum, Boulder, Colorado.

## A New Species of Pauropus from Iowa (Pauropoda).

By William A. Hilton, Pomona College, Claremont, California.

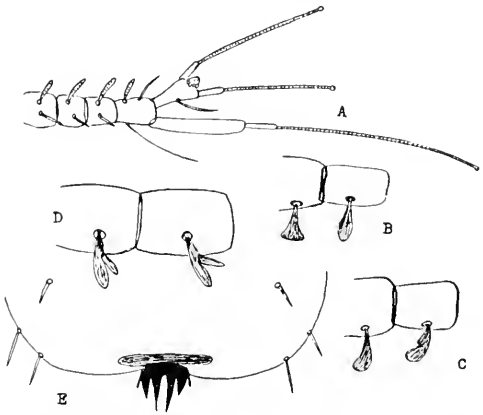
**Pauropus medianus** n. sp.

Length .92 mm., width of body at the widest, .2 mm.

*Head*—Length and breadth, .13 mm. It has three rows of knobbed hairs above or about 24 in all.

Back of the head there are two or three rows of knobbed hairs. The last of these are less clubbed. The next division of the body has four hairs in a cephalic row, four in a middle row and four in a caudal row. The next has two rows of three each. The next has three long hairs on each side. The last has four long hairs above. These last are all long and straight. The next to the last region of the body has six long ventral hairs and the last ventrally eight long hairs. Except for the last two regions and near the head ventral hairs were not abundant. The last plume hair was 1 mm. long; the others about half this length.

*Antennae*—Length .25 mm. The base was 0.076 mm. long. The ramus bearing the globulus is about half as long as the




Parts of *Pauropus medianus* n. sp. A. Antenna. B. Two basal segments of first leg with appendages. C. Same as last from second leg. D. Same as last from first leg. E. Caudal Plate.

other. The two flagellae of the globulus ramus are of about equal length and two thirds as long as the long flagellum. The globulus is small, sessile and surrounded by minute appendages. Each basal joint of the antennae has two knobbed hairs.

*Legs*—The legs are of the following lengths: First, .18 mm.; Second, .21 mm.; Third, .23 mm.; Fourth, .24 mm.; Fifth, .26 mm.; Sixth, .27 mm.; Seventh, .31 mm; Eighth, .31 mm.; Ninth, .36 mm. The Claws are small. The two basal joints of all the legs bear short, scale-like hairs which are simple on the upper legs. The next to the last and the last legs bear double hairs of a peculiar type on the two basal joints. The relative lengths of the leg joints are as follows, beginning with the shortest joint: First leg: 3-(1-2-4)-5. Second leg: 5-(1-3-4)-6. Third leg: 5-(1-2-3-4)-6 Fourth leg: 5-(1-2-3)-4-6. Fifth leg: 5-(2-4)-3-1-6. Sixth leg: 5-3-(1-4)-2-6. Seventh leg: 5-(3-6)-(1-2-4). Eighth leg: 5-3-(1-2)-4-6. Ninth leg: (1-2-3)-4-5.

*Distinctive Features:* The anal plate has six central points. There are four club-shaped hairs on the under side of the first body division back of the head, but none like them farther back. The last two legs have jointed scales or spines on the first two basal segments. Many of the more caudal legs have appendages that have a tendency to branch.

The *type* is a male in the Pomona College Collection. This was compared with others from the same locality. Specimens were received from H. B. Mills, Ames, Iowa. Specimens from other parts of Iowa sent by Mills were all of this species. Some of these were immature. They were collected during October, November and December, 1932. They seem nearest to *P. caudaspinosus.*

## Two New Arizona Coleoptera (Buprestidae and Cerambycidae).

By J. N. Knull, Hummelstown, Pennsylvania.

**Agrilus parapubescens** n. sp.

Form slender, aeneous, beneath cupreous, more shining than above, sides of pronotum, humeral depressions of elytra and disk of elytra along suture near apex, clothed with white recumbent pubescence; front cupreous.

Head convex, median depression not evident; surface granulose, becoming rugose on occiput; clothed with white recumbent pubescence; antennae short, reaching to slightly beyond middle of pronotum, serrate from the fifth joint.

Pronotum wider than long, wider in front than at base; when viewed from the side the marginal and submarginal carinae are broadly arcuate in front and are not united at any point; a

third short carina starting near the apex runs parallel to the marginal carina to beyond the middle of the pronotum; disk moderately convex, an oblique lateral depression extending to the lateral margin on each side, prehumeral carinae long and prominent; surface transversely rugose, punctate between rugae. Scutellum transversely carinate.

Elytra wider than the pronotum at base, slightly wider back of middle than at base; sides constricted in front of middle, expanded behind middle, obliquely narrowed to tips which are separately rounded and serrulate; disk flattened along sutural margins which are elevated; surface densely imbricate-punctate, each puncture containing a recumbent hair.

Abdomen beneath sparsely finely punctate, first and second segments only slightly flattened; pygidium carinate, carina not projecting. Prosternum broadly rounded, a dense median line of pubescence extending from pronotum to first abdominal segment; ventral portions of pro-, meso- and metasternum with dense patches of recumbent white pubescence.

Anterior and middle tibiae mucronate on inner margin at apex. Posterior tarsi about as long as the tibiae, first joint as long as the three following joints. Tarsal claws similar on all feet, cleft, inner portions not turned inward.

Length 4 mm.; width 1 mm.

Described from a single male labeled Wilcox, Arizona, June, 1933, D. K. Duncan, collector. *Type* in writer's collection.

According to Fisher's key,[1] this species would run to *A. pubescens* Fisher. It is quite distinct from all of the other forms in this group by the general appearance and the presence of the extra carinae parallel to the lateral carinae.

**Elaphidion (Anoplium) hoferi** n. sp.

Slender, light brown in color, resembling *A. cinerescens* Lec. in size, color and general appearance.

Head with large, irregularly placed punctures; eyes prominent, coarsely granulate; antennae of male extending to slightly beyond the apex of elytra when laid back over dorsal surface, those of female not quite reaching tips, scape stout, second joint very short, third joint longer than fourth, fifth joint longer than fourth, sixth joint shorter than fifth, joints six to ten gradually decreasing in length, last joint longer than tenth; joints three and four with short spines; antennae coarsely punctured, pubescence fine, short, scattered long flying hairs.

[1] W. S. Fisher, U. S. National Museum, Bull. 145, pp. 1-347, 1928.

Pronotum slightly broader than long, of about equal width at base and apex, widest in the middle; surface covered with a network of intervening lines which tend to form large shallow punctures, each of these large punctures containing a small puncture from which arises a moderately long hair. Scutellum densely pubescent.

Elytra about three times as long as broad; sides nearly parallel to apical fourth, then broadly rounded; apices truncate; surface densely coarsely punctured, punctures becoming smaller toward apex; a moderately long hair arising from each depression.

Ventral surface lighter in color than above; punctures of abdomen small, not prominent.

Length 6.5 mm.; width 2 mm., paratypes varying to 8 mm. in length and 2.5 mm. in width.

The female differs from the male in length of antennae and by having a wider thorax.

Described from five specimens labeled Tucson, Arizona, June 4, G. Hofer collector. Male *type* and *paratypes* in writer's collection.

The species comes close to *A. cinerescens* Lec. and undoubtedly stands under that name in some collections.

## A Summary of the Sucking Lice (Anoplura).

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

For several years the writer has been engaged upon a series of papers which have been intended—when and if completed—to constitute a systematic monograph of the Order Anoplura, the sucking lice. Thus far six parts [1] have been published, these completing the systematic review of all but a small number of genera and about twenty species. The remaining portions of the series are either entirely ready for publication or in condition to be rounded up rapidly but will probably not appear in print for some time to come owing to the existing financial situation. Because of the prospects of delay it seems justifiable to present a general summary of the results which appear from this study.

First as to the status of the Order. At one time the two

[1] Stanford University Publications, University Series, Biological Sciences, Vol. 2. Six parts, 470 pages, 276 figs.

groups of the biting and the sucking lice were united into a single Order under the name Anoplura. They were later separated and for a time this name disappeared, the biting lice being recognized as the Order Mallophaga while the sucking lice were attached to the Hemiptera as a suborder, variously known as the Suctoria or Parasita. Once more they were restored to ordinal rank, various names, Pseudorhyncota, Lipognatha, Ellipoptera, Siphunculata, being employed. And again the tendency to unite the two groups into a single Order has appeared, with resulting question as to the proper name to be employed.

Without entering into the arguments, the simple conclusion may be stated that in the writer's opinion the two groups may justifiably be recognized as distinct Orders and that for the sucking lice the name Anoplura may reasonably be retained. While without much doubt the two groups of lice are related, just as the Lepidoptera and Trichoptera are related, the differences between them are trenchant, extending much farther than the differences in mouthparts, and are not bridged by any known form. Whatever difficulty there may be in expressing this relationship properly may be ascribed to the defects of our traditional nomenclatorial system which attempts to make a very limited number of categories express a very large number of degrees of relationship. To place the Mallophaga and Anoplura under a single Order will very greatly complicate the difficulties encountered in formulating an expressive and balanced intra-ordinal classification.

This intra-ordinal classification presents problems concerning which the writer does not desire to express definite opinions until all the evidence to be derived from comparative morphological studies is in and has been carefully weighed. That the old classification of a single family, the Pediculidae, is unduly limited is evident. But the recognition of all the families that have been proposed, especially the Haematopinoididae and the Phthiridae, appears possible only by concentrating attention upon what are probably more or less superficial differences rather than upon fundamental resemblances. The consistent

use of criteria of the grade employed in establishing these two would result in the establishment of a considerable series of "families" based upon little more than generic or super-generic peculiarities of no deep-seated significance. The writer holds as a definite principle that it is the underlying thread of continuity, rather than the varying beads which are strung upon it, that should be followed if a balanced and logical classification is to be achieved.

One family which has been named in the Anoplura is valid enough but does not belong to this Order. This is the family Haematomyzidae, based upon the single species *Haematomyzus elephantis* Piaget. This has been discussed elsewhere by the writer and referred to a suborder, the Rhynchophthirina, of the Mallophaga.

One genus, *Acanthophthirius* Perkins, with a single species, *A. etheldredae* Perkins, is based upon an immature mite.

The total number of known species of Anoplura can not be stated precisely. Several named forms are still in doubt, owing to the inadequacy of original descriptions, but may possibly be recognizable at some time through circumstantial evidence or the rediscovery of the types, and some synonyms may prove to be involved. Furthermore, differences of opinion as to what constitutes a species are of considerable significance, especially in some genera, such as *Pediculus,* and considerably modify the total number. On the basis of the criteria of specific distinctness which are employed by the writer, the number of species is 200 plus or minus 2 or 3. Other authors might possibly recognize as many as 215.

The rate of growth in our knowledge of the group may be seen from the following figures. The Dalla Torre catalogue of 1909 recognized 65 species and the writer's catalogue of 1916 included 120. Both catalogues include a number of synonyms and there are some omissions in each, the synonyms, however, over-balancing the omissions so that the actual number of known species was in each case less than the number cited. Our knowledge of the species of Anoplura has therefore more than tripled since 1909.

It is interesting to speculate upon what percentage of the

existing species may now be known. Some rough idea may be formed by taking into consideration the known facts of distribution.

It may be taken as definitely established that certain large groups of mammals do not harbor sucking lice, these including the bats, the marsupials, the land carnivores (with the anomalous exception of certain Canidae), a considerable portion of the insectivores and certain families of rodents such as the Geomyidae and Erethizontidae. The groups upon which Anoplura may normally be expected to occur are the Primates, most of the rodents and the "ungulates." If we take, for example, the mammals of North America as they appear in a recent catalogue, we find that only 59% of the recognized species and subspecies are members of groups subject normally to infestation. This percentage will vary in different parts of the world, being exceedingly low in Australia with its marsupial fauna and possibly higher in Africa with its large numbers of rodents, Primates and "ungulates." Unfortunately for our purposes, no satisfactory estimate of the number of known living species of mammals in the whole world is available. The writers of two recent general zoological texts present estimates, the origins of which are not indicated, one of 7500 and the other of 15000! Trouessart in 1904 listed 9377 species, this, however, including fossil forms. There has been much activity among mammalogists since that date, particularly in the naming of subspecies and undoubtedly a great deal of synonymy is involved. Perhaps the number of known species is in the neighborhood of 10,000 and this will not be increased by many hundreds more in the future.

On this basis there are perhaps 6000 species of mammals on which Anoplura may be expected to occur. But the number of possible species of Anoplura can be no where near that figure. A single Anopluran species may range over a large number of closely related mammal species, as is the case, for example, with *Neohaematopinus sciurinus* Mjöberg, which has been recorded from about 25 host species and may be expected to occur on perhaps 100, or *Enderleinellus suturalis* (Osborn) which is recorded from 15 or more species of citelline squirrels

and probably occurs upon 50 or more. On the other hand, the situation is complicated by the fact that as many as three species of Anoplura may occur upon a single host species, as is the case with *Enderleinellus*, *Hoplopleura* and *Neohaematopinus* on *Sciurus* or *Haematopinus*, *Linognathus* and *Solenopotes* on domestic cattle, or the customary occurrence of species of both *Polyplax* and *Hoplopleura* upon many rodents.

But even so the number of Anopluran species relative to the number of possible hosts is small. The number of known possible hosts in North America is about 1300 species and subspecies. The number of Anoplura, from these hosts, including those now known and certain others not yet collected but the existence of which is almost certain, will scarcely exceed 50. On this basis the number of Anopluran species is about 4% of the number of possible hosts. Extending this to the world, we would have about 240 as the probable number of Anoplura. This is evidently too small a figure, but even so the writer would estimate that there are certainly not over 500 species of Anoplura in the world and in all probability the number is considerably less.

(To be continued)

## Zur Systematik der Oribatiden (Acarina) nach Willmann (May, 1930).

By Arthur Paul Jacot.

Willmann's remarks on my "Genera of Pterogasterine Oribatids" (1929) are in some instances based on misunderstanding which I hope to clear.

I believe in using the descriptions and figures of the old authors, but they must be applied to that species which most closely fits the description or figure, irrespective of earlier redeterminations. For instance *Hoplophora laevigata* Koch cannot be applied to a rough-sculptured species. Likewise one cannot apply the name *O. orbicularis* Koch to an elongate species.

Oudemans (1926), as I have already shown (1932), makes *Acarus geniculatus* Linné 1758 identical with a species

described from England by another author, and bases his interpretation of Linné's species on the assumption that the two are identical. *A. geniculatus* Linné can only be reidentified on the basis of Linné's description. Anyone else's identification of a species with Linné's, contemporary or later, was probably another species. Even as late as 1905, acarologists were erroneously identifying species from neighboring regions. Linné's *A. geniculatus* is undoubtedly the largest and commonest species on dead branches about Utrecht. Why Oudemans should regard Shaw's *A. colcoptratus* (1800) as Linné's *A. geniculatus* is left to our imagination. This is not science.

*Sphaerozetes.* Willmann writes that my statement is not in the *sense* of Berlese. No one can tell what Berlese's sense was. Five persons might have five different ideas as to what Berlese's sense was. The only final sense is what Berlese *printed*. He was responsible for what he printed. We must abide by the printed page. This is also according to International Rules. Thus my statements on page 419 are technically correct.

*Trichoribates. Murcia trimaculata* Koch is not at all certainly the nymph of *Oribates setosus*. Michael merely said it probably was. Certainly Koch's figure (fasc. 3/21) and Michael's (pl. 7, fig. 4) do not resemble each other, for Michael's is four spotted and has conspicuous bristles on posterior edge and on dorsal face of notogaster. Michael also said *Z. ephippiatus* was probably the nymph of *O. fuscipes*, but *Zetes morticinus* is much more probably the nymph, compare Koch's figure (fasc. 31/14) with Michael's (pl. 7, fig. 2).

As a matter of fact this has nothing to do with the Italian species which I named *S. berlesei*. Willmann talks as if I renamed the German species (for what reason I cannot understand); it is the Italian species which needed renaming and which I therefore named after the Italian acarologist.

Then through some other occult form of reasoning Willmann says the type of Trichoribates is *M. trimaculata* Koch when I distinctly appointed *S. berlesei* (the Italian species). It appears very much as if Willmann did not understand my English.

*Lepidoribates.* I wrote my statement concerning the synonymy of this genus in 1928. It was published in 1929. Sell-

nick's separate reached me February 6, 1929. Some claim that a few copies were circulated in 1927. This is a bogus date, as the work did not enter into circulation, so that even specialists on Oribatids could get them, until 1929. The date of issue is not the date when a few advanced copies were sent to two or three acarologists. Thus Willmann's remark is short-sighted. Whether I saw Sellnick's statement or not, I should have included my remarks to make my paper complete.

*Tegoribates.* Willmann's remarks under this head are his only worthwhile contribution in this paper.

*Heterozetes.* My knowledge of this genus I based on Willmann's original statement and figures. Here he separated the subgenus because the type species had but one hook on legs 1. This character is of specific or even subspecific value at most. I have shown that it is not even of subspecific value in Pseudotritia (1933). As Willmann points out in his later recharacterization (1931, p. 165) this genus is quite closely related to Ceratozetes and may still be regarded as a subgenus. It is encouraging to realize that I have caused Willmann to do a little more detailed and fundamental observing.

*Punctoribates.* Of course it is entirely not understandable that this genus is closely related to Sphaerozetes when one overlooks almost all I said under this genus, namely that *O. orbicularis* Koch is not *O. orbicularis* Michael but more like *O. lapidaria* Michael. Sphaerozetes is a genus of spherical oribatids with short cephaloprothorax and not as it has formerly been erroneously made out. Why cannot Willmann study Koch's figure and see that Michael's reidentification is wrong?

Willmann's idea of Minunthozetes again is all wrong. He figures it (1931, p. 173) as having a translamella. Michael's figure of the genotype (1884, pl. 12, fig. 6) is without translamella. Willmann's Minunthozetes is Jurabates.

If Willmann does not care to regard Mycobates as subgenus of Limnozetes, why worry? I did not so regard it on page 423 but placed it so in the key. How eccentric!

As to Zetes and Galumna, see my forthcoming revision of the subfamily.

*Acarus colcoptratus* is not type of Notaspis because Hermann never so much as used the term *type* (or even example).

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# Entomological Literature

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

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

(*) Papers containing new forms or names not so stated in titles, have an * within parentheses thus (*) following the pagination of reference to paper.

(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 Entomolog, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

**Note.** Titles of papers containing new forms or new names will be indicated by an asterisk within parentheses at end of reference, (*).

*Papers published in the Entomological News are not listed.*

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Ward's Entomological Bulletin is publishing a series dealing with the fundamentals of entomology under the title "Insect Studies." It is written by Dr. Alexander B. Klots, head of the entomological department of Ward's Natural Science Establishment in Rochester, N. Y. The introduction in volume two, number 2, of this bulletin states the purpose of this series and the "Why" of the study of insects. The next installment will begin to answer the innumerable "Hows?" Both professional and amateur entomologists will, no doubt, find this series interesting reading and glean some worthwhile information. The same number contains some remarks on mimicry with illustrations of several examples: a note on the Colorado potato-beetle in England; notices of prices and lists of collections of ants and other insects; and recommending carbon tetrachloride as an insecticide and fumigant [this liquid is used at the Academy of Natural Sciences of Philadelphia, as a degreasing agent]. The unit tray system for collections is also discussed.

## OBITUARY

To our great regret we have learned of the death of Professor Henry Frederick Wickham, at Iowa City, Iowa, on November 17, 1933. According to *American Men of Science,* he was born at Shrewton, England, October 26, 1866, studied at the University of Iowa 1887-91, received its Master of Science in 1894 and became successively assistant curator of the Zoological museum 1891-1927, instructor and assistant professor of zoology 1894-1903, professor of entomology 1903, and professor of applied zoology 1919. At times he was also connected with the Bureaus of Entomology (1914-16) and of Biological Survey (1917-20) of the Federal Department of Agriculture.

His entomological work was mainly with the Coleoptera. The bibliography attached to Leng's *Catalogue of the Coleoptera of America North of Mexico* (1920) lists 147 papers by Wickham (pp. 441-443), chiefly but not exclusively on Coleoptera, which appeared in our various entomological journals from 1888 to 1918. To that *Catalogue* he contributed the list of Fossil North American Coleoptera, pp. 347-365, including references to 16 additional papers by himself. The *First Supplement* (1927), by Leng and Mutchler, to the Catalogue gives (p. 69) an additional list of 9 papers on recent and fossil Coleoptera by Wickham (1919-1923) and the latter contributed to it a supplemental list of fossil species (pp. 53-56). Finally the recent *Third Supplement* (1933) has a *Second Supplement to the Catalogue of North American Coleoptera described as Fossils* by Wickham (pp. 103-105) with references to two later papers by him in this field (p. 105).

Two of his papers came out in Volume 1 of ENTOMOLOGICAL NEWS: Notes from the North West (pp. 33-36), based on his collecting trip of the summer of 1889, and on the habits of some Meloini (pp. 89-90), chiefly of New Mexico. Many of his papers dealt with the Coleoptera of Canada in *The Canadian Entomologist* (1894-1899). Another series gave his Recollections of Old Collecting Grounds (ENT. NEWS, 1897-1899). Among his more extensive works was a Catalogue of the Coleoptera of Colorado, which appeared in the Bulletin of the Iowa Laboratory of Natural History for 1902. He was an honorary member of the Entomological Society of Ontario.

PHILIP P. CALVERT.

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Prof. WILLIAM MORRIS DAVIS, distinguished member of the geological faculties of Harvard and the California Institute of Technology, died at Pasadena, California, February 5, 1934. He was born in Philadelphia, Pennsylvania, February 12, 1850, and was elected a resident member of the American Entomological Society June 8, 1874. We shall be glad to learn of any entomological publications by him.—EDITOR.

---

ERRATA: The *even*-numbered pages of the NEWS for January, 1934, are marked "Jan., '33," but should be "Jan., '34."

# EXCHANGES

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

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

**Wanted**—Names and addresses of those desiring insects from Wisconsin. Will collect in all orders from May to October. Correspondence invited. George Kettler, Platteville, Wis.

**Wanted**—Names and addresses of those desiring Coleoptera, Lepidoptera and Hymenoptera of Pennsylvania and New Jersey. R. C. Casselberry, 71 E. Price Ave., Lansdowne, Pa.

**Exchange**—Texas Orthoptera. F. B. Isely, Trinity University, Waxahachie, Texas.

**Wanted**—Names and addresses of those desiring insects from Colorado. Charles H. Hicks, P. O. Box 262, Boulder, Colorado.

**Desire to Exchange**—Lepidoptera—pupae—ova. Cocoons, chrysalids especially wanted. Correspondence desired from all parts U. S., Canada, Mexico, Central, South America. Arthur Smith, Los Banos, California.

**Geometers Wanted** for cash, or in exchange for West Coast Butterflies, Noctuids or other Geometers. Edward Guedet, P. O. Box 305, Napa, Calif.

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# ENTOMOLOGICAL NEWS

**APRIL, 1934**

Vol. XLV No. 4

HARRISON GRAY DYAR,
1866-1929.

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, Sc.D., John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows:

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| United States and possessions, Central and South America | $3.00 |
| Canada | 3.15 |
| Foreign | 3.25 |

Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance.
One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 7.00
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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1934, on the fourth Thursday of each month excepting February, June, July and August, and on the third Thursday of February.

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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The printer of the "News" will furnish reprints of articles without covers over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 35 cents; three or four pages, twenty-five copies, 70 cents; five to eight pages, twenty-five copies, $1.40; nine to twelve pages, twenty-five copies, $2.00; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be at the corresponding multiples of these rates. Printed covers for 50 copies, $4.00 or more, according to number of pages bound.

# ENTOMOLOGICAL NEWS

VOL. XLV. APRIL, 1934 No. 4

## A Summary of the Sucking Lice (Anoplura).

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

(Continued from page 74)

For the reception of the 200 known species a total of 57 generic and subgeneric names has been proposed. Of these, one is invalidated by preoccupation and two by community of type with other Anopluran genera, thus leaving 54 names that are nomenclatorially valid. Of these—as an expression of purely personal opinion—the writer rejects 20, thus leaving 34 which in his view represents groups that are worthy of recognition in the present state of our knowledge. All of these rejected generic names are available for use, however, and some of them may possibly be employed by future workers.

The largest genera are *Hoplopleura* with 37 species, *Polyplax* with 28, *Linognathus* with 23 (another undescribed one is at hand), *Enderleinellus* with 19, *Neohaematopinus* with 17 and *Haematopinus* with 11. The number of monotypic genera—14—is rather large, but of these at least half will in all probability receive future additions. The others are probably genuinely monotypic, that is represent groups of which there remains but a single living species. Such are probably *Hybophthirus*, from the "aard vark"; *Haematopinoides*, from a North American mole; *Microphthirus*, from the American flying squirrels and *Lepidophthirus* from the southern sea elephant. The three species of *Microthoracius*, from Camelidae, almost certainly represent the entire complement of this genus and there can not be many more than the three known species of *Fahrenholzia*, from the little rodent family Heteromyidae. So with certain other genera; we may confidently assume that few, or even no, more species will be found.

The problems of distribution are among the most interesting of those associated with the group. Within certain limits it is evident that the distribution of the lice is correlated with the



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phylogeny of the hosts. The genus *Polyplax*, for example, is characteristically present on rodents of the family Muridae; *Hoplopleura* ranges over several rodent families; *Enderleinellus* is strictly sciurid-infesting; *Linognathus*, with one curious exception, occurs only on Bovidae; *Pedicinus* belongs exclusively to the cynomorph monkeys. But there are a number of strange exceptions, some of which are susceptible to reasonable explanation, others of which are not.

How far the parallelism between the parasite and host groups extends and to what extent the classification of one group may legitimately be used to throw light on the phylogeny of the other can not finally be determined until the Anophura are practically completely known and anything which may be said at the present time must be subject to reservations and future revision. For example. In the writer's opinion the lice of the lemuroids as far as known bear out Wood-Jones' contention that the lemurs are not Primates but are related to the tree shrews, but it must be confessed that our knowledge of the lice of the lemuroids is still too fragmentary to permit very definite decisions. It is entirely possible that further collecting will completely destroy the value of their evidence.

The lice of man and the monkeys present some of the most interesting and at the same time puzzling problems to be found in the study of the Order. The evidence is by no means all in, and probably will not be for many years to come, for to be satisfactory it must eventually include a considerable body of laborious and difficult experimentation together with cytological studies on chromosome numbers as well. But as it stands at present some things seem definitely indicated.

The lice of the cynomorph monkeys constitute in the writer's opinion but a single genus, *Pedicinus*, the other two genera which have been named being in his view uncalled for. This genus contains not more than 8 known species, for which some 15 names have been employed. The genus should be retained in the same family with *Pediculus*, but the two are well separated. This is consistent with mammalogists' views as to the relationships of the Cynomorpha.

One's attitude toward the problems within the genus *Pediculus* will be conditioned largely by his basic concept of the meaning of the word "species." As the writer has pointed out elsewhere, there are two different kinds of species. There are those groups of organisms which a systematist working from preserved material labels by the same name and there is a biological concept and the two may not coincide. This condition is well exemplified in this genus. In the writer's view most of the numerous "species" and "subspecies" which have been named in the genus *Pediculus* are purely "specimen species." For example, one so-called species, *P. lobatus* Fahrenholz, as originally described and as re-described by a later author, is based solely upon shrunken specimens, which when properly treated and expanded become another "species." Other species and subspecies have been described with a complete disregard of the possibilities of individual variation—it can not well be determined from a single specimen—and are of but little more significance.

The biological concept of the species, to which the writer has finally come, is this. "A species is a group of individuals forming a genetically linked or interwoven complex." With this definition in mind; with a background of the extensive experimental work on the lice of man which was carried out by Nuttall and his colleagues; and from the examination of a large range of material from different races of man and various species of monkeys and apes, this including various types and other authentic material, the writer has come to these general conclusions.

There are but three known, valid, biological species of the genus *Pediculus*, these being *P. humanus* Linnaeus, of man; *P. schäffi* Fahrenholz, of the chimpanzee; and a third, for which the name *P. mjöbergi* Ferris appears to be applicable, from New World monkeys. The supposed races, or subspecies of *P. humanus* from various races of man, have no existence in fact, with the possible exception of a form which may be characteristic of African negroes.

It is evident that the distribution of the species of *Pediculus*,

as our knowledge stands at the moment, presents some strange aspects. The occurrence of one of these species upon New World monkeys, which are conceded by all mammalogists to be but remotely related to any of the other Primates is unreasonable from any point of view. But this is merely one of several such problems which may eventually be elucidated when our knowledge has been properly extended.

As to the ecology of the sucking lice, we at present know but very little. The work which has been done upon *Pediculus humanus* includes practically all that has been done. Here are still fields that are virtually unexplored.

## The Copperhead as a Destroyer of Cicadas.

It is generally known that the copperhead, *Agkistrodon mokasen* Beauvois, ordinarily subsists upon a diet of frogs, mice, and other small mammals, varied by an occasional bird: consequently, when one of these snakes forsakes the realm of vertebrata for food, the event is worthy of note.

Examination of the stomach contents of an example of this species, collected at Bloomsdale, Missouri, on August 9, 1931, disclosed a large cicada (identified as *Tibicen chloromera* Wlk. by Mr. William T. Davis) in a partly digested state. Of course it frequently happens that insects found in snake stomachs had been eaten previously by vertebrate victims of the snakes rather than by the snakes themselves. In such cases the bones of the vertebrates are usually present with the insect remains, but in the present instance no other animal matter was found, so it is probable that the snake actually seized the cicada for food.

This observation agrees with those of Surface,* who examined the contents of the stomachs of more than forty copperheads and found cicadas (*Magicicada septendecim* Linn.) in six of them.

All six had gorged themselves upon these insects, which constituted eight per cent of the total amount of food consumed by the snakes he examined. This snake appears, therefore, to be a regular destroyer of cicadas, although it still remains to be determined whether copperheads habitually seek them for food or feed upon them only when there is a lack of sufficient vertebrate prey.—Dorothy A. Boyer and Albert A. Heinze, Kimmswick, Missouri.

* Surface, H. A. Zool. Bull. Penna. Dept. Agr., Vol. IV, p. 189, 1906, and Vol. V, p. 74, 1907.

## New Species of Buprestidae (Coleoptera) with Notes Concerning Others.

By Edwin C. Van Dyke, University of California, Berkeley, California.

(Continued from page 66)

**Chrysobothris boharti** new species.

Moderately elongate, more or less depressed, bright green or bronze green above, dark bottle green beneath, shining, the head and undersurface finely sparsely pilose, the elytra also showing a few fine and sparse hairs apically.

Head moderately convex, rather coarsely, closely punctured, interstitial areas alutaceous, occiput with a fine, median longitudinal line, often extending forwards even as far as the clypeus and sometimes impressed, especially in females and posteriorly, the front sometimes with vague callosities and often oblique lines above as well; clypeus broadly, shallowly emarginate, with sides of emargination a bit angulate; the eyes large and well separated; antennae piceous or more or less greenish towards base, gradually more slender to tip, third segment elongate but not quite as long as the two succeeding segments together, the fourth and following segments transverse.

Thorax about twice as wide as long, sides somewhat parallel at middle and obliquely convergent towards base and apex, dorsum convex, deplanate laterally, rather coarsely, closely punctured especially at sides, generally with transverse strigosities, without well defined median sulcus or callosities, though often with a fine median smooth line extending from base to center which is in turn a bit impressed in a few individuals, the interstitial areas also alutaceous as in the case of head and elytra.

Elytra but little wider than prothorax, sides slightly sinuate, broadest back of middle, obliquely narrowed towards apex, each elytron individually rounded at apex, and without well defined serrations though with vague indications of same under high magnification, the disk rather closely, distinctly punctured on basal area, more finely apically, basal impressions distinct, the median and posterior evident though vague, and several of the costae more or less defined.

Body beneath coarsely, closely punctured on prosternum, coarsely, shallowly punctured on pleurae, the abdomen more finely, sparsely punctured and shining and without evident serrations on lateral margins, the apex of last ventral segment more coarsely and closely punctured than in front, and the prosternum definitely lobed in front. Length 8-10 mm., width 3.75-4.5 mm.

♂. Generally smaller and less robust, with prosternum more densely punctured and clothed with rather long pile, the last ventral segment rather deeply, semi-circularly emarginate at apex, and the anterior tibiae arcuate and with an elongate dilation at apex.

♀. With prosternum less closely punctured at middle and more finely, sparsely pubescent, the last ventral either finely notched or but faintly emarginate at apex, and with anterior tibiae feebly arcuate and without dilatation at apex.

*Holotype* male, *allotype* female (Nos. 3758 and 3759 Mus. Calif. Acad. Sci.), and five *paratypes,* all collected by Mr. R. M. Bohart at an altitude of 1100 feet on Mt. Hoffman, Yosemite National Park, CALIFORNIA, July 30, 1933. The holotype, allotype and two paratypes will be deposited in the collection of the California Academy of Sciences through the generosity of Mr. Bohart, the other specimens remaining in his possession.

This interesting species does not strictly fall into any of the groups given by Horn.[3] Its non-serrate last ventral and vague elytral foveae and costae would place it in Group VIII near *prasina* Horn but it lacks distinct elytral serrulations. It is also somewhat related to *cyanella* Horn of Group V as shown by the dilated apices of the anterior tibiae in the male and slightly pubescent elytra. Its most conspicuous feature is the practically smooth elytral margin.

DICERCA TENEBRICA Kirby.

*Dicera prolongata* Lec. will have to be placed as a synonym of the above. Though Kirby's type seems to be lost, there is a specimen from the Saunder's collection in the British Museum which is marked "Compared with type of *tenebrica* Kirby." This also agrees with LeConte's *prolongata.* Crotch[4] called attention to the fact that the description of *tenebrica* fitted *prolongata.* The locality where the former was collected is also the region where the latter is normally found, not where *divaricata* (Say) is most common.

[3] A monograph of the species of *Chrysobothris* inhabiting the United States, by Geo. H. Horn, Trans. Am. Ent. Soc., Mch. 1886, p. 71.

[4] Proceed. Nat. Sci. Phila., vol. XXV (1873), pp. 84-85.

DICERCA SEXUALIS Cr. and DICERCA CALIFORNICA Cr.

I consider that these two are the same species, the first name unfortunately having priority. They have the same range and only differ as regards the apices of the last ventral segment in the females. I have found the same differences among individual females of the more common *tenebrosa* Kirby, so consider the character of no specific value.

DICERCA MUTICA Lec.

The only known specimen of this is the type in the LeConte Collection at Cambridge. To me, after having studied it critically at least three different times, it appears to be nothing more than an unnatural or deformed specimen of *Dicerca obscura* (Fab.). It is definitely asymmetrical, the prothorax in particular more dilated on the right side, the left similar to that in typical *obscura*. The elytral apices which have the outer spine eliminated might easily have this as a result of the general deformity. If it were a good species, it seems hardly possible that a second specimen should not have been collected since the first was taken over seventy years ago.

## Notes on the Behavior of Creophilus villosus Grav. (Coleoptera: Staphylinidae).

By CYRIL E. ABBOTT, Morgan Park, Illinois.

The generally accepted conclusion that *Creophilus villosus* is necrophagous (see Comstock, J. H., Introduction to Entomology, p. 489) has been drawn from the fact that the species occurs in great numbers on animal carcasses. But the obvious preference of the beetle for living blowfly larvae, raises several interesting questions. Is *Creophilus* drawn to carrion through an olfactory sense? Are the antennae, or palpi, or both, olfactory in function? How does *Creophilus* recognize the edibility of fly maggots?

Adult beetles were kept in a cylindrical cardboard box about seven inches in diameter. It was half filled with sand and covered over with a double thickness of cloth. Experiments were conducted in a glass fruit jar of quart capacity. While

unmolested, most of the beetles, excepting for short intervals of exploration, lay buried in the sand. Sometimes, especially at night, they attempted to escape by gnawing through the cloth covering.

After a period of about thirty hours, during which the insects had received no food, and while all were buried, I placed on the surface of the soil a piece of freshly cooked beef about the size of a walnut. In a few minutes several of the beetles had left their burrows to gnaw at the meat. About this time the discovery of the predilection of the beetles for maggots prompted further experiments.

About fifty living maggots, after being carefully washed, were placed in a cloth sack suspended about one-fourth inch above the sand. The six beetles used in this test had the antennae amputated close to the head. Nothing unusual was noted until the morning of the fourth day from the beginning of the test, at which time the remains of several maggots were found, and an opening about one-fourth inch in diameter was found in the sack.

This experiment was repeated with the following modifications: the maggots were dead and the *Creophili* lacked both the antennae and palpi. After three days the maggots were still untouched. However, when this test was repeated under identical conditions but with a different group of beetles, not only was a hole made in the sack, but one beetle was actually seen devouring a maggot.

Maggots, living and dead, were fed to individual beetles variously treated. Four normal beetles made attempts to seize maggots 1 cm. distant. Beetles without antennae and palpi, as well as those without antennae, made no attempt to take the maggots until the latter were in actual contact with their heads.

Small sections of match stick, about the size and color of individual maggots, were attached to a thread and dragged over the sand not far from the beetles. At a distance of more than 2 cm. *Creophilus* appeared not to notice these bits of wood. More often the stick was seized at a distance of 1 cm.

or less. Of course, when once seized, the stick was quickly rejected.

Mutilated specimens of *Creophilus* appeared to live as long as normal specimens, and since they copulated quite freely, their behavior could hardly be considered abnormal.

In spite of their crudity, the experiments detailed above do seem to indicate that *Creophilus villosus* is by preference predaceous upon fly maggots and possibly other small insects. The mandibles of this species are sickle-shaped, and hence admirably fitted for seizing prey, while this very structure makes the chewing of heavy, muscular tissue difficult, as any one who has observed the attempts of *Creophilus* to eat beef will realize. On the other hand, it is fairly obvious that this species is attracted to the place where it feeds by the odor of decaying flesh. Indeed odor must be the chief guide to the prey itself. The beetles see badly. Although large objects in motion (such as the movements of the experimenter) may send the beetles running wildly about, small objects are scarcely noticed. Vision cannot function very well beneath a carcass. No doubt *Creophilus* is guided to some extent by contact.

Judging from the behavior of mutilated specimens, the antennae and palpi of *Creophilus* may be the seat of an olfactory sense. That the sense is not restricted to those organs is indicated by the fact that mutilated specimens still reacted to maggots, and even to decaying flesh.

## An Abnormal Butterfly Collected in the Field. (Lepid.: Pieridae).

On the 27th of July, 1933, a male *Pieris protodice* Boisduval and Leconte was captured in the sweeping net near Glen Lake, Hennepin County, Minnesota. The right eye was white, the left red. The left antenna was missing. Careful removal of the scales about the antennal region failed to reveal any antennal stump or any sign that an antenna had been present on the left side. The butterfly died shortly after capture. Dissection showed normal male genitalia. The white eye appeared to have a complete complement of ommatidia and was merely lacking in pigmentation.—Nellie M. Payne, University of Minnesota.

## A Simple Valve for Controlling Liquid Flow under Hydrostatic Pressure, through Rubber Tubing.*

By S. W. Simmons, Washington, D. C.

The principle of using a glass bead in rubber tubing to check or regulate liquid flow, although occasionally employed in laboratories, apparently is not widely known. It is desired here to call attention to this simple device.

The convenience of a valve that controls the rate of flow, and instantly stops it when shut off, is evident to most users of ordinary pinch-cocks. In making such a valve a solid, round, glass bead is inserted into the tubing, (Fig. 1A). The bead should be slightly larger than the inside diameter of the tube

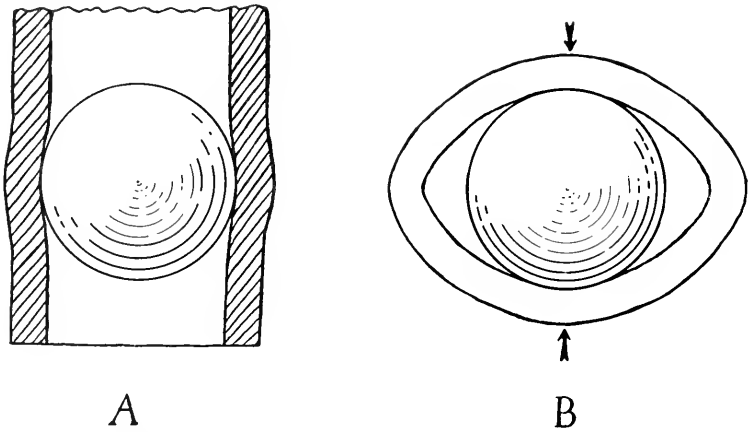


Fig. 1. A. Longitudinal section of closed valve. B. Cross section of closed valve, showing openings made by applying pressure at arrow points.

in order to hold it in place and prevent leakage. By pressing the tube between the fingers, at the point of the bead, a bulge is caused on each side of the obstruction (Fig. 1B), permitting liquid to pass. The rate of flow is proportional to the pressure applied. It may be varied from a mere drop to a steady stream.

* From the Division of Insects Affecting Man and Animals, U. S. Bureau of Entomology.

With certain pinch-cocks it is difficult, and often impossible, to obtain a slow stream of liquid, and to check it immediately; and when rapidly transferring the tube from one container to another, as in tubing culture media, this excess liquid usually drops on the table or on the sides of the culture tube. Rarely does a drop pass out after pressure is released from the bead valve. After releasing most pinch-cocks it is necessary to hold them in the correct position for reclamping. With the bead this is rendered unnecessary, as the tube holds it firmly in place preventing any dislocation. Tubing clamped for a time by a pinch-cock becomes permanently flattened, thus obstructing liquid flow. A bead valve does not press the tube out of its normal shape.

The valve is not suitable where a large forceful stream is desired, as when filling large containers from a reservoir. Five hundred cc. of water is delivered from a funnel through an unobstructed 16-inch tube, 4 mm. inside diameter, at the average rate of 25 cc. per second, whereas the bead valve allows a maximum flow of about 5 cc. per second, under the same conditions. The latter amount may be varied to quantities approaching zero.

The bead valve is especially recommended for work requiring quantities of liquid which must be controlled, as in filling small vials with alcohol, etc., tubing culture media, capping anaerobic media with hot oils, and rinsing stains from bacteriological slides. It will be found very useful on the end of burettes when doing titration or other work requiring precise measurements. Thin-walled tubing should be employed with this type of valve, as it is tiresome to maintain extended pressure on heavy tubing.

Summary of advantages of the bead valve: (1) Convenient, (2) simple, (3) inexpensive, (4) does not dislocate by slipping, (5) stops liquid flow instantly when pressure is released, (6) does not pinch tubing out of shape, (7) permits an accurate control of the rate of liquid flow.

# Studies of Semidesert Ants (Hymenoptera: Formicidae).

By A. C. Cole, Jr., Twin Falls, Idaho.

## 1. Seasonal Successions of Ants in a Typical Portion of the Sagebrush Semidesert.

In spite of the popular opinion of the stability of an ant colony contain factors operating on the individuals tend to make the colony an unstable unit. Thus, as seasonal successions occur among non-social animals and plants, they may appear also in the case of colonies of ants—typical social units, each individual of which is an integral part of its colony.

As is well known, a group of factors, rather than a single one, brings about succession, although at times one or more of these dominates. Breaking up the group, we may say that in this particular case the apparent dominants are moisture and temperature, and these together produce and modify other factors. Composition of soil is important in ant successions only when considered from the standpoint of moisture, temperature, and the existing vegetation.

During early spring a great many ant colonies inhabit superficial nests on hill slopes, chiefly those facing the south. At such locations atmospheric and soil temperatures are higher than at others. The moisture content of the soil remains relatively high in spite of the higher temperatures and stronger winds on the slopes. The soils of the more level areas and, in many places, those of the north-facing slopes, are almost too moist for ant colonization and activity. Most of the ants moved from these locations during the previous fall to places with more favorable moisture and temperature conditions. As the spring season progresses precipitation decreases and temperatures reach and fluctuate at higher levels. The soil dries and its temperature at various levels is and remains much higher than earlier in the season. Meanwhile, the soil on the south-facing slopes has become practically air-dry as the result of high mean temperatures and rapid evaporation of moisture, and the annual vegetation becomes scant and dry. It is de-

cidedly a poor habitat for most ants, and except in protected areas, such as along rock ledges, where the temperature of the soil is lower and the moisture content higher, or along a stream where sufficient moisture continually prevails in the soil, the area is limited to a few species characteristic of a xeric habitat. The species which prevailed on the south-facing slopes during the spring later migrate to north-facing slopes with more favorable conditions, and there they may be found throughout the summer. As late autumn appears, many of the ants again migrate, this time from the north-facing to the south-facing slopes because of decreasing temperatures of the summer habitat.

An area 1/10 mile square was selected on a typical south-facing slope in the semi-desert region near Twin Falls, Idaho, in which to study seasonal ant successions. The results of this study appear in Table 1. During spring and autumn there was a total of fifteen species, subspecies and varieties present, while during the summer only twelve, and during the winter fourteen. This summer minimum was caused apparently by the hot, dry condition of the hillslope. Among the species tending to shift habitats in response to changes in climate were *Lasius niger americanus* Emery, *Lasius niger sitkaënsis* Pergande, *Tapinoma sessile* Say, *Leptothorax curvispinosus rugatulus* Emery, *Lasius umbratus mixtus aphidicola* Walsh, and *Formica fusca subaenescens* Emery. It will be noted by consulting the table that the number of nests of moisture-loving species noticeably declined during the summer and in most cases normally increased in autumn and winter. The number of nests of mound-building species, however, as well as those of *F. subpolita* and *F. subpolita camponotoceps*, remained constant throughout the year.

Many species, particularly the mound-building ones, spend their entire existence in one habitat. Examples of these are *Formica rufa obscuripes* Forel, and *Pogonomyrmex occidentalis* Cresson, which because of adequate nest construction are well able to withstand marked fluctuations in climate.

## TABLE 1.

### Seasonal Successions of Ants on a South-facing Hillside Near Twin Falls, Idaho.

| Spring | No. of Colonies | Summer | No. of Colonies | Autumn | No. of Colonies | Winter | No. of Colonies |
|---|---|---|---|---|---|---|---|
| Formica subpolita Mayr | 32 | Formica subpolita Mayr | 32 | Formica subpolita | 32 | Formica subpolita Mayr | 32 |
| F. subpolita camponoticeps Whlr. | 12 | F. subpolita camponoticeps Whlr. | 12 | F. subpolita camponoticeps Whlr. | 12 | F. subpolita camponoticeps Whlr. | 12 |
| F. fusca subaenescens Emery | 16 | F. fusca subaenescens Emery | 2 | F. fusca subaenescens Emery | 4 | F. fusca subaenescens Emery | 10 |
| F. fusca gelida Whlr. | 3 | F. fusca gelida Whlr. | 3 | F. fusca gelida Whlr. | 3 | F. fusca gelida Whlr. | 4 |
| F. rufa obscuripes Forel** | 8 | F. rufa obscuripes Forel** | 8 | F. rufa obscuripes Forel** | 8 | F. rufa obscuripes Forel** | 8 |
| Polyergus breviceps Mayr | 1 | Polyergus breviceps Mayr | 0 | Polyergus breviceps Mayr | 1 | Polyergus breviceps Mayr | 1 |
| Lasius niger americanus Emery* | 16 | Lasius niger americanus Emery* | 7 | Lasius niger americanus Emery* | 12 | Lasius niger americanus Emery* | 13 |
| L. niger sitkaënsis Pergande* | 2 | L. niger sitkaënsis Pergande* | 0 | L. niger sitkaënsis Pergande* | 3 | L. niger sitkaënsis Pergande* | 0 |
| L. umbratus mixtus aphidicola Walsh* | 5 | L. umbratus mixtus aphidicola Walsh* | 1 | L. umbratus mixtus aphidicola Walsh* | 4 | L. umbratus mixtus aphidicola Walsh* | 7 |
| Tapinoma sessile Say* | 6 | Tapinoma sessile Say* | 1 | Tapinoma sessile Say* | 7 | Tapinoma sessile Say* | 9 |
| Pogonomyrmex occidentalis Cresson** | 6 | Pogonomyrmex occidentalis Cresson** | 6 | Pogonomyrmex occidentalis Cresson** | 6 | Pogonomyrmex occidentalis Cresson** | 6 |
| Leptothorax rugatulus Emery* | 7 | Leptothorax rugatulus Emery* | 6 | Leptothorax rugatulus Emery* | 4 | Leptothorax rugatulus Emery* | 6 |
| Monomorium minimum Buckley* | 3 | Monomorium minimum Buckley* | 1 | Monomorium minimum Buckley* | 2 | Monomorium minimum Buckley* | 1 |
| Solenopsis molesta Say* | 21 | Solenopsis molesta Say* | 8 | Solenopsis molesta Say* | 17 | Solenopsis molesta Say* | 23 |
| Aphaenogaster uinta Whlr.* | 7 | Aphaenogaster uinta Whlr.* | 0 | Aphaenogaster uinta Whlr.* | 6 | Aphaenogaster uinta Whlr.* | 9 |
| Total | 145 | Total | 86 | Total | 121 | Total | 141 |

* Moisture-loving species.

** Species with stationary nests (mounds).

## 2. Ant Communities of a Sand Dune Area in Southern Idaho with Special Reference to the Dominant Vegetation.

*Description of the Area.* Many large active dunes of pure sand are to be found in a semidesert area about fifteen miles south and west of Hammett, Idaho. The dune area is composed of several diverse units. On the eastern margin is an extensive level plain of mixed vegetation consisting chiefly of *Atriplex canescens, Atriplex confertifolia, Artemisia tridentata, Chrysothamnus graveolens, Chrysothamnus* sp., *Sarcobatus vermiculatus,* and *Bromus tectorum.* West of this plain are small rolling hills of sand covered with shrubs. These may be spoken of as small stable dunes. They are covered with clumps of *Artemisia tridentata, Chrysothamnus graveolens, Sarcobatus vermiculatus,* and *Atriplex confertifolia.* Still farther west are long, low dunes of sand in an active condition. These support plants of *Psoralea* sp. whose long twining root-stalks are constantly being exposed on the surface. The next unit of the area is a shallow valley of sand in which grow many plants of *Oryzopsis hymenoides Franseria* sp., and *Eriogonum* sp.* This community is more or less protected from the force of the wind by the low narrow dunes on the east and the large dunes on the west which form the next part of the area. These large dunes are constantly being shifted by the wind and support no vegetation of any nature. Just beyond the large dunes is a deep valley in which grows abundant vegetation, consisting of *Chrysothamnus graveolens, Artemisia tridentata, Sarcobatus vermiculatus, Atriplex canescens, Hilaria* sp., and *Salix* sp. Most of the plants of this community grow in clumps with large areas of intervening bare sand. West of this valley are many small dunes which merge into another plain of mixed vegetation.

*The Plant Communities.* The plant communities may be divided into, (1) the Sagebrush-Mixed Community, (2) the Shrub-Hill Community, (3) the Psoralea Community, (4) the

* The plants were determined by R. L. Piemeisel, U. S. Bureau of Plant Industry, Twin Falls, Idaho.

Oryzopsis-Franseria Community, and (5) the Shrub-Perennial Grass Community. Between the Oryzopsis-Franseria and Shrub-Perennial Grass Communities is a barrier of large active dunes. The composition of these communities has been discussed in a foregoing paragraph.

*The Ant Communities.* Three communities of ants were evident; namely, (1) the Pogonomyrmex-Formica Community, (2) the Myrmecocystus Community, and (3) the Pogonomyrmex-Myrmecocystus Community. There was a gradual overlapping of all three.

The Pogonomyrmex-Formica Community occupied the level semi-desert plain which contained the Sagebrush-Mixed Plant Community. Predominant were incipient and fully-developed mounds of the Occident Ant (*Pogonomyrmex occidentalis* Cresson). These mounds were scattered in the Bromegrass (*Bromus tectorum*) areas between the shrubby vegetation. Under rocks in the bare areas were many colonies of *Formica subpolita* Mayr., and a few nests each of *Lasius niger americanus* Emery, L. *niger sitkaënsis* Pergande, and *Tapinoma sessile* Say. There were also a great many incipient mounds containing only queens of *Myrmecocystus mexicanus* subsp. or var.

The Myrmecocystus Community was found to occupy the Shrub-Hill Plant Community on the small stable dunes. Its dominant was *Myrmecocystus melliger semirufus* Emery and the small, exquisitely sculptured crater nests abounded in the bare sandy areas between the shrubs. This appears to be the northernmost record of *M. semirufus* which is quite common in the deserts of Arizona, New Mexico, and California. Winged males and females, as well as large numbers of workers were present in all of the nests. Associated with *M. melliger semirufus* were many colonies of *M. mexicanus* subsp. or var., a large semitransparent, lemon-yellow ant. Winged forms of both sexes were present and workers abundant in nests of this variety.

The Myrmecocystus Community merged into the Pogono-

myrmex-Myrmecocystus Community in the area occupied by the Shrub-Perennial Grass Plant Community. No ants were found on the intervening dunes or in the shallow valley supporting the Oryzopsis-Franseria Plant Community. Components of this ant community were *Pogonomyrmex occidentalis* and *Myrmecocystus melliger* subsp. or var. Neither species occurred abundantly but there were more nests of *P. occidentalis* than of the latter. The mounds of both species were small and scattered and contained relatively few individuals.

*The Biotic Communities.* Combining the plant and ant communities we may express them as follows: (1) the Sagebrush-Mixed—Pogonomyrmex-Formica Community, (2) the Shrub Hill—Myrmecocystus Community, (3) the Psoralea—Ant Free Community, (4) the Oryzopsis-Franseria—Ant Free Community, and (5) the Shrub-Perennial Grass—Pogonomyrmex-Myrmecocystus Community.

The above classification enables one to secure a clear picture of the component units of a typical sand dune area in the semidesert region of the western United States. •

(To be continued)

## Vespula germanica Attacks a Living Eacles imperialis (Hymen.: Vespidae; Lepid.: Citheroniidae).

The great variety of food taken to the nest by *Vespula germanica* Fabr. is well known, and it should not be surprising to observe these wasps attacking live adult insects. The Raus (Wasp Studies Afield, 1918, pp. 295-296) list the following kinds of animal food which they saw used by wasps of this species: greasy chicken bones, eyes of dead rat, dead roach, cold broth, and head of rooster, and in ENTOMOLOGICAL NEWS, June, 1930 (xli: 185-190), Rau gives records of their attacks on a moth and a grasshopper. The following instance of similar behavior adds another definite record to our knowledge of their feeding habits; it is interesting because of the disproportionately small size of the wasp as compared to that of its prey.

Late in the afternoon of August 3, 1933, at Ranken, St. Louis County, Missouri, I saw a battered female *Eacles imperialis* Drury lying on the ground beneath a shrub, its wings quivering

as though flight were imminent. While I was hurriedly preparing to take the moth alive for the purpose of securing eggs, a little yellow-jacket, *Vespula germanica*, emerged from the moth's abdomen. Closer inspection revealed a hole on the lower surface of one of the abdominal segments, just large enough to permit the passage of the wasp. I placed the moth on the ground again and awaited the wasp's return. I watched while the wasp made one trip after another; the moth would flutter feebly while the wasp was working inside of its body, but remained quiet while it was away. The nearly uniform length of the wasp's absences and the fact that there was never more than one wasp present at a time made it certain that this one was always the same individual, and that it did not lead others to the place as bees do under similar circumstances. On each trip, after working for several minutes inside the moth's body, the wasp would fly to a branch of the shrub overhead where it would cling while adjusting its burden, which could be seen as a yellow mass larger than the wasp's head. Then a short, circling flight of orientation would be followed by a swift flight away toward the northeast. Attempts to find the nest by following the wasp were unsuccessful. At the conclusion of the observations, after about a dozen flights, the moth was quite dead; most of the abdomen had been cut away by the wasp and carried to the nest, and a large cavity had been dug from the abdomen into the interior of the thorax.—HAROLD O'BYRNE, Webster Groves, Missouri.

## Cresson's Synopsis of the Hymenoptera.

It was rather startling to find in Dr. Clarence E. Mickel's article "Contribution to Taxonomy of Insects" Ann. Ent. Soc. Amer., XXIII, pp. 507-512, (1930) complete omission of reference to one of the best known works on the taxonomy of the Hymenoptera, the "Synopsis of the Families and Genera of the Hymenoptera of America North of Mexico, together with a Catalogue of the Described Species and Bibliography," by E. T. Cresson, 1887. This contribution of 350 pages is the only work of this kind on the North American fauna. It has never been revised or brought up to date, and consequently is consulted by all hymenopterists having access to this scarce publication. No doubt Dr. Mickel, who is making a special study of the hymenopterous family Mutillidae, had a copy on his desk while writing this article and, being so near him, it was overlooked.

## Notes on Orthoptera from Northwestern Minnesota.

By Morgan Hebard.

During the summer of 1933 a large series of Orthoptera was secured at Plummer, in northwestern Minnesota, by D. Denning. As we have recently reported on the Orthoptera of Minnesota [1] and as several interesting extensions of distribution are included in this material, the following brief notes are here presented.

Plummer is located near the western edge of the narrow belt of deciduous forest, between the prairie and coniferous-deciduous forests. This forest there consists of oak, poplar, elm, cottonwood and a few ash. The elevation is between 1000 and 1500 feet. Collecting was largely confined to an area along the Clearwater River and the adjacent fields and swamps.

Acrydium granulatum Kirby. Large series were secured.

Acrydium acadicum acadicum (Scudder). 3 ♂, 8 ♀. The majority were taken in late May and early June.

Acrydium ornatum (Say.) 4 ♂, 14 ♀ (six females caudate, one male and one female subcaudate, the others abbreviate) were captured from July 1 to October 4. In this series the one or two largest specimens are, as is often the case, extremely difficult to distinguish from *acadicum acadicum*. More difficulty in the Plummer series, lies in the fact that considerable individual variation in the large series of *arenosum angustum* is shown and a number of specimens of that insect could easily be mistaken for *acadicum acadicum* or *ornatum*. Plummer is a northern limital point in this longitude.

Acrydium arenosum angustum (Hancock). 50 ♂ and 70 ♀ were secured from May 29 to September 17 and a large series of immature individuals was also taken. A goodly percentage of the adults were subcaudate. Two males and five females have a pale pronotal saddle and one female has the dorsum of the pronotum light red brown with latero-cephalic portions alone dark. Plummer is a northern limital point in the distribution of this race.

Tettigidea lateralis lateralis (Say). 15 ♂ and 23 ♀, taken May 27 to August 22 and 13 immature individuals were secured. The adults are very depauperate. Two females are

[1] Minnesota Tech. Bull. 85, pp. 1 to 61 (1932). Note that the collections made in 1932 are separately recorded on pages 54 to 61.

caudate, the other adults abbreviate. The series is graceful in form, the average more slender than in southwestern series but not quite as slender as the majority from the southeast. This bears out strongly our recent decision that *lateralis parvipennis* (Harris) may not be worthy of racial recognition, but if recognizable is certainly not a race which occupies all of the northern portions of the distribution of the species, as we had for some time supposed. Plummer is a northwestern limital point for the insect.

Orphulella speciosa Scudder. A large series was taken. Plummer is a northern limital point.

Orphulella pelidna (Burmeister). 4 ♂ and 13 ♀ were taken at Plummer, which is a very slight extension northward of the known range of the species.

Chloealtis conspersa Harris. 12 ♂ and 7 ♀. One male and one female are macropterous. In the many hundreds of specimens of this species which we have seen, there is only one other macropterous male, from Duluth, Minnesota. Macropterism in females is infrequent but by no means as rare as in males.

Chorthippus curtipennis (Harris). A very large series was taken including occasional macropterous individuals.

Stethophyma gracile (Scudder). 5 ♂ and 4 ♀ were taken June 16 to September 24.

Stethophyma lineatum (Scudder). 2 ♂ were secured July 29 and August 23.

Ageneotettix deorum (Scudder). Only three females were secured at Plummer. Though this a northern limital point the species undoubtedly occurs over all of extreme western Minnesota.

Arphia pseudonietana (Thomas). 8 ♂ and 9 ♀ show decided size variation, two being extremely small.

Chortophaga viridifasciata (DeGeer). The majority of 17 ♂ and 12 ♀ were taken in late May, but a battered individual was secured as late as August 15.

Encoptolophus sordidus costalis (Scudder). Recent additions to our series have convinced us that two species can not be recognized and that *costalis* must be considered the western race of *sordidus*. A large series was captured, all of the specimens being typical of *sordidus costalis*. A goodly number of the specimens are partly or largely green.

Camnula pellucida (Scudder). Among the thirty specimens a number are very pallid.

PARDALOPHORA APICULATA (Harris). 2 ♂ were secured May 27 and June 1.

DISSOSTEIRA CAROLINA (Linnaeus). Five specimens were taken.

SPHARAGEMON BOLLI Scudder. 6 ♂ and 7 ♀ were taken July 18 to August 18 at Plummer, which is a western limital point in the known range of the species.

SPHARAGEMON COLLARE (Scudder). 17 ♂ and 18 ♀ show unusually great variation in size and coloration.

TRACHYRHACHIS KIOWA KIOWA (Thomas). 26 ♂ and 30 ♀ are typical of this Great Plains race.

HESPEROTETTIX VIRIDIS PRATENSIS Scudder. 2 ♂ and 2 ♀ were secured at Plummer on August 12 and 14, that locality being a northern limit. These specimens are typical of *viridis pratensis*.

MELANOPLUS BIVITTATUS (Say). The caudal tibiae in the 8 ♂ and 7 ♀ are pink in one male and two females, pink distad in one female, greenish yellow becoming yellow distad in two males and one female and bluish black paling to glaucous or yellowish distad in the others.

MELANOPLUS DAWSONI (Scudder). In the series of 11 ♂ and 12 ♀ there are seven females and four males which are macropterous. This is a very high percentage for that condition in the present species.

MELANOPLUS GLADSTONI (Scudder). 2 ♂ and 5 ♀ taken August 18 to September 4 are very small for the species, two females being the smallest we have seen.

MELANOPLUS FEMUR-RUBRUM FEMUR-RUBRUM (DeGeer). Nineteen specimens were taken.

MELANOPLUS INFANTILIS Scudder. 10 ♂ and 5 ♀ were secured at Plummer from August 8 to September 4. This is a northeastern limital record for the species.

MELANOPLUS FASCIATUS (F. Walker). 7 ♂ and 2 ♀ were taken from July 17 to 21.

MELANOPLUS BOREALIS BOREALIS (Fieber). A female taken at Plummer on June 21 is perfectly typical of *borealis borealis*.[1] This constitutes a southern limital point for this northern race, though some specimens from northern Minnesota which we re-

[1] It agrees fully with material from Birch River and Aweme, Manitoba, now before us. The species is exceedingly plastic and the southern race *junius* may prove to be no more than a pallid color phase in response to a more temperate environment. Detailed study of many series can alone determine how many races of *borealis* should be recognized.

ferred to *borealis junius* we believe should also be assigned to the present race.

MELANOPLUS MEXICANUS MEXICANUS (Saussure). Six specimens were taken.

MELANOPLUS BRUNERI Scudder. 3 ♂ and 10 ♀ were captured from July 21 to September 17.

MELANOPLUS KEELERI LURIDUS (Dodge). Decided size variation is shown by the 5 ♂ and 5 ♀, taken July 27 to August 22, at Plummer. This is a northern limital point.

SCUDDERIA PISTILLATA Brunner. 2 ♂ and 2 ♀ were captured.

SCUDDERIA FURCATA FURCATA Bruner. A northern limit in the longitude of western Minnesota is Laporte, where a female was taken August 1, 1930, by D. Denning.

ORCHELIMUM GLADIATOR Bruner. 3 ♂ were taken June 16 to August 8 at Plummer.

CONOCEPHALUS FASCIATUS FASCIATUS (DeGeer). 4 ♂ and 1 ♀ were secured from June 16 to September 22.

CONOCEPHALUS SALTANS (Scudder). At Plummer a macropterous female was taken August 7 by D. Denning.

CEUTHOPHILUS MACULATUS (Harris). A very small immature male was found alive on the snow at Plummer on November 19 by D. Denning.

GRYLLUS ASSIMILIS Fabricius. 1 ♂, 1 ♀, June 2 and July 1, Pennsylvanicus Variant; 1 ♀, September 4, Neglectus Variant.

NEMOBIUS FASCIATUS FASCIATUS DeGeer. 3 ♂ and 1 ♀ were taken.

OECANTHUS NIGRICORNIS NIGRICORNIS F. Walker. Three females were captured, all large and stout, with pronotum immaculate; two with antennae suffused and Class 6′ marking, one with antennae faintly suffused only at juncture of joints and Class 4 marking (in this feature as is normal in *nigricornis quadripunctatus*.)

TRIDACTYLUS APICIALIS Say. June 1 to October 5, 5 immature individuals; September 3, 1 ♀ (macropterous). All are unusually recessive in coloration. Plummer is a considerable extension northward of the known range of *apicialis*.

TRIDACTYLUS MINUTUS Scudder. June 1, 2 ♂, 1 ♀ (one male macropterous, pair brachypterous) and 1 large juv. ♂. Plummer is also in this case a considerable extension northward of the known range of the species.

# Entomological Literature

COMPILED BY 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 o American or exotic species will be recorded.

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

All continued papers, with few exceptions, are recorded only at their first ins'allments.

(*) Papers containing new forms or names not so stated in titles, have an * within parentheses thus (*) following the pagination of reference to paper.

(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 Entomolog, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

**Note.** Titles of papers containing new forms or new names will be indicated by an asterisk within parentheses at end of reference, (*).

*Papers published in the Entomological News are not listed.*

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**HYMENOPTERA.—Arlé, R.**—Sobre a nidificacão, a biologia e os parasitos de Sceliphron (Trigonopsis) abdominalis. [An. Acad. Brasileira Sci.] 5: 205-211, ill. **Atwood, C. E.**—The genera Halictus and Andrena in western Nova Scotia. [Canadian Jour. Res.] 10: 199-220, ill. (*). **Cockerell, T. D. A.**—Records of western bees. [40] No. 697: 15 pp., ill. (*). Two new bees from Colorado. [19] 29: 17-18. **Dow, R.**—A new Gorytes from Paraguay (Sphecidae). [19] 28: 218-219.* **Fernald, H. T.**—The North American and West Indian digger wasps of the genus Sphex (Ammophila). 1934: 167 pp., ill. (*). **Rodeck, H. G.**—Records of American Bembicidae. [40] 692: 2 pp. (*).

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THE PROBLEMS OF INSECT STUDY. PAUL KNIGHT, Assistant Professor of Entomology, University of Maryland. Copyright 1933. Edwards Brothers, Inc., Lithoprinters and Publishers, Ann Arbor, Michigan. 3 + 118 lithoprinted pages, 10¾ x 8 inches, on one side of the leaves only, many illustrations. For sale only by the Students' Supply Store, University of Maryland, College Park, Md. Price $3.00 plus postage.—The introduction begins as follows: "This is a book on entomology for people who encounter insects in newspaper columns, gar-

dens, clothes presses, or at the seaside; people who would like to learn something about them but do not want to become entomologists in order to do so. It might be called a consumer's entomology rather than an entomologist's guide book, for it is designed to help the person who uses entomological information rather than gives it. . . . The organization of this manuscript has been based on the things that have interested the largest number of students in the writer's entomology classes. Records of these have been kept for the past eight years. Some of these might not be considered entomology, while others often termed highly important have been omitted or slighted."

The insect problem, we are told, is: "First the recognition of the serious competition between mankind and the insects, and second, the development of effective methods of insect control, with one eye always on the Utopia of complete extermination" (p. 6). The author, one of mankind, although he has devoted much space to the second aspect of this problem, may be said to have written in praise of insects also, for he considers their structure to be perfect (pp. 47, 53), their instincts never-failing (p. 52), and to have enabled them to survive, during long periods of time, in competition with other animals presumably less perfect. We would like to see this question discussed by some one not an entomologist and to see whether equal perfection of structure can be shown to exist for some other groups of terrestrial and freshwater animals.

The first, second and sixth chapters, totalling 74 pages, are concerned with the relations between insects and man; the third, fourth and fifth, or 37 pages, deal with the geological distribution, anatomy, physiology, development and classification of insects, the last-named only as far as the orders. There is considerable duplication in the second and sixth chapters, which we think might be profitably compressed or united. There is a list of references at the end of each chapter, and of Entomological Literature in Appendix I near the end of the volume. Appendix II is a list of 50 of the more important insects not native to the United States and III a list of 14 native insects, both of human economic value. As we infer that this lithoprinted edition is the prelude to one in type, we suppose that fact to be the reason for the absence of an index which every book of this nature should have. Personally, and we are not alone in this, we find the width of page in this and similarly produced volumes, to be too great for comfortable reading for any length of time. P. P. CALVERT.

## OBITUARY

With great regret we note in *Science* for March 2, 1934, announcement of the deaths of WILLIAM BEUTENMÜLLER on February 24th and of DR. ROBERT H. WOLCOTT on January 23rd. We are indebted chiefly to *American Men of Science* for the following biographical details.

Mr. Beutenmüller was born at Hoboken, New Jersey, March 31, 1864, and educated in public and private schools in New York City. He was curator of the department of entomology in the American Museum of Natural History from 1888 to 1912. He married Edna Hyatt, daughter of the distinguished naturalist, Alpheus Hyatt, and her skilful pencil illustrated many entomological publications of the early part of the present century.

Mr. Beutenmüller edited the first eleven volumes of the *Journal of the New York Entomological Society*, of which organization he was president in 1900. His entomological publications dealt with the Orthoptera (1894) and Lepidoptera (1890-1902) of the vicinity of New York City, insects of the Black Mountains of North Carolina, with various Coleoptera and Lepidoptera, particularly the genus *Catocala* (1902-08) and the Sesiidae (1897-1909), gall insects (1907-1918) and insects injurious to forest trees. In recent years he lived at Tenafly, New Jersey.

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DR. ROBERT HENRY WOLCOTT was born at Alton, Illinois, October 11, 1868, and studied at the University of Michigan whence he received the degrees of B.L. (1890), B.S. (1892) and M.D. (1893). In the following year he entered the department of zoology at the University of Nebraska, eventually becoming professor and chairman of the department in 1909. In 1906 he was president of the Nebraska Academy of Science. His entomological work was concerned with the Lepidoptera of Michigan and of Nebraska and with the Acarina, especially the Hydrachnidae.

# EXCHANGES

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

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

**Wanted**—Names and addresses of those desiring Coleoptera, Lepidoptera and Hymenoptera of Pennsylvania and New Jersey. R. C. Casselberry, 71 E. Price Ave., Lansdowne, Pa.

**Exchange**—Texas Orthoptera. F. B. Isely, Trinity University, Waxahachie, Texas.

**Wanted** — Names and addresses of those desiring insects from Colorado. Charles H. Hicks, P. O. Box 262, Boulder, Colorado.

**Desire to Exchange**—Lepidoptera—pupae—ova. Cocoons, chrysalids especially wanted. Correspondence desired from all parts U. S., Canada, Mexico, Central, South America. Arthur Smith, Los Banos, California.

**Geometers Wanted** for cash, or in exchange for West Coast Butterflies, Noctuids or other Geometers. Edward Guedet, P. O. Box 305, Napa, Calif.

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**MAY, 1934**

Vol. XLV No. 5

HARRISON GRAY DYAR,
1866-1929.

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, Sc.D., John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

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# ENTOMOLOGICAL NEWS

VOL. XLV. MAY, 1934 No. 5

## Studies of Semidesert Ants (Hymenoptera: Formicidae).

By A. C. COLE, JR., Twin Falls, Idaho.

(Continued from page 101)

*Environmental Factors Governing the Sand Dune.* The sand dune presents many interesting and diverse problems to the investigator. Its close resemblance to the desert with similar conditions of temperature, moisture and soil, provides a well-marked region for study within the bounds of practicability. As in the true desert, environmental conditions of the sand dune are continually fluctuating.

Perhaps the most outstanding features of a dune habitat which guide the distribution and number of ants are prevailing temperatures. Important among these are soil surface and substratal temperatures, for all dune-dwelling ants are soil inhabitants. The general lack of dense vegetation on the dune, which, if present, would provide shade, and the nature of the soil itself tend toward high diurnal soil surface and substratal temperatures. At night, though cooling of the sand is relatively rapid, the accumulated heat below the surface is partially retained. High daily atmospheric temperatures and unimpeded sunlight are, for the most part, responsible for the high temperatures of the soil.

Moisture, in its many phases, is of great importance to the physical and biotic make-up of the dune habitat. Precipitation, especially during the summer, is slight. The sand acts as a sponge and absorbs rain as rapidly as it falls. Thus the relative humidity of the atmosphere is almost invariably low, while the rate of evaporation, due among other things to the continuous action of the wind, is very high. The combination of these various components of moisture produces xeric conditions.

Great variation in the action of strong winds is, aside from

the nature of the soil, one of the most obvious of the set of factors governing the sand dune. Over much of the area the sand is continually in motion, and the dune gradually moves. Thus the instability of the dune is of great importance. Where the sand is continually in motion, vegetation and ant colonies as well are absent. They are unable to contend with such hostile environment. Only in "blowouts" or valleys is there protection from wind, and, in such a habitat, flora and fauna are present in their greatest numbers.

The soil in much of the dune area is composed of pure sand. In places where "blowouts" have occurred and where vegetation has become established, a small amount of humus is intermingled with the sand, increasing in proportion with the disintegration of plants. The instability of the dune inhibits the development of the soil and most of it remains in a more or less sterile condition.

### 3. The Winter Mortality of Pogonomyrmex occidentalis.

The ant, *Pogonomyrmex occidentalis* Cresson, passes the winter in chambers deep below the surface of its mound. The depth seems to vary with snow cover, soil moisture, and the like, but the bulk of the ants probably do not descend lower than three feet from the apex of the mound. Seeds are stored in the lower chambers during the autumn and, without any doubt, feeding occurs during the winter or "hibernating" season. The mounds may be entirely or partially leveled during the winter by the action of wind and rain and often the site of

TABLE 2.

The Winter Mortality of *Pogonomyrmex occidentalis* in the Twin Falls Area, Idaho.

| Mound Number | Total Mortality |
|---|---|
| 1 | 33 |
| 2 | 26 |
| 3 | 41 |
| 4 | 40 |
| 5 | 38 |
| 6 | 22 |
| 7 | 15 |
| 8 | 4 |
| 9 | 18 |
| 10 | 36 |

the colony is marked by only a few scattered pebbles. The ants are practically inactive during the entire winter and no mound reconstruction takes place.

During early spring the ants transport to the surfaces of the mounds their kind which have died during the winter. During 1932 the transportation occurred on the twenty-second of March and continued for only two days. Apparently all dead ants were brought to the surface, for minute examinations of mounds disclosed no additional ones. Table 2 shows total winter mortality for a series of ten mounds in the vicinity of Twin Falls, Idaho. Mounds selected for examination were those protected from wind so that conditions tending to disturb the dead ants were reduced to a minimum. It should be noted that these data present only an indication of mortality in various parts of the region occupied by *P. occidentalis* but they do seem to be indicative of conditions in the Twin Falls area.

TABLE 3.

Winged Ants Collected from a Wind-vane Insect Trap Near Hollister, Idaho.

| Date | Species of Ants* | No. Ants (20 ft. Trap) | No. Ants (30 ft. Trap) | Weather |
|---|---|---|---|---|
| 7/ 5/32 | P. occidentalis | 41 | 22 | Windy |
| 7/ 8/32 | " " | 103 | 17 | " |
| 7/11/32 | " " | 432 | 296 | " |
| 7/15/32 | " " | 1,974 | 871 | " |
| 7/19/32 | " " | 5,455 | 1,200 | " |
| 7/22/32 | " " | 1,325 | 472 | Still |
| 7/29/32 | " " | 213 | 87 | " |
| 8/ 5/32 | " " | 4 | 2 | " |
| 8/12/32 | " " | 1 | 0 | Windy |
| 8/19/32 | " " | 0 | 0 | " |
| 8/26/32 | " " | 0 | 0 | " |
| 10/13/32 | L. rugatulus | 3 | 2 | " |
| 10/14/32 | " " | 7 | 4 | " |
| 10/20/32 | " " | 5 | 1 | " |
| 10/21/32 | " " | 1 | 0 | " |
| 10/27/32 | " " | 0 | 0 | " |
| 10/28/32 | " " | 0 | 0 | " |

* All winged females.

4. The Effect of Wind on the Dissemination of Semi-desert Ants.

Although ants are well able to fly to considerable heights, prevailing winds are influential in determining the height and distance covered.

The contents of two wind-vane insect traps,* mounted upon a pole at twenty and thirty-foot heights, near Hollister, Idaho, were watched constantly for winged ants throughout the spring, summer, and autumn of 1932. Table 3 gives the number of each species found. Only two species, *Pogonomyrmex occidentalis* Cresson, and *Leptothorax curvispinosus rugatulus* Emery (all winged females), occurred in large enough numbers to be significant.

It is an interesting fact that the last ant species to develop winged forms in the vicinity of Twin Falls is *L. rugatulus*, one of the two species listed in the table. When the brood-rearing of *P. occidentalis* has ceased that of *L. rugatulus* is progressing rapidly, the last date in which brood appeared in the nest during 1932 being November 6.

It has been observed by the writer that new colonies of *P. occidentalis* are most abundant in areas east and southeast of the center of the original concentration. Apparently this is due to the transporting action of the prevailing westerly and northwesterly winds of southern Idaho. So marked is this action that the writer has been able to observe rough zones extending outward from the centers of original concentration, the number of colonies roughly being inversely proportional to the distance from these centers.

## Description of a New Species of Eurytoma (Hymenoptera: Chalcidoidea).

By A. B. Gahan, U. S. Dept. Agr., Bureau of Entomology, Washington, D. C.

Two species of *Eurytoma* have been reared from galls of *Eurosta solidaginis* (Fitch) by Miss Gwladys F. Hughes, a graduate student at Cornell University. One of these species proves to be *Eurytoma gigantea* Ashmead, long known to in-

* Fulton, R. A., and Chamberlin, J. C. A new automatic insect trap for the study of insect dispersion and flight associations. Jour. Econ. Ent. XXIV, (1931), 757-761.

fest the galls of *Eurosta*. The other species is apparently new and is described herewith in order to make the name available for use by Miss Hughes in an account of her observations on its development.

**Eurytoma obtusiventris,** new species.

This species is distinguishable from most of the Nearctic species by the more robust, less protracted, and less strongly compressed abdomen. The abdomen is similar to that of *obtusiloba* Ashmead but in that species the scape, legs, and ovipositor are testaceous while in the new species they are black. Less obvious but apparently dependable characters in which the new species seemingly differs from most if not all of the other species are to be found on the front coxae and the occiput. In all of the species of *Eurytoma* the front coxae are more or less impressed on the ventral side to receive the lower margin of the head, this depression in some instances being carinately margined, but more commonly with the edges rounded and without a carina. In the present species the front coxae are broadly flattened ventrally, the flattened area limited apically by a weak and slightly oblique transverse carina which is elevated at outer margin of coxa to form a distinct but short rounded tooth-like projection. Likewise on the posterior surface of the head of many and probably all of the species of *Eurytoma* there is present a distinct groove extending from the dorsal margin of the occipital foramen downward toward the base of the mandible and dividing the postgena (in the sense of Snodgrass) into an inner and an outer plate. In most of the species (*e.g., gigantea* Ashmead) this groove is deep, with its inner edge forming a strong carina or fold which is most prominent near its lower extremity just before it reaches the carina separating postgena from gena. In the present species this fold is distinct above but gradually becomes weaker and fades out entirely before reaching the carina separating gena and postgena.

♀.—Length 3.5 mm. Head nearly three times as broad as thick antero-posteriorly at the middle, with the umbilicate punctures unusually coarse, the interstices narrow but with very fine reticulate sculpture, the umbilicate punctures at the bottom smooth and shining; clypeus and a broad median line on face without umbilicate punctures, nearly smooth but with weak reticulation; gena also with a moderately broad area running from the eye margin to the base of mandible without umbili-

cate punctures but densely finely punctate and dull; ocellocular line very little longer than diameter of ocellus. Antenna not distinctly clavate; first funicle joint about one and one half times as long as broad; second a little longer than broad; third to fifth funicle joints subequal and nearly or quite as long as broad; club 3-jointed, not broader than the funicle and a little shorter than the preceding three joints combined.

Prothorax, mesoscutum, and scutellum sculptured like the head; propodeum broadly hollowed out, irregularly transversely striated medially, coarsely rugoso-punctate laterally both within and outside the concavity. Hind coxae finely punctate and dull; hind tibia clothed with silky hairs. Marginal vein usually a little longer than postmarginal, stigmal and postmarginal nearly equal.

Abdomen about as long as thorax, not strongly compressed, very shortly petiolate, the second and third tergites subequal, fourth a little shorter than second and third combined; fifth very short, sixth longer than fifth but nearly perpendicular, seventh very short; first to fourth tergites smooth and polished dorsally, faintly reticulated laterally, entirely bare; sixth tergite distinctly hairy; apices of ovipositor sheaths very slightly exserted.

Knees, very narrow apices of all tibiae, and tarsi except the apical joint, reddish testaceous; wings hyaline; rest of insect deep black.

*Type-locality.*—Ithaca, NEW YORK. *Type.*—Cat. No. 49893, U. S. N. M.

Described from 58 female specimens as follows: The *holotype* and 43 *paratypes* from Ithaca, N. Y., reared by Miss Gwladys F. Hughes from *Eurosta solidaginis,* in 1930; 3 females from the same host and locality reared May 12, 1927, by Mrs. V. T. Phillips; 3 females reared at Chicopee, MASSACHUSETTS, from "Trypeta galls on Solidago" (probably those of *E. solidaginis*) by F. Knab; 5 females reared from *Eurosta solidaginis* at Tallulah, LOUISIANA, in April, 1910, and bearing Hunter No. 1932; 1 female from galls on goldenrod taken at St. Catherine, ONTARIO, in July, 1907; 1 female from gall on *Solidago* collected in Riley Co., KANSAS, by Marlatt in September, 1888; and 1 female from the collection of Asa Fitch, also from some insect on *Solidago,* the locality not given.

# Two Chalcid Parasites of the Goldenrod Gall-fly, Eurosta solidaginis (Hymenoptera: Chalcidoidea; Diptera: Trypetidae, et al.).

By Gwladys F. Hughes.

The purpose of this investigation has been to learn something more about the parasites of *Eurosta solidaginis*. In 1915 Dr. C. Ping[1] made a study of the tenants of galls found on Canada goldenrod; he worked out the life histories of the gall maker *Eurosta solidaginis* and the associated Mordellid beetle *Mordellistena unicolor*. He thought it probable that a certain chalcid, *Eurytoma gigantea*, also present in the gall, is parasitic on *Eurosta*. Others also have believed the chalcid to be a parasite, but a question has been raised as to whether this *Eurytoma* is not itself a gall maker, since it appears to be found in somewhat smaller galls.[2] Rev. Thomas W. Fyles[3] mentions the fact that he raised two kinds of parasites from the galls, one of which was *Eurytoma gigantea*.

## The Goldenrod Plant and the Gall Maker.

The Canadian goldenrod, *Solidago canadensis*, grows most abundantly upon flood plains or in wet meadows. The gall, as is well known, is formed as a swelling of the stem tissues caused by the fly *Eurosta solidaginis*. Measurements were made of 100 galls taken December 14. Length ranged from 20 to 40 mm., width varied from 20 to 30 mm.; average length was 28 mm., average width 25 mm.

In the spring *Eurosta solidaginis* lays its eggs upon the plants. The larvae hatch, establish themselves in small cavities within the pith, and attain their full size during the growing season. Prior to pupation, while the larvae have mouth hooks to do the work, they make burrows extending from the central cavity of the gall to the outside. In general, the epidermal layer is left, and the adult insects must make their way through it.

[1] Ping, Chi. 1915. Some Inhabitants of the Round Gall of the Goldenrod. Pomona Journal of Entomology and Zoology, 7: 161-177.

[2] Johannsen, O. A. 1910. Notes for 1910. Maine Agricultural Experiment Station, Bulletin 187: 9.

[3] Fyles, Rev. Thomas W. 1894. *Trypeta solidaginis* Fitch and Its Parasites. Canadian Entomologist 26: 120-122.

Pupation begins in November (indoors) and continues sometimes until late in June, according to temperature. Out of doors the Eurostas normally do not pupate before March, and they do not emerge as adults until late May or June. After June 18 no more puparia have been found.

To hasten the development of Eurosta larvae, galls collected were brought into the laboratory and kept in boxes at room temperature. Adults were reared and fed upon sugar solutions. Often when galls were opened for examination, flies were found to have escaped from their puparia and begun to break through the epidermal wall of the galls. Upon release from the burrow, they ceased their efforts and came out by the easier way. In no case observed did development progress normally thereafter; the fly failed to become a normal adult and did not live long.

## The Population of the Galls.

The galls were found to be infested with the gall maker *Eurosta solidaginis* and with the larva of a stem-boring Mordellid beetle, *Mordellistena unicolor*, previously studied by Ping; with the two species of *Eurytoma*,—*Eurytoma gigantea* and *Eurytoma obtusiventris* that are the subject of this paper; and with a number of other lesser parasites and scatterings to be mentioned later. Of the four usual inhabitants counted, there were: 834 *Eurosta solidaginis*, 352 *Eurytoma gigantea*, 1045 *Eurytoma obtusiventris* and 245 *Mordellistena unicolor*.

Besides Eurostas, Eurytomas and Mordellids, the galls were occupied by Hymenoptera belonging to the family Braconidae. These began to appear in numbers during May. Several adults were found inside the galls before they had emerged, occupying burrows just outside the central cavity. They were determined by Mr. A. B. Gahan of the United States Museum as belonging to subfamily Sigalphinae, genus *Schizoprymnus*. They may, he said, be parasitic upon the Mordellid beetle in the gall, but certainly not upon the gall maker.

On June 4 and again on June 6, small beetles were observed among the galls collected a week before. These were determined by Dr. P. P. Babiy, of Cornell University, to be *Iso-*

*hydnocera curtipennis* Newman of the family Cleridae. Leng and Davis in "Insects of New York" state [4] that another species in this genus is "predatory on Mordellid larvae in stems of annual plants."

On June 16 a large shriveled pupa case in a small gall made by *Eurosta* was identified by Dr. W. T. M. Forbes, of Cornell, as that of a Lepidopteran of the family Pyralididae, subfamily Pyraustinae. The moth had emerged; an exit hole plugged with silk was found near the bottom of the gall.

A gall opened July 16 contained a number of tenants. One of these, having a white silk cocoon, Mr. Cushing, of the United States Museum, determined as an Ichneumonid, *Lissonata marginata* Provancher. Six Lepidopterous larvae found dead within a gall were identified by Mr. Heinrich, of the same Museum, as *Trichotaphe levisella* of the family Gelechiideae; he said that these are probably inquilines.

Gall Dimensions in Relation to Gall Inhabitants.

Since it had been suggested by Dr. Johannsen that Eurytomas occupy galls smaller than those in which Eurostas are found, an examination was made of gall dimensions in relation to gall inhabitants. Three sizes were arbitrarily selected as "large," "medium" and "small," and 490 galls were arranged in three groups according as they approximated these measurements: Large—30 mm. x 25 mm., Medium—25 mm. x 20 mm., Small—20 mm. x 15 mm.

| | *Large* | *Medium* | *Small* |
|---|---|---|---|
| *Eurosta* | 47 | 107 | 47 |
| *Eurytoma gigantea* | 0 | 3 | 6 |
| *Eurytoma obtusiventris* | 48 | 167 | 65 |

Judging from these figures, and from observations made throughout the work for this paper, I should say that in general the size of the gall does not clearly indicate the nature of its inhabitants.

Eurytoma gigantea and Eurytoma obtusiventris.

Dr. Ping found two species of chalcids in Eurosta galls.

[4] Cornell Agricultural Experiment Station Memoir 101.

One was the well known *Eurytoma gigantea*, the other an unnamed species *Eurytoma obtusiventris*, described in an accompanying paper by Mr. A. B. Gahan. In my collections the latter species outnumbered the former three to one.

Larvae of both species were found in galls in early September. Their pupae develop more slowly than the pupae of Eurostas, and the emergence of the adults takes place from one to two weeks after the emergence of the first Eurostas. They will live for at least two weeks, and will feed upon sugar solutions.

The larva of *Eurytoma gigantea* is larger than that of *Eurytoma obtusiventris*, and different in appearance. The former species disposes of the *Eurosta* larva before *Eurosta* has pupated, and is found naked within the central cavity of galls early in September. On the other hand, *Eurytoma obtusiventris* pupates in the last larval skin of Eurosta, in the puparium of the fly itself. Galls examined in September showed many *Eurosta* larvae with the larvae of *Eurytoma obtusiventris* within their bodies.

The presence of *the parasitic larva stimulates Eurosta to a much earlier pupation.* Out of doors in the latitude of Ithaca, New York, *Eurosta* is not known to pupate normally before March; under the stimulus of the parasite it forms its puparium in September.

I have found that *Eurytoma obtusiventris* transforms to the adult stage during May, but that *Eurytoma gigantea* is later, not becoming adult until the end of May, and emerging during June and July.

## Terminology of Types.

By Ezra T. Cresson, Jr.

In "The American Midland Naturalist" there appeared a very interesting and commendable paper by Donald Leslie Frizzell, entitled "Terminology of Types".[1] Therein is listed 233 different nomenclatural type-terms and words compounded

[1] Published by the University of Notre Dame, Vol. 14, pp. 637 to 668 (1933).

with "type" (insofar as they are employed in biology) which have been proposed for the various kinds of types of genera, species, etc., and illustrates the chaotic condition existing in this field. The list is prefaced by an introduction wherein the author states the purpose of the paper, nature of a nomenclatural type, choice of type-terms, recommendations, acknowledgments and a selected bibliography. Various symbols and different type-faces have been employed to indicate the status of the various terms; those recommended by the author are printed in bold-face type. These are: genotype, holotype, homoeotype, hypotype, lectotype, neotype, paratype, plastotype and syntype. In selecting these, which the author considers sufficient, he adopts the principle of priority except where it conflicts radically with usage, stating that "a limited number of terms is desirable if the goals of uniformity, of usage and ease of comprehension are to be attained," but realizes that "certain groups of organisms will require types and corresponding terms which would be absurd in other groups." He further states that he has consulted several well known taxonomists and biologists and the published literature on this subject.

In reviewing this paper and referring to the protologs of some of the terms, I find that the author does not seem to be fully acquainted with his literature, in that his definitions of some of the terms are not those of the protologists. In the matter of selecting the term to use, the law of priority should be followed as long as the term is in active use, whether or not it is correctly formed. Discarded, subsequently discovered, synonymous terms and amended constructions should not be considered if we are to attain stability.

As many students and some well known taxonomists apparently do not know the correct meaning of the type-terms they use, or if so, prefer to supply their own definitions, which may be quite different from the original meaning and intent, it seems that more attention should be given to this important subject. With this in mind I am taking the present opportunity to list those terms most in use by entomologists. In the entomological

department of the Academy of Natural Sciences of Philadelphia, only the following terms are recognized, and are considered sufficient to indicate all the necessary "types": type (holotype or lectotype), cotype (rarely), paratype, allotype, topotype, homotype and genotype. These terms are used as follows:

*Type.*—This term is applied to the specimen upon which a species is based. Dr. Oldfield Thomas,[2] in his suggestions for the more definite use of the word, says that the name "itself when first introduced was meant to refer to the particular specimen originally described, but it soon was naturally applied to any individual of the original series . . . ", but was later "applied to any individual from the collection of the original author obtained no matter how much later, and often not even determined by him as belonging to his species." At present, however, there is no doubt as to what is meant by "type."

A specimen selected and designated by the protologist as the type of his species and published as such when describing his species, becomes a HOLOTYPE. This term was proposed by Schuchert [3] for "a particular individual deliberately selected by the author of a species." We may infer here that the selection must be made at the time the species is first described for he further qualifies by stating that "the author of a new species having failed to select a holotype, no subsequent author can do this for him."

A specimen subsequently selected from a cotypic series, designated and published as the type, either by the protologist of any other person, becomes a LECTOTYPE. This term was also proposed by Schuchert [4] for a cotype "chosen subsequently to the original description to take the place which in other cases a holotype occupies." This definition is sufficient to need no comment except that such selection of the lectotype, to be valid, must be published. The mere labeling as "type" a specimen of a cotypic series does not validate such selection. Many taxonomists use the word holotype in the sense of lectotype. The

[2] Proc. Zool. Soc. London, 1893, p. 241-242.
[3] Science, (n. s.), V, p. 637 (1897).
[4] Ann. Mag. Nat. Hist., (7), XVI, P. 103 (1905).

two are not synonymous although either is applied to the type of the species.

*Cotype.*—This term as proposed by Thomas in 1893, applies to "one of two or more specimens together forming the basis of a species, no 'type' having been selected." The word "syntype" was later proposed to replace the poorly constructed word "cotype," and is an unnecessary synonym. When a type (lectotype) is properly selected from a cotypic series, the remainder of the series automatically become paratypes. Some taxonomists use cotype incorrectly for paratype.

*Paratype.*—This term is used for a specimen, other than the holotype or lectotype, of the series upon which the protologist based his species. The selection of the lectotype automatically makes the remainder of a cotypic series, paratypes. The word cotype should not be used for a paratype.

*Allotype.*—This term should be used with caution. It was proposed by Muttkowsky [5] (not by Banks and Caudell as stated by Frizzell), for the sex not designated by the holotype. "It need not be described by the protologist; it can be contained in the original as well as in any subsequent description by other authors," and "the first of the opposite sex subsequently described is to be called the allotype." Here we note, that it is the first description of the opposite sex that established the allotype, whether or not it is so designated. This fact brings into the field an element conducive of instability, as there is always the possibility of a previous description of the opposite sex being discovered. If we consider the term to apply to the specimen of the opposite sex first described as the allotype, we again conduce to instability in that the student may have misidentified his material. One can readily see in this case that several allotypes may possibly be described and so designated, of which one or none may be valid. It is a much abused term, which I personally do not use in print, merely including such specimen as one of the paratypes, if the original series contained both sexes.

*Topotype.*—This term is applied to any specimen conspecific with the type collected at the exact locality where the type was obtained. A topotype is of importance when the type of the

[5] Bull. Milwaukee Oub. Mus., I, p. 10 (1910).

species is lost or has been destroyed. In some respects it is of more value than a paratype.

*Homotype.*—This term was proposed by Walsingham and Durant [6] for "a specimen named by another than the author, after comparison with the Type." This is the first use of the term in a nomenclatural sense, and as originally constructed and as it is in general use, the emended "homoeotype" is unnecessary. Homotype is a term of doubtful value. If used in its original meaning, "like the type," such specimen should be not only conspecific with the type, but of the same sex, and possessing the same structural and color features as the type. A specimen compared with the type and considered conspecific with the type, but not necessarily a replica of the type, should be labeled merely "Comp. w. Type" (Compared with type). This specific use of the term homotype gives a greater value to the specimen. Of course the qualifications and the carefulness of the comparer is an important factor in this matter, consequently his or her name and the date (year) the comparison was made should always be given on the label.

*Genotype.*—This term is now applied to a species upon which a genus is based. It was originally proposed to apply to a specimen of the type-species of a genus, but was practically never used in that sense.

In designating or citing genotypes, certain information is essential in order to avoid ambiguity. The original generic name of the genotype, the name of its author and the date of its proposition, should be given, and as well, the new combination if such is created. For example:

Genotype: *Lucilia caesar* as *Musca caesar* Linn., 1758. (By designation of Macquart, 1833.)

The manner in which the genotype is created or selected, may be expressed by a few explanatory words instead of by the use of a specific term, as: "by original designation" instead of orthotype; by "monotypy" instead of haplotype; "by subsequent designation" or "by designation of . . . " instead of logotype; "by tautonomy" instead of tautotype.

[6] Rules for Regulating Nomenclature. "Merton Rules." London, 1896, p. 13.

## An Answer to E. Graywood Smyth on "Synopsis of Cicindelidae" (Coleoptera).

By Alan S. Nicolay, Montclair, New Jersey.

In Entomological News, Vol. XLIV, No. 8, October, 1933, pp. 197-204, Mr. Smyth saw fit to criticise the above paper.* According to this article everything appeared wrong and nothing right. The authors had blundered badly.

Now to be helpful, criticism should be constructive. Errors, incorrect citations and carelessness are bad enough in an original paper, but when included in the criticism of the work of another they are not only inexcusable but appear deliberately intended. The only justification I can find for Mr. Smyth's tirade is that being several thousand miles away from collections and literature he apparently thought that the final curtain had been run down on Cicindelidae in 1907 and that there was nothing additional to be added to the subject.

I have examined all the types and specimens in the LeConte collection in Cambridge, the Horn collection in Philadelphia, the Casey collection in Washington has been gone over thoroughly many times, also the collections in the American Museum of Natural History, the Brooklyn Museum, and many private collections, combined with innumerable specimens loaned by my correspondents, especially from California. From the remarks and conclusions drawn it is evident that Mr. Smyth never looked in a "Casey Box." Before sending this paper (which is the type I dislike exceedingly to take my limited time to write) to press, I have again rechecked the Casey species mentioned here.

I shall now take up Mr. Smyth's remarks in detail.

Mr. Smyth writes, "Few of their contemporaries, we fear, can agree with them in the view that the arrangement of a complex group can be simplified by using another's carefully worked out list, and from it elevating his subspecies to the specific rank and considering his varieties and phases as varietes." I quote from our paper, "We feel that the best results are obtainable by recognizing only species and varieties." Having adopted

* Jour. N. Y. Ent. Soc. Vol. xl, No. 3, Sept. 1932.

this policy, which is that of Mr. Charles Leng, not only in his check list used by all coleopterists but also in his "Revision of the Cicindelidae" (Trans. Am. Ent. Soc. XXVIII, March, 1902), the last complete monograph on the entire family, in what other way could we handle the subject than by placing each name either as a *bona fide* species, variety or synonym, on its own merits?

Mr. Smyth "wonders why we passed over the crepuscular genera and began with the most difficult group in the genus *Cicindela*, that of *purpurea*." I again quote from our paper, "It would, undoubtedly be preferable to publish one large paper on the entire family. However, the spare time of both authors is very limited, and we deemed it more desirable to publish our findings in the various groups in serial form rather than postpone the entire paper to a far distant date." I cannot figure Mr. Smyth's reasoning that the *Cicindela purpurea* group is more difficult than Megacephalini including *Omus*. To my mind *Omus* is now so split up and confused that no one, with the exception of Dr. Walther Horn, is in a position to say with any certainty what names should be applied to many specimens. I have looked often with bewilderment into the two cabinet drawers of *Omus* containing Colonel Casey's collection at the National Museum and for this very reason, and until I had sufficient time to study this most difficult genus, decided to take up *Cicindela* first.

As mentioned in our paper, our "Synopsis" is intended only as a forerunner of a monographic revision, which will be complete and arranged according to the accepted present classification of the entire family.

Our paper is almost entirely a task of collecting and consolidating the views and conclusions of our predecessors. There is very little that we have changed, but of course we reserve the right to use that which we consider correct while mentioning briefly our reasons for rejecting other conclusions.

Mr. Smyth feels that our key "based almost wholly upon color and maculation" is not adequate. I am inclined to agree with him, speaking in general, but when one deals with such

distinctly marked forms and takes up only one small group (all considered as one stem species by some authorities) of such and enormous and world-wide genus as *Cicindela*, I challenge him to offer a key on structure. It cannot be done! When we write our key on all the North American species we will certainly avoid color and maculation as much as possible.

Mr. Smyth writes "those acquainted with the *purpurea* group have decided years ago that *cimarrona* is not entitled to specific rank" and then quotes Doctor LeConte to this effect. Where has Mr. Smyth been all these years and why does he make so erroneous a statement? *Cimarrona* is considered a valid species by Mr. Charles Leng, not only in his check list (1920) but also in his revision (1902). In this latter paper Mr. Leng writes, "I separate this species because the type of the elytral markings is radically different and, notwithstanding the variations in color, is constantly preserved, thereby suggesting a form too well established to be called a variety." *Cimarrona* is regarded as a subspecies by Dr. Walther Horn (1930) in which class he also puts *decemnotata*, which Mr. Smyth writes, "is admittedly entitled to specific standing!" Finally among the many specimens and collections seen, I have yet to note an example that could not be readily and easily placed as *cimarrona*.

For Mr. Smyth's information, Casey's *auguralis* is identical in every way with *limbalis* (not *purpurea*) except for the slight differences mentioned in our "Synopsis." Casey's misleading statement connecting *auguralis* with *purpurea* instead of *limbalis* was possibly due to the fact that his *limbalis* was known to him and incorrectly labelled in his collection as *amoena*. According to the views of Lantz as mentioned by Smyth, *auguralis* having the middle band less oblique but at right angles to the border of the elytra (exactly as in *limbalis*, *splendida*, *denverensis*, etc.) could not possibly be a variety of *purpurea* following out Mr. Smyth's line of reasoning. One should when possible examine types before forming too hasty conclusions.

I again looked at the *auguralis* in the Casey collection. The one specimen, marked type, is of a dull bronzed color and has

the middle band touching the sides and of course at right angles to them. The other four specimens are marked paratypes and are of a greenish color. All five are from Colorado. The middle band is long and sinuate but slightly more oblique than in typical *limbalis*. Also the band does not end in the usual oval dot or dash of typical *limbalis*, but is about the same width at both base and apex. These last characters also undoubtedly led Casey to associate it with *purpurea*.

Although we are accused of displaying a rather empirical method of handling the subject, we at least are not guilty of suggesting two new names without not only paragraphing an original and specific description but even designating a type or exact locality other than general range. Mr. Smyth has perpetrated this error on two occasions. I have read Doctor Horn's "Letters of a Traveling Entomologist," and certainly, as he was aware of this so-called species *sedalia*, he would have named it himself in one of his subsequent papers on American tiger beetles if he had thought it worthy of a name. I can see no connection between this form and *cimarrona* with the short branches for lunule, which is so well known by Mr. Charles Leng and others.

After examining specimens from Colorado in the Horn collection in Philadelphia, I can fit them nicely in either *limbalis*, *splendida* or variety *cyanocephala*, and *cimarrona*. I really feel that the name *sedalia* is superfluous and if retained at all would rank only as a variety.

Although Mr. Smyth claims to have shown years ago that *transversa* and *splendida* were one species, because they were taken in copula near St. Louis, Missouri, we would humbly report that we made this same observation here in New Jersey and New York with *limbalis*, and where the more southern species *splendida* is never found nearer than three hundred miles away, around Washington, D. C. Also Mr. Leng originally described *transversa* from Illinois and New Jersey, *limbalis* being indigenous to both states. It is true, he placed it as a variety of *purpurea*, but at that time (1902) the short transverse middle band was not regarded of value in designating

a species or group. Now as mentioned in this paper previously, Lantz after studying the subject regarded it as separating the *purpurea* group from the *limbalis*, *splendida*, etc., group, and it is apparently one of the few things that Mr. Smyth and I agree on.

Although Mr. Charles Leng in his check-list ranks *splendida* as a good species, Mr. Smyth "finds small reason" for this. Why, may I ask, if such easily separated things as *limbalis*, which is never found in the East as far south as Virginia and North Carolina (except an occasional specimen taken high up in the Blue Ridge Mountains, Virginia, where *splendida* does not occur), and *splendida*, which does not occur north of Virginia (and possibly southern Maryland), are found together in Kansas and even taken there in copulation, should they be regarded as the same species? Has Mr. Smyth never heard of Lepidoptera of closely related, but distinct, species being found in copula with the resulting hybrids? As I pen this article I look at a tank of tropical fish in which are Mexican platies and swordtails. Although not only of distinctly different species but even of different genera these two species commonly cross with resulting offspring having interesting characters of both. Then why not occasionally among Cicindelidæ?

(To be continued)

## A New Gall Midge on Fig (Diptera: Itonididae).

By E. P. Felt, Stamford, Connecticut.

The species described below was reared by Mr. Henry Bird, of Rye, New York, in April, 1933, from fruits of a species of fig known as *Ficus populina* (*brevifolia*), growing in the Royal Palm State Park, Florida.

He found that the larva occupies an enlarged seed capsule which elongates inwardly towards the center of the fruit, attaining a length of five times or more than that of the surrounding seed vesicles. The fleshy tissue of the fruit receptacle is not mined nor affected except at maturity. The newly-formed

puparium wriggles part way through the wall of the receptacle, the outside skin being marked with a pit-like scar and in a couple of days the edges of this "pock mark" becomes slightly elevated and blackened and soon the puparium protrudes from the fruit. Mr. Bird states that in the puparium and directly after emergence, the adult abdomen is distinctly reddish, it turning later to the dark smoky hue of the rest of the insect. He found that it was preyed upon to a considerable extent by a Hymenopterous parasite.

This species is easily distinguished from the related *Ficiomyia perarticulata* Felt by the more pronounced brownish color of the body and in particular by the distinct fuscous markings of the wings and the occurrence of only 32 antennal segments or fewer, as compared with the 41 antennal segments of the earlier described species.

**Ficiomyia birdi** n. sp.

♂. Length 2.5 mm. Antennae nearly as long as the body, rather thickly haired, light brown; 32 segments, the fifth with a stem three-fourths the length of the subcylindrical basal enlargement, the latter with a length one-fourth greater than its diameter, a low circumfilum near the basal third and apically, a whorl of coarse setae basally and a broader whorl of finer, strongly bent setae subapically. Terminal segment produced, with a length three times its diameter and tapering to a narrowly rounded apex. Palp consisting of one, slender, rather long segment.

Mesonotum yellowish brown, the submedian lines thickly haired. Scutellum and postscutellum fuscous yellowish. The abdomen fuscous yellowish, sparsely covered with brown scales, the latter more abundant on the distal segments.

Wings, the basal half of costa thickly clothed with fuscous scales, the distal half a variable pale yellowish, the membrane subhyaline, with a distinct irregular ornamentation of fuscous scales, there being a broad, subquadrate patch on the anterior margin near the distal third and attached thereto a somewhat n-shaped mark reaching to the margin of the fifth vein, the free ends extending toward the tip of the wing. There is also a small irregular fuscous patch near to and just in front of the wing tip and an indistinct broad fuscous crescent extending from the tip of the branch of the fifth vein and arching over

to the fifth. Halteres pale yellowish basally, fuscous apically.

Legs, femora and tibiae dark brown, the tarsi mostly yellowish. Claws simple, strongly curved, the pulvilli rudimentary.

Genitalia, basal clasp segment moderately stout and at the internal angle a long, tapering, curved process, roundly truncate apically, the latter making the short, stout, terminal clasp segment with a large tooth at its internal apical angle, subapical. Dorsal plate broad, deeply and triangularly emarginate, the lobes broad, obliquely truncate and thickly setose apically. Ventral plate short, broad, broadly and roundly emarginate.

♀. Length 2 mm. Antennae probably nearly as long as the body, thickly haired, light brown, presumably 32 segments, the fifth with a short, broad stem one-half the length of the broad basal enlargement, the latter with a length scarcely equal to its width and remarkable because of the thick sub-basal whorl of long stout setae reaching to near the middle of the following segment. Low transverse circumfila occur at the basal third and apically on the enlargement.

Color, wing and leg characters nearly as in the male. Ovipositor moderately stout, about half as long as the abdomen, pale yellowish orange, the terminal lobes narrowly oval, with a length about twice the width, pale.

Types deposited in the U. S. National Museum.

## Sex of Migrating Danaus archippus (Lepid.: Danaidae).

In the NEWS for July, 1933, Dr. H. T. Fernald, of Orlando, Florida, asks as to the sexes of migrating *D. archippus*. So far as I have ever been able to ascertain, all such taken at sea and away from this continent have been males. In my "Butterfly Hunters in the Caribbees" (Scribners, 1894) I describe one such migration observed off the Bahamas. Since then I have found them, food for fishes, off Haiti and Jamaica, near Cienfuegos, Cuba, and on the island of Cozumel, off the east coast of Yucatan—all males. This past fall, over the Skokie Marshes, north of Chicago, desultory stragglers in small flights of a few dozens to some hundreds, all caught were males. From all that I have gleaned from others, I was not aware that females were ever found among those in migration. *C. eubule*, another of our migrants, also seem to be males, as far as I have been able to ascertain.

It is getting on towards the half-century mark since Horn,

Cresson, Skinner, Ridings and I started the NEWS, as its first issue will show; now, in my "eighties," after collecting for seventy years this spring, I find the fire taken from such fathers of science as Leidy, Cope, Le Conte, Packard, Scudder, Strecker, Neumoegen, Holland, Riley, Howard and Edwards, still burning brightly. Dr. Fernald, if he be the one I remember, must also feel waves of the same afflatus.

EUGENE MURRAY-AARON, 3238 N. Oakley Ave., Chicago.

# Entomological Literature

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

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

(*) Papers containing new forms or names not so stated in titles, have an * within parentheses thus (*) following the pagination of reference to paper.

(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.** Titles of papers containing new forms or new names will be indicated by an asterisk within parentheses at end of reference, (*).

*Papers published in the Entomological News are not listed.*

**GENERAL.—Cockerell, T. D. A.**—The Entomological Society of London. [76] 1934: 332-342, ill. **Cockerell, T. D. A.**—"Mimicry" among insects. [31] 133: 329-330. **Davis, A. C.**—Notes on the insect inhabitants of wood rat houses in California. [38] 33: 12-24. **Davis, A. C.**—Notes on some insects found in the burrows of the California ground squirrel in Orange County, California. [19] 29: 79-83. **DeLong, D. M.**—What shall be the objective in the training of an entomologist? [12] *27*: 53-58. **Engelhardt, G. P.**—Biological explorations in the North and South West. [19] 29: 57-64. **Forbes, W. T. M.**—Namable? [19] 29: 65-67.

**Frizzell, D. L.**—Terminology of types. [Amer. Midland Nat.] 14: 637-668. **Metcalf & Phillips.** Decrease in government appropriations for entomological work. [68] 79: 253. **Pierce, W. D.**—Some thoughts on the interpretation of experimental data. [12] 27: 185-190. **Ross, E.** — Ueber bedeutende Koleopterologen und den verbleib ihrer sammlungen. [18] 27: 525-529, cont. **Ross, H. H.**—How to collect and preserve insects. [Illinois State Nat. Hist. Surv.] Circ. 25: 27 pp., ill. **Seitz, A.**—Fünf entomologische tage. [17] 51: 49-57, cont. **Steiniger, F.**—Eine besondere form vom bewegungslosigkeit bei insekten. [Nat. und Mus.] 63: 364-370, ill. **Wagner, J.**—Weitere beiträge zur auffassung des sogenannten "Caput fractum" bei insekten. [34] 106: 7-15, ill.

**ANATOMY, PHYSIOLOGY, ETC.** — **Borror, D. J.** — Ecological studies of Argia moesta (Coenagrionidae) by means of marking. [43] 34: 97-108, ill. **Bugnion, E.**—La Leptura cordigera. Biologie, anatomie, physiologie. [Mem. Soc. Vaudoise Sci. Nat.] 4: 329-364, ill. **Clark, R. L.** — The external morphology of Acroneuria evoluta. (Perlidae, Plecoptera). [43] 34: 121-128, ill. **Galliard, H.**—La mue embryonnaire des hemipteres hematophages. [77] 115: 823-824. **Gresson, R. A. R.**—Studies on the gametogenesis of Stenophylax stellatus, (Trichoptera) Oogenesis. [Pro. R. Soc. Edinburgh] 53: 322-346, ill. **Horn, W.**—Gibt es bei insekten echten dimorphismus der männlichen kopulations-organe? [2] 28: 66-67, ill. **Kerrich, G. J.**—A new case of teratology in Ichneumonidae. [8] 70: 61-62, ill. **Klein, K.**—Ueber die helligkeitsreaktionen einiger Arthropoden. [94] 145: 1-38, ill. **Lutz & Grisewood.**—Reactions of Drosophila to 2537. A radiation. [40] 706: 14 pp., ill. **O'Byrne, H.**—Papilio troilus attacked by Polistes rubiginosus while mating. [19] 29:73. **Pictet, M. A.**—Instincts et réflexes. [Lambillionea] 34: 27-36. **Poos & Wheeler.**—On the hereditary ability of certain insects to transmit diseases and to cause disease-like injuries to plants. [12] 27: 58-69, ill. **Reukauf, E.**—Sind alle echten spinnen giftig? [Mikro. Naturf.] 12: 25-32, ill. **Salt, G.** — Experimental studies in insect parasitism. [Pro. R. Soc. Lond.] B, 114: 450-476, ill. **Savory, T. H.**—Possible factors in the evolu-

tion of Spiders. [75] 13: 392-397. **Semichon, L.**—Sur un nouvel élément contenu dans le corps adipeux des Chenilles. [25] 38: 319-320. **Sherriffs, W. R.**—The internal anatomy of the spider [Hong Kong Nat.] 4: 127-131, ill. **Shibata, K.**—Ecology of subterranean insects. [Trans. Nat. Hist. Soc. Formosa] 23: 335-351. [in Japanese]. **Teissier, G.**—Difference sexuelle dans la resistance a l'inanition des Tenebrio molitor. [77] 115: 791-793. **Wolf & Ras.**—Effect of mitogenetic rays on eggs of Drosophila melanogaster. [31] 133: 499. **Yen-An, F.**—Sur la technique employée a la recherche de la présence de centrosomes chez les Lonicera. [77] 115: 1087-1088.

**ARACHNIDA AND MYRIOPODA.—Gertsch, W. J.**—Notes on American crab spiders (Thomisidae). [40] 707: 25 pp., ill. (*).

**THE SMALLER ORDERS OF INSECTS—Frison, T. H.**—Four new species of stoneflies from North America (Plecoptera). [4] 66: 25-30, ill. **Gloyd, L. K.**—A new Corduline dragonfly, Tetragoneuria sepia, from Florida. [Occ. Pap. Mus. Zool. Univ. Michigan] 274: 5 pp., ill. **Hood, J. D.**—Some further new Thysanoptera from Panama. [Pro. Biol. Soc. Washington] 47: 57-81. (*). **Werneck, L.**—Sobre duas especies de Anoplura encontradas em ratos sylvestres do Brasil. [Mem. Inst. Oswaldo Cruz] 27: 407-415, ill. (*). Sobre uma nova especie de Mallophaga encontrada na chinchilla (Trimenoponidae). [Mem. Inst. Oswaldo Cruz] 27: 417-421, ill. (S).

**ORTHOPTERA.—Bradshaw, F.**—Grasshoppers routed by gulls. [Can. Field-Nat.] 48: 68-69. **Hebard, M.**—Studies in Orthoptera which occur in North America north of Mexican boundary. III Revisionary data and new North American Decticinae. [1] 60: 31-54, ill.

**HEMIPTERA.—Bruner, S. C.**—Notes on Cuban Dicyphinae. Macrocephalus en Cuba-una correccion. [Mem. Soc. Cubana Hist. Nat.] 8: 35-50. (*). **China, W. E.**—Hemiptera collected by the Oxford University Expedition to West Greenland, 1928. [75] 13: 330-333. **Gould, G. E.**—A change of name in the genus Rhagovelia (Veliidae). [19]. 29: 56. **Hottes, F. C.**—Aphid descriptions and notes.

[Pro. Biol. Soc. Washington] 47: 8 pp. (*). **Lindinger, L.**—Melanaspis eugeniae aus Porto Rico (Coccoidea). [17] 51: 45-46. (*). **de la Torre-Bueno, J. R.**—Note on Heteroptera in wood rat nests. [19] 29: 83. **Yothers, M. A.**—Biology and control of tree hoppers injurious to fruit trees in the Pacific Northwest. [U. S. Dept. Agric.] Tech. Bull. 402: 46 pp. ill.

**LEPIDOPTERA.—Cabrera, J.**—Algunos insectos raros. [Mem. Soc. Cubana Hist. Nat.] 8: 34. **Comstock & Dammers.**—Additional notes on the early stages of California Lepidoptera. [38] 33: 34, ill. **Duncan, D. K.**—An unusually early hatch [Libythea bachmani]. [19] 29: 56. **Forbes, W. T. M.**—Two wasp-guests from Puerto Rico. [5] 40: 89-92, ill. (*). **Gunder, J. D.**—A check list revision of the genus Basilarchia. [4] 66: 39-48. (*). **Kremky, J.**—Studien an einigen arten der gattung Hemimene (Tortricidae). [Ann. Mus. Zool. Polonici] 10: 61-85, ill. (*) **Meyrick, E.**—A new micro-lepidopteron (Tineina) from Greenland. [9] 67: 59. **Richards, A. G.**—A Correction [to Klots's New Records....]. [19] 29: 64.

**DIPTERA.—Bequaert, J.**—Notes on the Tabanidae described by the late C. P. Whitney. [Occ. Pap. Boston Soc. Nat. Hist. 8: 81-88. **Brannon, C. H.**—Observations on the blow-fly Lucilia sericata. [Jour. Parasit.] 20: 190-194. **da Costa Lima, A.**—Sobre um novo Aëdes (Ochlerotatus) do Brasil. [Mem. Inst. Oswaldo Cruz] 27: 403-406, ill. (*). **Curran, C. H.**—The Templeton Crocker Expedition of the California Academy of Sciences, 1932. No. 13. Diptera. [61] 21: 147-172, ill. (*). **Edwards, Shannon, Aubertin, Malloch.**—Diptera of Patagonia and South Chile. Part VI. 117-175, ill. (*). Ephydridae, Syrphidae, Conopidae. **Felt, E. P.**—New gall midges. [19] 29: 77-78. **Greene, C. T.**—Tachinid flies with an evanescent fourth vein, including a new genus and five new species. [10] 36: 27-40, ill. **Malloch, J. R.**—Diptera of Patagonia and South Chile. Part VI. 177-391, ill. (*). A remarkable new genus of the family Periscelidae. [107] 3: 52-53, ill. (S*). **Matheson, R.**—Notes on Psorophora (Janthinosoma) horridus. [10] 36: 41-43, ill. **Mullen, J. A.**—Diploneura nitidula. [68] 79: 294. **Tarwid, K.**—

Ueber den systematischen wert von Anopheles maculipennis alexandrae-schingarewae (Culicidae). [Ann. Mus. Zool. Polonici] 10: 57-60, ill.

**COLEOPTERA.—Bierig, A.**—Un genero y especies nuevas de Xantholini de la america central. Dos nuevos Scopaei neotropicos. New North American Astenus. [Mem. Soc. Cubana Hist. Nat.] 8: 15-23; 24-28; 29-30. (*). **Blake, D. H.**—New West Indian and Central American Chrysomelidae. [19] 29: 45-56, ill. (*). **Brown, W. J.**—The American species of Dalopius (Elateridae). [4] 66: 30-39, ill., cont. (*). **Chagnon, G.**—Contribution a l'études des Coléoptères de la Province de Québec. [Nat. Canadien] 61: 84-95, ill. **Chapin, E. A.**—An apparently new scarab beetle now established at Charleston, South Carolina. [Pro. Biol. Soc. Washington] 47: 33-35. **Duncan, D. K.**—Acmaeodera papagonis. [19] 29: 64. **Hincks, W. D.**—Notes on the Passalidae. [8] 70: 55-59. (S). **Ohaus, F.**—Genera Insectorum. Fasc. 195. Scarabaeidae. Euchirinae-Phaenomerinae. 1-18, ill. **Schedl, K. E.**—Ein neuer Corthylus aus Costa Rica. (Scolytidae). [2] 29: 33-35, ill. **Schedl, K. E.**—Neue borkenkäfer. [2] 30: 37-39. (S). **Trippel, A. W.**—New records of Indiana Chrysomelidae. [19] 29: 74-76. **Uhmann, E.**—Eine neue Cephaloleia-art aus Costa Rica. Beitrag zur kenntnis der Hispinen (Chrys.). [2] 29: 168-169. **Wolfrum, P.**—2 neue Anthribiden aus einer bestimmungssendung des Herrn Nevermann in Costa Rica. [2] 29: 39-41.

**HYMENOPTERA.—Dowden, P. B.**—Zenillia libatrix, a tachinid parasite of the gypsy moth and the brown-tail moth. [Jour. Agric. Res.] 48: 97-114, ill. **Hicks, C. H.**—The capture and stinging of the prey of Sphex xanthopterus. [38] 33: 39-41. **Rohwer, S. A.**—Descriptions of five parasitic Hymenoptera. [10] 36: 43-48. (*).

**SPECIAL NOTICES.—A Catalogue** of the works of Linnaeus preserved in the libraries of the British Museum. Edition 2. London. British Museum. 246+63 pp.—**A recently initiated** entomological publication. Year Book, Bureau of Entomology. Chekiang, Hangchow No. 1. 1931. No. 2. 1932. [in Chinese].

JUNGLE BEES AND WASPS OF BARRO COLORADO ISLAND. (With Notes on Other Insects). By PHIL RAU. Published by Phil Rau, Kirkwood, St. Louis County, Missouri. 1933. 324 pp., 100 half-tone plates. $2.75.

The main part of this work is based on observations made during a six weeks' stay on the island, beginning August 16, 1928. There are 26 pages on the Stingless Bees, 54 on the social paper-making Polybia wasps, 21 on the behavior of *Polistes* wasps, 28 covering several genera of social wasps, including the nocturnal *Apoica*, 21 on solitary wasps, and 38 pages of ecological notes on various spiders and other arthropods. Then follow 40 pages on the life and behavior of the Great Carpenter Bee, *Xylocopa*. A multitude of observations are here recorded, dealing with the interesting and often peculiar habits of the tropical bees and wasps, and they offer good reading to any one interested in the Hymenoptera or in social insects generally. Of the Stingless Bees we of the so-called temperate zone have no direct knowledge, but the Polybias with their paper nests remind us of our own yellow-jackets, except for the many surprising variations in habit. The description of the habits of a neotropical *Polistes*, comparing it with a nearly related northern form, offers opportunity for discussing the modes of adaptation to climate. The chapter on the Carpenter Bee, a northern form, takes us again out of the tropics, but is nevertheless very welcome for it represents a more thorough study, made over a series of years, of the life and behavior of this hardy insect whose nests are generally so difficult to investigate.

The book is also a human document, reflecting the personality of its author. We enjoy with him his experience, that of a "dooryard" entomologist, as he calls himself, transported suddenly to the tropical jungle, and we feel how his mind is set atingle by the countless new and strange insects he encounters, and by their still more strange habits. He is impelled to seek explanations and to formulate ideas as to how all these peculiar adaptations have come to be. And so there runs through the book as a thread, the author's continual effort to arrive at an evolutionary explanation of the origin of instincts and of structural adaptations. These ideas finally receive a fuller treatment in the last 40 pages on "Mind as a Forerunner of Evolution." The main thesis is that each instinct must have been acquired intelligently. A new behavior repeated becomes a habit, is transmitted to the offspring and thus becomes an instinct. This is orthodox Lamarckian theory, but is here com-

bined with the mnemic idea. When better fitted strains have been thus evolved, natural selection will then weed out the less fit. Although the reviewer was not converted to the author's views, he has learned to recognize even more clearly that the problem of the evolution of instincts is as difficult a one as that concerning the evolution of the structures of animals or of their physico-chemical adaptations, and that in dealing with psychic characteristics there is added the internal difficulty of interpretation of the observational data. But, however we may feel towards the author's theories, there is no question as to his abilities as an intelligent observer and recorder of insect habits, or of the outstanding value of the present contribution.

R. G. SCHMIEDER.

## OBITUARY.

HOWARD AUSTIN SNYDER, an associate of the Entomological Section of the Academy of Natural Sciences of Philadelphia from 1899 to 1918, died at his home at Delanco, New Jersey, on April 3, 1934, at the age of eighty. He was active as a collector of insects in the first decades of the twentieth century. In October, 1905, he visited the Bermuda Islands and exhibited the insects which he collected there at the Section meeting of January 25, 1906 (ENT. NEWS, xvii: 184). This excursion furnished the observations on which he based his article "Color and Environment" (ENT. NEWS, xix: 147-149, 1908), in which he maintained that Bermudan insects are of a lighter color than examples of the same species in the United States, by elimination of the darker individuals more conspicuous on the coral roads and white calcined roofs of those islands. In the exchange column of the NEWS for December, 1909, he had a notice in one of the artificial universal languages, perhaps the only one of this kind in the journal's history. An obituary notice of Mr. Snyder in the Philadelphia *Public Ledger* for April 5, 1934, states that prior to his retirement in 1914, he was with the credit department of Strawbridge & Clothier's large department store in Philadelphia, and gives names of his surviving children.

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# REVISTA DE ENTOMOLOGIA

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# ENTOMOLOGICAL NEWS

**JUNE, 1934**

Vol. XLV No. 6

HARRISON GRAY DYAR,
1866–1929.

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, Sc.D., John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

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| Canada . . . . . | 3.15 |
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# ENTOMOLOGICAL NEWS

VOL. XLV. JUNE, 1934 No. 6

## The Progression Factor in the Growth of the Japanese Beetle (Popillia japonica Newman) (Coleop.: Scarabaeidae).

By DANIEL LUDWIG, Department of Biology, University College, New York University.

Calvert (1929) gave an excellent review of the published work on the progression factor in the growth of Arthropods, considering in turn, the application of Brooks' Law, Dyar's law, and the principle of Przibram. In Crustacea, Brooks (1886) found that at each successive molt there is a definite increase in length. In *Coronis* larvae, he found that the length of the larva increases uniformly at each molt by one-fourth of its length before the molt. Dyar (1890) observed that in Lepidoptera, the width of the head of the larva in its successive stages follows a regular geometrical progression. Przibram and Megusar (1912) working on the Egyptian praying mantis, *Sphodromantis bioculata*, observed that with each molt the shed skin is double the weight of the preceding exuvia and the weight of the newly molted insect shows a doubling from molt to molt. They also found that the length of the prothorax increases from one molt to the next as the cube root of two, or 1.26, and that increases in area occurred at the rate of the square root of two, or 1.41+.

In the case of Przibram's principle, the definite progression in the growth of the insect is supposed to result from a single division of the body cells. The progression implies that each molt represents a definite increase in size which is correlated with a definite number of cell divisions. It postulates that between molts all cells have divided only once. Sztern (1914) advanced the hypothesis that there is a simultaneous division of all cells in the praying mantis, *Sphodromantis bioculata*, and Bodenheimer (1933) also states that a simultaneous division of all body cells may occur in insects. Huettner (1923) re-

ported that in *Drosophila melanogaster*, all cells are in the same stage of division during the early cleavage stages of the egg. He found (personal communication) that later, however, cell divisions are very irregular and remain so during embryonic and larval development. Hence, in *Drosophila* it is definitely known that cell divisions are not simultaneous except in the early cleavage stages.

The principle of Przibram was deduced from studies on insects with incomplete metamorphosis. Its application is demonstrated by the work of Przibram and Megusar (1912), Titschack (1924), Eidmann (1924), Bodenheimer (1927, 1932), Teissier (1928a), and others. That the doubling in weight from molt to molt is due to the division of all of the cells of the insect is suggested by the work of Sztern (1914) who counted the number of cells in the epidermis of the mantis, *Sphodromantis bioculata*, and concluded that they doubled in number from one molt to the next. He made observations on the meso-thoracic ganglion and reported that since there is very little variation in the size of the ganglion nuclei, and since all dimensions of the ganglion increase from molt to molt as the cube root of two, there is also a doubling of the number of ganglion cells from one molt to the next. He also found that the length of the facets of the compound eye increased from molt to molt as the cube root of two. Friza (1928) demonstrated a doubling of the number of cells in the epidermis, and a doubling of the mass of each cell composing each ommatidium of the compound eye of the walking stick, *Dixippus morosus*, from one molt to the next. Przibram (1930) showed that in the mantis, *Sphodromantis bioculata*, between stages I and VI, there is a doubling of the corneal volume at each molt, and between stages VI and IX, the length of each facet increases only very slightly, but that there is a doubling of the number of eye facets.

In the case of Brook's law, Dyar's law, and Przibram's principle, Calvert (1929) pointed out that there are considerable fluctuations in the rates of growth and that growth constants obtained by each method are very variable, due to individual

differences. He emphasized that Przibram and Megusar (1912) found a considerable range of variation in their weighings and measurements of the praying mantis. For the first nine molts, the average increase in weight of the exuviae from one molt to the next ranged from 1.54 to 2.54, mean 2.02; of the living insect from 1.40 to 3.36, mean 2.09. The average increase in length of the prothorax of the exuviae from one molt to the succeeding molt ranged from 1.18 to 1.36, mean 1.28; in the living insect from 1.13 to 1.38, mean 1.29. Individual measurements showed a greater range of variation in each series. To account for this variation, they state that in many cases instead of doubling its weight from molt to molt, the animal more than doubles and this is usually followed by a standstill in the following stage. Przibram and Brecher (1930) found that the average progression factor of the Japanese mantis, *Tenodera aridifolia*, for the different instars ranged from 1.753 to 2.643 with an average of 2.143. Titschack (1930) showed that in the bed bug, *Cimex lectularius*, the progression factors are not constant but decrease with the age of the animal. He gives the following factors for successive instars: 2.56, 2.06, 1.94, and 1.76. Calvert (1929) applied the principle of Przibram to his measurements on different species of Odonata. Because of the variations in the progression factors obtained, he stated, "the growth factor, calculated from existing data, often varied greatly from instar to instar. These data, in most cases, do not allow us to do more than assume very varying rates of growth". A typical example of the variations he obtained is given below. These figures are for successive instars of an individual dragon fly of the species, *Nannothemis bella*, and are taken from Table VII, page 258. They are as follows: 1.22, 1.27, 1.02, 1.28, 1.44, 1.11, 1.22, 1.21, 1.36, 1.36, 1.37, as compared with a constant of 1.26 required by Prizibram's principle. In spite of this variation, Bodenheimer (1933) in his discussion of Calvert's results, asserted that the agreement between Calvert's data and Przibram's principle is obvious. This statement is based on the fact that the average of all the progression factors which Calvert obtained on various species was

approximately 1.26. Hodge (1933) found that the progression factors of the grasshopper, *Melanoplus differentalis*, ranged from 1.08 to 1.64. He believes that the variations in the factors and the irregularity of occurrence of the variations, make the application of Przibram's principle rather doubtful. Similar variations have been found in a number of species of hemimetabolous insects as a study of the tables in the review of Bodenheimer (1932) will show.

With regard to holometabolous insects, the principle is not well established. In these insects, the weight is usually more than doubled between molts, and the hypothesis has been advanced that all of the body cells go through several divisions between each molt. This explanation has been offered by Alpatov (1929) and Bodenheimer (1927, 1932). Alpatov (1929) states, "The need for a double division and multiplication by 1.26 indicates that each of the moltings in *Drosophila* larvae is connected with two cell divisions. It is very likely that the limited number (two) of moltings during the larval life of Diptera cyclorrhapha is a process of secondary reduction, and that in an earlier phylogenetic stage the larvae were characterized by four moltings, each of them linked with one cell division." Titschack (1926) found that in the clothes moth, *Tinola biselliella*, molting is not dependent on body size and that under different experimental conditions, the number of molts varies from 4 to 40. He also demonstrated that, in the clothes moth, the increase in size becomes progressively less with succeeding molts. Teissier (1928b) found that *Tenebrio molitor* may, under certain conditions, lose weight progressively with each molt. No evidence is available, for holometabolous insects, which would show positively whether the increase in weight between molts can be correlated with a definite number of cell divisions.

Ludwig (1932) studied the growth of the Japanese beetle at the temperatures of 20° and 25° C. and attempted to apply Przibram's principle to his results. Because of the range and the variation in the constants obtained, he stated that the investigations on the Japanese beetle do not substantiate the prin-

ciple. With reference to this work, Bodenheimer (1933) writes, "For the Japanese beetle (*Popillia japonica*), Ludwig denies the value of Przibram's principle. But his data mainly confirm it, if we consider that *Popillia* as a holometabolic insect with many divisions cannot show a full agreement." Bodenheimer included a table showing the mean observed weights after each molt (taken from Ludwig's paper), the calculated values, and some of the percentage deviations of the calculated from the observed results. Two percentages (—27.7% and —29.8%), which do not show a very close agreement, he fails to include. The present study is an analysis of the results obtained on the growth of the Japanese beetle and an attempt to apply Przibram's principle, as modified for the growth of holometabolous insects by Bodenheimer (1932 and 1933).

Tables I and II list the weights at successive molts of each of the Japanese beetle larvae reared to the completion of the growth period at 25° and 20° respectively. These readings, in every case, were made within 24 hours after the molt. The calculated results were obtained by the method of Bodenheimer (1932). It consists of dividing the maximum weight for each insect by 2 and the resulting figure by 2, etc., as indicated in Table III. The figure corresponding more closely to the weight observed at the end of each molt is the calculated weight for that stage. The number of divisions by 2 which is necessary to change the figure from a calculated weight after a molt to that after the molt just preceding, indicates the number of cell divisions which, according to Bodenheimer, has occurred between the molts.

A study of these tables will show that the Japanese beetle is extremely variable in size and rate of growth. As pointed out by Ludwig (1932), at 25°, the ratio of the weight after the first molt to the weight of the newly hatched larva ranges from 4 (in number 123) to 12 (number 141) with an average of 6.5; at 20°, it ranged from 4 (number 181) to 8 (number 201) with an average of 5.7. At 25°, the ratio of the weight immediately following the second molt to the weight immediately following the first molt ranged from 3 to 8, with an average

Table I. Calculated and Observed Weights (expressed in milligrams) of Japanese Beetle Larvae reared at 25° C.

| No. | Wt. when hatched obs. | Wt. when hatched calc. | % Deviation | Wt. of 2nd instar obs. | Wt. of 2nd instar calc. | % Deviation | Wt. of 3rd instar obs. | Wt. of 3rd instar calc. | % Deviation | Max. larval wt. | No. of divisions calc. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 2.7 | 2.3 | —17.3 | 17.6 | 18.4 | + 4.3 | 94.7 | 73.8 | —28.3 | 295.2 | 7 |
| 16 | 2.6 | 2.1 | —23.8 | 19.5 | 17.3 | —13.3 | 94.0 | 69.5 | —35.2 | 278.3 | 7 |
| 19 | 2.6 | 2.6 | | 21.8 | 21.2 | — 2.8 | 115.0 | 84.9 | —35.4 | 339.7 | 7 |
| 20 | 2.2 | 2.4 | + 8.3 | 20.5 | 19.3 | — 6.2 | 81.3 | 77.4 | — 5.0 | 309.7 | 7 |
| 21 | 2.3 | 2.0 | —15.0 | 17.6 | 16.4 | — 7.3 | 87.3 | 65.9 | —32.4 | 263.8 | 7 |
| 22 | 2.4 | 2.0 | —20.0 | 15.7 | 16.7 | +10.1 | 87.4 | 67.1 | —30.2 | 268.5 | 7 |
| 23 | 2.5 | 2.6 | + 3.8 | 20.2 | 22.2 | + 9.0 | 114.9 | 88.8 | —29.3 | 355.5 | 7 |
| 24 | 2.5 | 2.0 | —25.0 | 20.7 | 16.1 | —28.5 | 85.0 | 64.7 | —31.3 | 258.8 | 7 |
| 25 | 2.5 | 2.4 | — 4.1 | 17.9 | 19.3 | + 7.2 | 96.8 | 77.4 | —25.0 | 309.6 | 7 |
| 27 | 2.2 | 1.5 | —46.6 | 15.5 | 12.3 | —26.0 | 69.1 | 49.5 | —39.5 | 198.3 | 7 |
| 28 | 2.5 | 2.1 | —19.0 | 11.3 | 17.4 | +35.0 | 42.9 | 35.9 | —19.5 | 143.8 | 6 |
| 29 | 2.0 | 1.8 | —11.1 | 15.9 | 14.2 | —11.9 | 73.9 | 57.1 | —29.4 | 228.4 | 7 |
| 30 | 2.7 | 2.3 | —17.3 | 19.8 | 18.5 | — 7.0 | 100.2 | 74.2 | —35.0 | 296.9 | 7 |
| 31 | 2.2 | 2.5 | +12.0 | 13.0 | 10.0 | —30.0 | 55.4 | 40.1 | —38.1 | 160.6 | 6 |
| 32 | 2.4 | 2.3 | — 4.3 | 17.5 | 18.6 | + 5.0 | 107.1 | 74.4 | —43.9 | 297.8 | 7 |
| 34 | 2.3 | 2.2 | — 4.5 | 15.0 | 17.6 | +14.8 | 83.4 | 70.7 | —17.9 | 283.0 | 7 |
| 35 | 2.5 | 2.1 | —19.0 | 15.9 | 17.3 | + 8.7 | 83.8 | 69.6 | —20.4 | 277.9 | 7 |
| 36 | 2.8 | 2.3 | —21.7 | 17.5 | 18.7 | + 6.8 | 98.1 | 74.9 | —30.9 | 299.7 | 7 |
| 37 | 2.1 | 3.0 | +30.0 | 17.5 | 23.2 | +24.5 | 94.5 | 83.0 | —13.8 | 322.0 | 7 |
| 38 | 2.5 | 2.0 | —25.0 | 20.3 | 16.5 | —23.0 | 85.1 | 66.0 | —28.9 | 264.6 | 7 |
| 39 | 2.8 | 2.5 | —12.0 | 18.3 | 20.1 | + 9.9 | 103.8 | 80.7 | —28.6 | 322.9 | 7 |
| 40 | 2.7 | 3.1 | +12.9 | 15.7 | 12.2 | —28.6 | 52.1 | 47.1 | —10.6 | 188.7 | 6 |
| 42 | 2.2 | 1.9 | —15.8 | 15.0 | 15.5 | + 3.2 | 80.4 | 62.3 | —29.0 | 249.4 | 7 |
| 43 | 2.8 | 2.1 | —33.3 | 16.5 | 17.3 | + 4.6 | 85.8 | 69.3 | —23.8 | 277.2 | 7 |
| 44 | 2.6 | 2.0 | —30.0 | 21.7 | 16.1 | —34.7 | 87.0 | 64.6 | —34.6 | 258.7 | 7 |
| 45 | 2.5 | 2.5 | | 18.4 | 20.1 | + 9.2 | 104.8 | 80.7 | —29.8 | 322.8 | 7 |
| 46 | 2.6 | 2.6 | | 22.8 | 22.1 | — 3.1 | 109.5 | 88.5 | —23.7 | 334.0 | 7 |
| 47 | 2.3 | 2.0 | —15.0 | 17.0 | 16.6 | — 2.4 | 100.2 | 66.4 | —50.9 | 265.8 | 7 |
| 48 | 2.2 | 2.1 | — 4.7 | 17.1 | 17.2 | | 90.7 | 69.1 | —31.2 | 276.7 | 7 |
| 49 | 2.3 | 2.0 | —15.0 | 18.5 | 16.2 | —14.1 | 85.6 | 65.1 | —31.4 | 260.5 | 7 |
| 51 | 2.3 | 2.1 | — 9.5 | 19.4 | 16.8 | —15.4 | 94.2 | 67.3 | —39.9 | 269.4 | 7 |
| 52 | 1.9 | 1.4 | —35.7 | 15.4 | 11.4 | —35.0 | 69.9 | 45.9 | —52.2 | 183.6 | 7 |
| 53 | 2.2 | 2.5 | +12.0 | 19.8 | 20.4 | + 3.0 | 95.5 | 81.8 | —16.7 | 327.3 | 7 |
| 54 | 2.1 | 2.1 | | 17.4 | 17.4 | | 100.0 | 69.8 | —43.2 | 279.2 | 7 |
| 55 | 1.9 | 2.3 | +17.3 | 16.2 | 18.7 | +15.4 | 88.8 | 74.9 | —18.5 | 299.6 | 7 |
| 56 | 2.2 | 1.6 | —37.5 | 14.2 | 13.1 | — 8.3 | 64.1 | 52.6 | —21.8 | 210.5 | 7 |
| 58 | 2.5 | 2.3 | — 8.7 | 16.5 | 18.6 | +11.2 | 84.8 | 74.7 | —13.5 | 299.1 | 7 |
| 59 | 1.9 | 2.1 | + 9.5 | 16.3 | 16.5 | + 1.2 | 81.5 | 66.3 | —22.9 | 265.4 | 7 |
| 60 | 2.5 | 2.1 | —19.0 | 16.5 | 16.9 | + 2.3 | 74.6 | 67.9 | — 9.8 | 271.6 | 7 |
| 61 | 2.3 | 2.4 | + 4.1 | 16.7 | 19.2 | +14.9 | 115.3 | 77.1 | —49.5 | 308.6 | 7 |
| 62 | 2.3 | 2.4 | + 4.1 | 19.8 | 19.3 | — 2.6 | 111.1 | 77.3 | —43.7 | 309.4 | 7 |
| 63 | 2.0 | 2.6 | +23.0 | 14.1 | 20.4 | +44.7 | 88.0 | 81.7 | — 7.7 | 326.9 | 7 |
| 64 | 2.3 | 1.7 | —35.2 | 14.5 | 13.8 | — 5.0 | 67.8 | 55.3 | —22.6 | 221.4 | 7 |
| 65 | 1.9 | 1.3 | —46.1 | 14.9 | 21.5 | +30.6 | 97.8 | 86.1 | —13.5 | 344.7 | 8 |
| 66 | 2.2 | 1.8 | —22.2 | 12.6 | 14.5 | +15.0 | 74.8 | 58.0 | —28.9 | 232.1 | 7 |
| 67 | 2.5 | 2.2 | —13.6 | 19.2 | 17.7 | — 8.4 | 91.2 | 70.8 | —28.8 | 283.5 | 7 |
| 68 | 2.3 | 2.3 | | 14.4 | 18.8 | +23.4 | 74.6 | 75.4 | +1.0 | 301.8 | 7 |
| 69 | 2.9 | 2.1 | —38.1 | 15.5 | 17.2 | + 9.8 | 91.0 | 68.9 | —32.0 | 275.7 | 7 |
| 70 | 2.4 | 2.6 | + 7.6 | 18.0 | 20.8 | +13.4 | 101.6 | 83.4 | —21.8 | 333.7 | 7 |
| 72 | 2.1 | 1.8 | —11.1 | 16.9 | 15.0 | —12.6 | 77.2 | 60.0 | —28.6 | 240.0 | 7 |
| 73 | 2.0 | 2.3 | +13.0 | 15.8 | 18.7 | +15.5 | 95.5 | 74.8 | —27.6 | 299.2 | 7 |
| 76 | 2.4 | 1.9 | —26.3 | 16.5 | 15.8 | — 4.4 | 80.4 | 63.2 | —27.2 | 252.8 | 7 |
| 77 | 1.9 | 2.1 | + 9.5 | 15.9 | 16.9 | + 5.8 | 88.3 | 67.6 | —30.6 | 270.7 | 7 |

| No. | Wt. when hatched obs. | Wt. when hatched calc. | % Deviation | Wt. of 2nd instar obs. | Wt. of 2nd instar calc. | % Deviation | Wt. of 3rd instar obs. | Wt. of 3rd instar calc. | % Deviation | Max. larval wt. | No. of divisions calc. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 78 | 1.8 | 1.6 | —12.5 | 12.0 | 12.8 | + 6.2 | 73.7 | 51.4 | —43.3 | 205.6 | 7 |
| 79 | 2.3 | 1.8 | —27.7 | 15.9 | 14.9 | — 6.7 | 88.6 | 59.7 | —48.4 | 239.0 | 7 |
| 80 | 2.7 | 2.2 | —22.7 | 13.2 | 17.9 | +26.2 | 80.0 | 71.9 | —11.2 | 287.9 | 7 |
| 81 | 2.8 | 2.9 | + 3.4 | 18.5 | 23.2 | +20.2 | 105.9 | 93.0 | —13.8 | 372.0 | 7 |
| 82 | 2.0 | 2.1 | + 4.7 | 17.3 | 17.5 | + 1.1 | 90.6 | 70.2 | —29.0 | 280.9 | 7 |
| 83 | 2.5 | 2.1 | —19.0 | 20.3 | 17.0 | —19.4 | 101.8 | 68.2 | —49.2 | 273.0 | 7 |
| 84 | 2.9 | 2.7 | — 7.4 | 20.6 | 22.1 | + 6.7 | 104.4 | 90.4 | —15.4 | 361.8 | 7 |
| 85 | 2.2 | 2.3 | + 4.3 | 16.8 | 18.7 | +10.1 | 88.3 | 75.0 | —17.7 | 300.0 | 7 |
| 86 | 2.7 | 3.6 | +25.0 | 16.9 | 14.7 | —14.9 | 88.3 | 58.8 | —50.1 | 235.2 | 6 |
| 88 | 2.7 | 3.6 | +25.0 | 11.9 | 14.4 | +17.3 | 65.7 | 57.8 | —13.6 | 231.4 | 6 |
| 90 | 2.2 | 2.3 | + 4.3 | 17.9 | 18.5 | + 3.2 | 107.3 | 74.1 | —44.8 | 296.7 | 7 |
| 91 | 2.6 | 1.8 | —44.4 | 14.1 | 15.0 | + 6.0 | 71.7 | 60.2 | —19.1 | 240.9 | 7 |
| 92 | 2.8 | 2.1 | —33.3 | 19.8 | 17.2 | —15.1 | 101.4 | 69.1 | —46.7 | 276.5 | 7 |
| 93 | 2.3 | 1.9 | —21.0 | 13.9 | 15.7 | +11.6 | 67.7 | 63.1 | — 7.2 | 252.6 | 7 |
| 94 | 2.5 | 2.2 | —13.6 | 17.2 | 18.2 | + 5.4 | 97.8 | 72.8 | —34.3 | 291.3 | 7 |
| 95 | 2.3 | 1.8 | —27.7 | 17.5 | 14.6 | —19.8 | 89.3 | 58.5 | —52.6 | 214.3 | 7 |
| 96 | 2.6 | 1.8 | —44.4 | 16.6 | 15.0 | —10.6 | 80.3 | 60.2 | —33.3 | 241.1 | 7 |
| 97 | 2.8 | 2.8 | | 20.5 | 23.1 | +11.2 | 106.3 | 92.5 | —14.9 | 370.1 | 7 |
| 98 | 2.1 | 1.5 | —40.0 | 12.8 | 12.4 | — 3.2 | 49.4 | 49.9 | + 1.0 | 199.8 | 7 |
| 99 | 2.6 | 2.5 | — 4.0 | 13.7 | 10.1 | —35.6 | 55.5 | 40.6 | —36.7 | 162.6 | 6 |
| 101 | 2.2 | 2.2 | | 16.2 | 17.9 | + 9.4 | 91.0 | 71.8 | —26.7 | 287.4 | 7 |
| 102 | 2.1 | 1.9 | —10.5 | 16.0 | 15.4 | — 3.9 | 88.3 | 61.9 | —42.6 | 247.9 | 7 |
| 103 | 2.7 | 1.9 | —42.1 | 15.2 | 15.4 | + 1.3 | 69.7 | 61.9 | —12.6 | 247.6 | 7 |
| 104 | 2.3 | 1.9 | —21.0 | 16.3 | 15.8 | — 3.1 | 84.3 | 63.2 | —33.3 | 253.0 | 7 |
| 105 | 1.8 | 2.3 | +21.7 | 15.0 | 18.4 | +18.4 | 74.1 | 73.9 | | 295.6 | 7 |
| 106 | 2.3 | 1.7 | —35.2 | 14.5 | 13.8 | — 5.0 | 78.1 | 55.2 | —41.4 | 220.8 | 7 |
| 108 | 2.3 | 3.1 | +25.8 | 12.7 | 12.8 | | 73.3 | 51.4 | —42.6 | 205.9 | 6 |
| 109 | 2.1 | 2.3 | + 8.7 | 19.2 | 18.6 | — 3.2 | 81.2 | 74.5 | — 8.9 | 298.3 | 7 |
| 111 | 1.5 | 1.6 | + 6.2 | 13.4 | 12.9 | — 3.8 | 69.2 | 51.8 | —33.5 | 207.5 | 7 |
| 112 | 2.6 | 2.2 | —18.1 | 15.6 | 18.1 | +13.8 | 98.2 | 72.7 | —35.0 | 290.8 | 7 |
| 113 | 2.4 | 1.7 | —41.1 | 16.1 | 13.8 | —16.6 | 84.3 | 55.5 | —51.8 | 222.1 | 7 |
| 115 | 2.2 | 2.2 | | 17.2 | 17.8 | + 3.3 | 87.8 | 71.3 | —23.1 | 285.4 | 7 |
| 116 | 2.3 | 2.2 | — 4.5 | 15.2 | 17.8 | +14.6 | 87.6 | 71.3 | —22.8 | 285.6 | 7 |
| 117 | 2.0 | 2.0 | | 15.1 | 16.6 | + 9.0 | 84.0 | 66.5 | —26.3 | 266.1 | 7 |
| 118 | 2.3 | 2.0 | —15.0 | 14.0 | 16.4 | +14.6 | 78.1 | 65.6 | —19.0 | 262.4 | 7 |
| 120 | 1.9 | 1.5 | —26.6 | 12.4 | 12.2 | — 1.6 | 64.6 | 48.8 | —32.3 | 195.2 | 7 |
| 121 | 2.4 | 2.0 | —20.0 | 17.6 | 16.5 | — 6.6 | 85.5 | 66.2 | —29.1 | 265.0 | 7 |
| 122 | 2.8 | 3.5 | +20.0 | 13.3 | 14.2 | + 6.3 | 71.9 | 57.0 | —26.1 | 228.0 | 6 |
| 123 | 2.5 | 3.2 | +21.8 | 10.2 | 12.9 | +22.4 | 63.4 | 51.7 | —22.6 | 206.9 | 6 |
| 124 | 2.4 | 2.2 | — 9.0 | 22.0 | 18.3 | —20.2 | 109.0 | 73.5 | —48.3 | 294.0 | 7 |
| 125 | 2.0 | 2.1 | + 4.7 | 18.0 | 16.9 | — 6.5 | 100.1 | 67.7 | —47.8 | 270.9 | 7 |
| 127 | 2.4 | 1.9 | —26.3 | 13.7 | 15.4 | +11.0 | 70.8 | 61.7 | —14.7 | 247.1 | 7 |
| 128 | 2.6 | 1.8 | —44.4 | 15.1 | 14.4 | — 4.8 | 78.9 | 57.6 | —36.9 | 230.6 | 7 |
| 129 | 2.1 | 1.8 | —16.6 | 14.5 | 14.6 | | 83.3 | 58.5 | —42.3 | 234.0 | 7 |
| 130 | 2.0 | 1.8 | —11.1 | 14.8 | 14.9 | | 75.9 | 59.6 | —27.3 | 238.6 | 7 |
| 133 | 2.6 | 1.9 | —36.8 | 19.6 | 15.6 | —25.6 | 99.4 | 62.4 | —27.2 | 249.8 | 7 |
| 134 | 2.4 | 2.6 | + 7.6 | 17.8 | 21.4 | +12.1 | 120.5 | 85.7 | —40.6 | 342.0 | 7 |
| 136 | 2.4 | 2.1 | —14.2 | 13.6 | 17.5 | +28.6 | 72.6 | 70.1 | — 3.5 | 280.5 | 7 |
| 137 | 2.6 | 1.8 | —44.4 | 15.6 | 14.9 | — 4.6 | 75.9 | 59.9 | —26.7 | 239.9 | 7 |
| 138 | 2.0 | 1.8 | —11.1 | 13.4 | 15.0 | +17.3 | | 60.1 | | 242.6 | 7 |
| 139 | 2.5 | 2.1 | —19.0 | 17.7 | 17.3 | — 2.3 | 86.2 | 69.5 | —24.0 | 278.2 | 7 |
| 140 | 2.5 | 2.7 | + 7.4 | 15.4 | 21.9 | +29.6 | 106.5 | 87.6 | —21.5 | 350.5 | 7 |
| 141 | 1.2 | 1.1 | — 9.0 | 14.7 | 18.6 | +20.9 | 92.8 | 74.4 | —24.7 | 297.8 | 8 |
| 142 | 2.0 | 1.5 | —33.3 | 12.0 | 12.5 | + 4.0 | 69.7 | 50.3 | —38.5 | 201.5 | 7 |
| 143 | 2.9 | 2.4 | —20.8 | 18.8 | 19.7 | + 4.5 | 104.2 | 79.0 | —31.8 | 316.2 | 7 |
| 144 | 2.9 | 2.4 | —20.8 | 17.7 | 19.4 | + 8.7 | 85.5 | 77.8 | — 9.8 | 311.4 | 7 |

Table II. Calculated and Observed Weights (expressed in milligrams) of Japanese Beetle Larvae reared at 20° C.

| No. | Wt. when hatched obs. | Wt. when hatched calc. | % Deviation | Wt. of 2nd instar obs. | Wt. of 2nd instar calc. | % Deviation | Wt. of 3rd instar obs. | Wt. of 3rd instar calc. | % Deviation | Max. larval wt. | No. of divisions calc. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 151 | 1.9 | 1.7 | —11.7 | 11.3 | 13.9 | +18.7 | 63.6 | 55.6 | —14.3 | 222.7 | 7 |
| 152 | 2.3 | 1.7 | —35.2 | 11.7 | 13.9 | +15.8 | 79.7 | 54.9 | —45.1 | 219.8 | 7 |
| 153 | 2.2 | 2.3 | + 4.3 | 12.3 | 18.9 | +34.8 | 48.0 | 37.9 | —26.6 | 151.7 | 6 |
| 154 | 2.0 | 2.0 | | 12.4 | 16.1 | +22.9 | 92.8 | 64.6 | —43.6 | 258.7 | 7 |
| 160 | 1.9 | 1.7 | —11.7 | 11.8 | 13.9 | +15.1 | 60.2 | 55.7 | — 8.0 | 222.8 | 7 |
| 163 | 1.7 | 1.4 | —21.4 | 11.0 | 11.7 | + 5.1 | 59.7 | 47.0 | —27.0 | 188.3 | 7 |
| 164 | 1.9 | 1.5 | —26.6 | 11.5 | 12.1 | + 4.9 | 54.5 | 48.4 | —12.6 | 193.6 | 7 |
| 166 | 2.0 | 1.6 | —25.0 | 14.1 | 13.2 | — 6.7 | 75.7 | 52.9 | —43.1 | 211.8 | 7 |
| 168 | 2.8 | 2.6 | — 7.6 | 16.1 | 21.5 | +25.1 | 98.7 | 86.0 | —13.1 | 344.1 | 7 |
| 172 | 2.6 | 3.3 | +21.2 | 13.4 | 13.5 | | 61.2 | 54.3 | —12.7 | 217.2 | 6 |
| 175 | 2.8 | 3.2 | +12.5 | 13.6 | 13.0 | — 4.6 | 52.7 | 52.0 | — 1.3 | 208.1 | 6 |
| 176 | 2.2 | 1.8 | —22.2 | 12.0 | 14.7 | +18.3 | 57.5 | 59.0 | + 2.5 | 236.6 | 7 |
| 178 | 2.6 | 2.2 | —18.1 | 15.6 | 17.8 | +12.3 | 73.5 | 71.5 | — 2.7 | 286.3 | 7 |
| 179 | 2.2 | 2.2 | | 12.5 | 17.8 | +29.7 | 64.4 | 71.5 | + 9.7 | 286.4 | 7 |
| 181 | 1.9 | 2.2 | +13.6 | 8.4 | 8.8 | + 4.5 | 37.4 | 35.2 | — 6.2 | 140.8 | 6 |
| 182 | 1.7 | 1.3 | —30.7 | 11.8 | 11.1 | — 6.3 | 50.1 | 44.7 | —12.0 | 178.9 | 7 |
| 183 | 2.4 | 3.3 | +27.2 | 12.2 | 13.2 | + 7.5 | 59.7 | 52.9 | —12.8 | 211.7 | 6 |
| 184 | 2.5 | 2.2 | —13.6 | 12.5 | 17.9 | +30.1 | 71.7 | 71.8 | | 287.2 | 7 |
| 185 | 2.3 | 1.9 | —21.0 | 12.1 | 15.2 | +20.3 | 59.9 | 61.1 | + 1.9 | 244.4 | 7 |
| 187 | 2.2 | 2.8 | +21.4 | 10.4 | 11.3 | + 7.8 | 39.5 | 45.5 | +13.1 | 182.2 | 6 |
| 190 | 2.3 | 1.8 | —27.7 | 12.9 | 14.5 | +11.0 | 58.0 | 58.2 | | 233.0 | 7 |
| 194 | 2.3 | 2.4 | + 4.1 | 11.1 | 9.6 | —15.6 | 51.4 | 38.5 | —33.5 | 154.1 | 6 |
| 200 | 2.1 | 2.3 | + 8.6 | 12.9 | 19.0 | +32.1 | 73.9 | 76.1 | + 2.8 | 304.4 | 7 |
| 201 | 2.0 | 1.6 | —25.0 | 16.2 | 13.5 | —20.0 | 66.8 | 54.3 | —23.0 | 217.5 | 7 |
| 203 | 2.3 | 1.7 | —35.2 | 13.7 | 13.7 | | 59.6 | 54.9 | — 8.5 | 219.8 | 7 |
| 204 | 2.4 | 2.5 | + 4.0 | 15.0 | 20.3 | +26.1 | 83.0 | 81.2 | — 2.2 | 324.8 | 7 |
| 205 | 2.2 | 1.6 | —37.5 | 11.9 | 13.4 | +11.1 | 77.0 | 53.6 | —43.6 | 214.7 | 7 |
| 206 | 2.1 | 2.0 | — 5.0 | 14.2 | 16.4 | +13.4 | 70.7 | 65.7 | — 7.0 | 262.9 | 7 |
| 207 | 2.4 | 3.1 | +22.5 | 14.1 | 12.5 | —12.8 | 52.5 | 50.0 | — 5.0 | 200.0 | 6 |
| 208 | 2.7 | 1.9 | —42.1 | 14.5 | 15.9 | + 8.8 | 63.0 | 63.7 | + 1.1 | 255.1 | 7 |
| 209 | 2.3 | 3.0 | +23.3 | 12.4 | 12.0 | — 3.3 | 61.2 | 48.3 | —26.7 | 193.3 | 6 |
| 210 | 2.8 | 1.9 | —47.3 | 14.7 | 15.4 | + 4.5 | 61.3 | 61.7 | | 246.9 | 7 |
| 212 | 2.4 | 1.7 | —41.1 | 13.2 | 13.7 | + 3.6 | 80.9 | 58.9 | —37.3 | 239.9 | 7 |
| 213 | 2.7 | 2.7 | | 12.8 | 10.9 | —17.4 | 50.6 | 43.8 | —15.5 | 175.2 | 6 |
| 215 | 2.8 | 1.9 | —47.3 | 14.8 | 15.0 | + 1.3 | 74.1 | 60.1 | —23.2 | 240.7 | 7 |
| 216 | 2.7 | 1.8 | —50.0 | 13.0 | 14.2 | + 8.4 | 67.9 | 56.8 | —19.5 | 227.2 | 7 |
| 217 | 2.2 | 1.5 | —46.6 | 12.0 | 12.2 | + 1.6 | 56.2 | 48.8 | —15.1 | 195.5 | 7 |
| 218 | 2.2 | 2.0 | —10.0 | 13.2 | 16.0 | +17.5 | 73.2 | 64.1 | —14.5 | 256.4 | 7 |
| 220 | 2.3 | 1.9 | —21.0 | 14.9 | 15.3 | + 2.6 | 80.0 | 61.3 | —30.5 | 245.2 | 7 |
| 221 | 1.9 | 1.9 | | 12.9 | 15.4 | +16.2 | 63.6 | 61.7 | — 2.1 | 247.0 | 7 |
| 223 | 2.8 | 2.3 | —21.7 | 18.3 | 18.7 | + 2.1 | 92.8 | 75.1 | —23.5 | 300.7 | 7 |
| 230 | 2.1 | 1.5 | —40.0 | 12.6 | 12.0 | — 5.0 | 59.8 | 48.3 | —23.8 | 193.3 | 7 |
| 234 | 2.5 | 2.2 | —13.6 | 16.8 | 17.7 | + 5.0 | 78.6 | 70.8 | —11.0 | 283.5 | 7 |
| 235 | 2.6 | 3.2 | +18.7 | 13.1 | 13.0 | — 0.7 | 56.3 | 52.2 | — 7.8 | 209.0 | 6 |
| 236 | 2.2 | 2.0 | —10.0 | 11.9 | 16.9 | +29.5 | 58.3 | 67.1 | +13.1 | 268.6 | 7 |
| 239 | 2.0 | 1.6 | —25.0 | 9.9 | 13.1 | +24.4 | 42.0 | 52.5 | +18.0 | 210.3 | 7 |
| 242 | 2.3 | 3.0 | +23.3 | 12.6 | 12.1 | — 4.1 | 55.1 | 48.5 | —13.6 | 194.0 | 6 |
| 247 | 2.0 | 1.5 | —33.3 | 9.5 | 12.6 | +24.6 | 47.0 | 50.5 | + 6.9 | 202.0 | 7 |
| 254 | 2.1 | 1.8 | —16.6 | 12.7 | 14.6 | +13.0 | 59.9 | 58.4 | — 2.5 | 233.9 | 7 |
| 259 | 2.7 | 2.4 | —12.5 | 14.6 | 19.6 | +25.2 | 92.2 | 78.5 | —17.4 | 314.1 | 7 |
| 260 | 2.3 | 2.2 | — 4.5 | 12.5 | 9.1 | —37.3 | 46.8 | 36.5 | —28.2 | 146.2 | 6 |
| 265 | 1.9 | 1.6 | —18.7 | 13.0 | 13.2 | + 1.5 | 57.5 | 52.9 | — 8.6 | 211.6 | 7 |
| 266 | 2.6 | 2.7 | — 3.7 | 11.5 | 11.0 | — 4.5 | 58.0 | 44.0 | —31.8 | 176.0 | 6 |
| 268 | 2.0 | 1.5 | —33.3 | 12.2 | 12.4 | + 1.6 | 57.2 | 49.8 | —14.8 | 199.4 | 7 |
| 270 | 1.9 | 1.5 | —26.6 | 12.8 | 12.4 | — 3.2 | 55.6 | 49.8 | —11.6 | 199.6 | 7 |

of 5.2; at 20°, it ranged from 3 to 8 with an average of 4.6. At 25°, the observed and calculated values very rarely show a close agreement and deviations usually range from 10 to more than 50 per cent. These discrepancies are especially apparent when the weights immediately following the molt to the third instar are considered. With the exception of two larvae, numbers 68 and 98, the calculated values are always smaller than the observed values and deviations of from 30 to 50 per cent are quite common. According to Przibram's principle, this suggests that the molt occurs when a division of only a part of the body cells has occurred. The principle postulates that molting occurs when all of the cells have divided. At 20°, the agreement between the observed and calculated weights is somewhat better than at 25°, although wide discrepancies are also very common. In both cases individual variations are so great that one is not justified in using the average weights of a group in the calculation of the progression factors as has been done by Bodenheimer (1933).

The probable number of cell divisions occurring during the growth of each larva is given in the last column of Tables I and II. The usual number, as calculated by dividing the maximum larval weight by two, in successive steps, until a number corresponding to the weight of the newly hatched larva is obtained, is seven. (There are only three larval instars in the Japanese beetle.) This method, as it has been applied, allows for a considerable amount of variation in the maximum larval weights before a change in the number of cell divisions is noted. For example, the weights of larvae numbers 23 and 24, when newly hatched, were 2.5 milligrams each. When growth was completed, number 23 weighed 355.5 milligrams and number 24 weighed only 258.8 milligrams, a difference of nearly 100 milligrams. Nevertheless, the number of cell divisions obtained by the above method of calculation is seven for each individual. In the case of larva number 23, the calculated initial weight corresponds very closely to that observed, while in larva number 24, the calculated initial weight deviates from that observed by — 25 per cent . This is less than the — 27.7 per cent devia-

tion shown in the table of Ludwig's data given by Bodenheimer (1933, page 94). An inspection of Tables I and II will show other cases which are just as variable in maximum weights but with seven calculated cell divisions. Very wide variations must be present before the method will show any changes in the number of cell divisions, provided deviations between calculated and observed results of from 20 to 30 per cent are permitted. Table I shows, however, that the number of cell divisions may vary, according to this method of calculation, from six to eight.

Table III. Calculated and Observed weights of Japanese Beetle Larvae showing latent Divisions.

| No. | Observed Weight | Calculated Weight |
|---|---|---|
| 141 | 297.8 mg. | 297.8 mg. |
| | | 148.9 mg. |
| | 92.8 mg. | 74.4 mg. |
| | | —24.7% |
| | | 37.2 mg. |
| | 14.7 mg. | 18.6 mg. |
| | | +20.9% |
| | | 9.3 mg. |
| | | 4.6 mg. |
| | | 2.3 mg. |
| | 1.2 mg. | 1.2 mg. |
| | No. of divisions = 8 | |

| No. | Observed Weight | Calculated Weight |
|---|---|---|
| 97 | 370.1 mg. | 370.1 mg. |
| | | 185.0 mg. |
| | 106.3 mg. | 92.5 mg. |
| | | —14.9% |
| | | 46.2 mg. |
| | 20.5 mg. | 23.1 mg. |
| | | +11.2% |
| | | 11.5 mg. |
| | | 5.7 mg. |
| | 2.8 mg. | 2.8 mg. |
| | No. of divisions = 7 | |

| No. | Observed Weight | Calculated Weight |
|---|---|---|
| 99 | 162.6 mg. | 162.6 mg. |
| | | 81.3 mg. |
| | 55.5 mg. | 40.6 mg. |
| | | —36.7% |
| | | 20.3 mg. |
| | 13.7 mg. | 10.1 mg. |
| | | —35.6% |
| | | 5.0 mg. |
| | 2.6 mg. | 2.5 mg. |
| | No. of divisions = 6 | |

Table III contains the observed and calculated weights (tabulated to show latent divisions) of three individuals. Number 141 has eight calculated cell divisions, number 97 has seven, and number 99 has six. These larvae were selected because the weight of the newly hatched larva in each case corresponds to that calculated by the method of Bodenheimer. The table shows that, notwithstanding the variations which are permitted before any change in the number of cell divisions is apparent, some larvae are found whose weights show a very close agreement with those calculated when eight cell divisions are assumed, and others which fit the calculations when only six cell divisions are assumed. If the method of calculating latent divisions has any justification in fact, it must be concluded that the number of divisions in the Japanese beetle larva varies from six to eight.

This variation would further justify the conclusion that the average of the group cannot be used in the calculation of growth constants and that the principle of Przibram is not applicable to the Japanese beetle.

Bodenheimer (1932) lists the average growth factors for the various instars of a number of holometabolous insects. In most cases he obtained high growth factors indicating a number of latent divisions between molts. Usually there are wide deviations between the experimental and calculated results, as indicated below for *Dytiscus semisulcatus* (Bodenheimer 1932, page 566.)

| Observed Weight mg. | Calculated Weight mg. | Percentage Deviation* |
|---|---|---|
| 1300 | 1300 | ..... |
| .... | 650 | ..... |
| 400 | 325 | — 23.0 |
| .... | 162 | ..... |
| 100 | 81 | — 23.4 |
| 30 | 40 | + 25.0 |

Bodenheimer (1932, page 555) states, "Als wichtigste Fehlerquellen sind anzusehen: 1. Die individuelle Variation, welche durch Wägen einer genügend grossen Individuenzahl behoben werden kann; 2. die Därmfüllung, welche direkt nach der Häutung ausgeschaltet ist; 3. ungleiche Temperatur-, Feuchtigkeits-, Nahrungs bzw. andere Umweltverhältnisse." It seems questionable whether averages of figures which vary as greatly as do the weights of different Japanese beetle larvae have any significance in the calculation of growth constants. If the number of cell divisions in an insect is to be calculated, readings made on the individual must be used and not averages of readings made on a number of individuals of a group, as is advocated by Bodenheimer.

## Literature Cited.

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* The figures in this column were not given in Bodenheimer's paper but were calculated by the writer.

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## An Answer to E. Graywood Smyth on "Synopsis of Cicindelidae" (Coleoptera).

By Alan S. Nicolay, Montclair, New Jersey.

(Continued from page 131.)

Mr. Smyth accuses us of being arbitrary in our reductions of names to synonymy without more fundamental reasons. He cites *mirabilis* as an example. If Mr. Smyth were only posted on the literature after 1907, he would have known that we had nothing whatsoever to do with it! Dr. Walther Horn in his last list (Trans. Am. Ent. Soc. LVI, 1930, page 80) did this and, after I carefully examined the single type specimen, I agreed, except that as we could find no reason for continuing the name *lauta*, both were placed as synonyms of *audubani*, instead of *mirabilis* being a synonym of *lauta*, as recorded by Dr. Horn.

Shortly after completing our paper it was my privilege to examine the tiger beetle collection of Mr. William C. Wood of New York City. In it were several examples of *mirabilis*. Mr. Leng also called this variety to my attention. In view of the fact that this insect is, therefore, apparently not a unique sport, I feel it should be returned to the standing of a good geographical variety, distinguished by its bright cupreous head and

thorax. The elytra are of course green and in the type the margins are blue, but this probably does not run constant in a large series. *Mirabilis* should be placed after *audubonii* in our key. It occurs in California (Dutch Flat, Placer County).

In the middle of the last paragraph (p. 202) of Mr. Smyth's paper he "suggests" the name *Cicindela plattensis*. Of course no type, specific locality or paragraphed description are necessary! This name is erected to take care of those forms of *denverensis* with complete markings such as differentiate *cyanocephala* and *splendida*. I had considered recognizing this form but decided to concur with Dr. Walther Horn, who, also after examining the Casey types, recognized only *denverensis*. For those who prefer a name for this more maculated variety, *conquisita* Casey has priority, with *orcada* Casey and *plattensis* Smyth as synonyms.

Although *purpurea* and *limbalis* do occur in approximately the same localities, in the East they are seldom found on the same spot or under similar conditions together. By this I mean that *purpurea* is very abundant in South Jersey and on Long Island, New York, in the pine barrens or near them; *limbalis* is never found there or even near there. *Limbalis* is taken on the tops and near the tops of hills overlooking the Hudson River around Bear Mountain, West Point, etc., New York, also on the higher hills surrounding Greenwood Lake in New Jersey and New York. *Purpurea* is taken in northern New Jersey also, but nearer Newark and at lower elevations. It approaches the land of *limbalis* at Midvale where it is found at lower elevations while *limbalis* commences to be found on the tops of the hills. An occasional *purpurea* is taken with these specimens of Midvale *limbalis*, although it is not established there in quantities as is *limbalis*. Also *purpurea* is found exclusively on the west shore of Greenwood Lake, high on the cliffs among the scrub pine and oak trees and running on the bare rocks, while *limbalis* is found on the east shore where the trees are deciduous. Last autumn in the Blue Ridge Mountains, (Skyland) Virginia, I found *purpurea* at lower elevations, while a single *limbalis* was taken near the top of Stony

Man Mountain. From these field observations I should say that *purpurea* and *limbalis* represent closely related but still abundantly distinct species.

Despite the last sentence in our introduction (p. 344) "The bibliography in this paper will also include the more important works on North American Cicindelidae," Mr. Smyth adds some additional papers stating they "will supply a few of the omissions from the bibliography of the authors."

In closing, I would like to quote from two letters received, acknowledging reprints of our paper. Dr. Walther Horn writes January 12, 1933—"I have seen with the greatest interest your synopsis on the Cicindelidae published together with Mr. H. B. Weiss. Please hand over also my best congratulations to the last one. I wish you could finish in near future this big work in the same way as you have begun. There is certainly a great need for such a Synopsis you are going to publish as the old ones are ancient and lists are not sufficient for the beginner."

Mr. Charles Leng writes January 4, 1933—"I have read with interest your remarks on the variations of *Cicindela purpurea* which in the main are well considered."

Finally I regret that such a long lapse of time has occurred between our first paper and the next. Unfortunately lack of time and a paper on Carabidae already started, has been the cause. I hope to have the next *Cicindela* paper in print during the current year.

## Collecting Catocalae (Lepid.: Noctuidae).

By Auburn E. Brower, Bar Harbor, Maine.

Catocalas are found thruout the United States, a number of species being found in almost all localities. Three important methods are used in securing them: collecting the moths on tree trunks, rustic buildings, verandas, caves in the rock, cliffs, etc.; catching them at bait at night; and rearing. Deciduous trees are usually selected as resting places. Oak, hickory, elm,

poplar, walnut, willow, dogwood, maple, tulip, and hawthorn are preferred. Usually mature stands, rather free from underbrush, are chosen, but good catches are made in situations ranging from shade trees along city streets to dense forest growths. The groves upon knolls or ridges are often favored. On the live oaks and huge cypresses of the swamps they rest and also about the bases of the live oaks in the mountains of California. A leafy branch may be used to brush the trees. Suitable buildings, caves, and crevices in the rock are rich collecting places especially in the West. They are local in many sections and their favorite localities must be sought. Hilly regions are best. Weather conditions greatly influence the numbers which can be found from day to day. Some Catocalas are taken as early as late March in southern Florida and by early June in the central States.

A net must not be used to collect cabinet specimens, but may be used to collect females for eggs. Perfect specimens can be secured sometimes with a net when it is possible to clap the open net to the ground and hold the bag up and open until a bottle can be slipped in from below and over the moth. They should be collected by stealthily placing wide-mouthed cyanide jars over the resting insects on the tree trunks, etc. When approaching a moth studiously avoid snapping a twig or casting a shadow over it, and place the cyanide jar over it from below. After practice surprising numbers can be caught. The writer usually leans around the tree. Jar caps like those on mayonnaise jars are preferable. Sometimes a bottle with a leather funnel slashed around the margin is mounted on a pole and used to catch the moths. After the moth is caught turn the bottle if necessary to keep the fluttering insect off of its back until it becomes quiet. Then the moth should be pinned in a killing box or put in an envelope and returned to a cyanide jar. The author uses four large strong cyanide jars. Two are used alternately for catching the moths, and the other two for papered specimens. After leaving them in a cyanide jar for sixty minutes they should be packed in a stout box. The resting position of each species before it is disturbed should be

observed, and also other habits, and these recorded. At home they should be turned out of the envelopes and be spread, pinned, or put in regular papers, always with data. Specimens should be so placed in the envelopes that the antennae lie along the front margin of the wings. Triangular envelopes should be made of medium weight paper; rectangular ones of glassine are poor.

A bait line is the only successful way known of getting some desirable species, and it is often the best method of collecting. It may be inferior to daylight hunting especially for the common species. Both methods should be tried, but some of the small ones are successfully secured at bait only. Bait lines are best along roads or paths thru timber. Mature, living deciduous trees are best, and in open stands or groves. Shade trees and even fence posts have given big catches. A bait line increases in attractiveness and should be baited day after day. Sometimes changing a bait line to another locality brings success. Greatly different catches may be made on trees twenty feet apart. Bait should be applied between sundown and dark breast high on the lee side of the trees. Most baits are applied with a big brush. Many bait mixtures are improved by stirring in a teaspoonful of amyl acetate just before applying them; formerly Jamaica rum was used. Warm dry weather is usually best but not always. The two hours after dusk are usually best and so are warm dark nights. The time when the different species appear at bait should be recorded and also their actions at bait.

Many different materials and mixtures have proved to be attractive at some time in some place. Nearly all depend upon fermentation products from fruits or other sweet substances for their attractiveness. Stale beer with a sweet or decaying fruit was long the most popular attrahent, rum or ethyl alcohol being added just before using. The following formulas have all been recommended: a mixture of apple cider and New Orleans sugar; ordinary syrup diluted with fermented fruit juice and rum; molasses one pound, brown sugar two pounds, two bottles of stale beer (left in sun for two or three days), pineapple essence, and rotting bananas; stale beer,

rotting bananas, and honey water; molasses and stale beer boiled down; many combinations of rotting or fermenting fruit pulp, especially apples and peaches, combined with molasses (preferably Blackstrap) and sugar make excellent baits. These are best with active fermentation present. Bevo and raisins fermented are good. Bull's-eye lanterns, spot lights, and gasoline lanterns are used in collecting the moths at bait. Gasoline lanterns are favored; moths which take wing often flutter to the ground and may be caught. Moths drop downward as they take wing and so the cyanide jar should be brought up from below. Movements should be quiet, rapid, and precise.

Some Catocalas may appear at bait in the daytime, especially in high altitudes where they also feed on sap flows by day. Some have been reported at fruit. Sap flows on oak, hickory, willow, maple, etc., may be very attractive. Some desirable species are taken at flowers about dark. Purple milkweed, persimmon, phlox, mescal, yucca, catalpa, etc., are attractive to some species. These methods are unusual ones, and notes should be made in all cases regarding conditions, time of appearance, actions while feeding, and other habits.

In general Catocalas are not strongly attracted to light, but most species are taken at light and big catches have been made at light. Warm, cloudy nights with a drizzling rain are best. Gasoline lanterns are usually used. A white sheet should be stretched behind the light (an overhang at the top helps) and another spread on the ground. From eleven until three o'clock yields most Catocalas. The species and time of the night when they appear should be recorded.

The eggs of Catocalas are found upon trees during the winter. The grayish disk-shaped eggs of the hickory-feeders are found between the scales of hickory bark, in localities where the moths rested. The more or less hemispherical ribbed eggs of the other groups are found secreted on the bark of the oaks, willows, Populus, etc. Information is needed on where and how the eggs are placed.

The worn or imperfect females which are to be kept for eggs, may be placed in envelopes in the field. They should be

kept as cool as possible. Two quart jars, four quart paper bags, tin boxes, and wire cages have all been used successfully in securing eggs. A piece of scaly or flaky bark of the food plant or pleated cloth should be enclosed into which the female can tuck her eggs. Each female should be fed a small piece of overripe fruit or some semifluid sweet when confined and again later at intervals of a few days. Sometimes a little water is put in the jars and a damp cloth may be spread under the cover of the tin boxes. The caged insects should be kept in a cool place and where rodents cannot get to them. Well-ventilated screen wire cylinders or cages are apparently best for many of the western species. Only one female should be put in a cage and the dead moth should be saved with her eggs that the larvae may be positively identified and the offspring compared with the parent. The eggs should be kept in a cool place. Eggs may be shipped in a quill, or paper bags may be folded leaving the contents inside.

The protectively colored larvae rest upon or near the food plant by day, feeding mainly by night. Larvae of some groups, which feed on bushes, feed by day. Some crawl from their host plant to hide in leaves and debris, but most species secrete themselves in crevices or furrows in the bark or other hiding places. Banding trees with old tow or burlap sacks, old clothes, cement bags, etc., furnishes a hiding place where the larvae will be found. Such bands should be put on seventy days or more before the moths appear. The bands will then have time to weather, after which they should be examined every few days. Hickory, pecan, walnut, willow, poplar, cottonwood, oak, black locust (*Robinia*), crabapple, hawthorn (*Crataegus*), *Myrica*, *Amorpha*, and a few related species are their food plants. The larvae may be known by their protective color, rounded upper surface, and flat ventral surface, the latter with purplish black spots in the middle of each segment. They appear hairless, having only a few fine setae. The desirable bush-feeding larvae on *Crataegus* and other bushes can be secured by beating. Shingles leaned together at the base or crumpled old paper about the bases of trees are used to trap larvae.

The different habits of the larvae should be noted. When rearing, glass containers must be kept out of the sun, and cages must be kept very clean to check diseases. Injured or sickly larvae should be preserved in 70% alcohol. But few parasites are known from Catocala larvae, and all parasites should be saved with a full record. Partly rotten leaves should be provided for forming the cocoon in cages. The pupae are formed in a thin cocoon under loose bark, in crevices and cavities, and especially in leaves and debris on the ground. Much fuller records of the pupal habits are needed. The pupal period is usually twenty to thirty days.

## On the Stabilizing of Four Generic Names (Lepid.: Rhopalocera).

To students of the involved generic nomenclature of the Palaearctic and Nearctic Diurnal Lepidoptera, the recent publication of the "Generic Names of British Rhopalocera" will prove of great interest. This pamphlet has been prepared by Mr. Francis Hemming at the request of the Committee on Generic Nomenclature of the Royal Entomological Society of London, and includes full details regarding type fixation and synonymy. Appended to the list is the first report of the Lepidoptera Sub-committee to the main committee, and following Mr. Hemming's suggestions, the suspension of the Law of Priority in four cases is advocated by this subcommittee, the grounds being that strict application of the rules would cause serious, and quite unnecessary, disturbance in existing practice.

The genera involved, with their proposed genotypes, are as follows:

*Argynnis* Fabr. (*P. paphia* Linn.); *Vanessa* Fabr. (*P. atalanta* Linn.);

*Strymon* Hbn. (*S. melinus* Hbn.); *Colias* Fabr. (*P. hyale* Linn.).

Welcoming any action that would assist in stabilizing generic Nomenclature, the undersigned lepidopterists express their full agreement with the recommendations of the above subcommittee and would urge the adoption of this report.

E. L. Bell, J. A. Comstock, C. H. Curran, W. T. M. Forbes, J. D. Gunder, E. I. Huntington, A. B. Klots, J. McDunnough, C. J. dos Passos, F. E. Watson, R. C. Williams, Jr.

## Notes and Descriptions of West American Cerambycidae (Coleoptera).

By E. Gorton Linsley, Oakland, California.

**Aplagiognathus remotus** new species.

Elongate, reddish-brown, shining. Head piceous, densely and coarsely rugoso-punctate; mandibles stout, shorter than head, irregular in shape, sides subangulate, dorsal surface with a laterally compressed, longitudinal carina, punctation coarse; antennae attaining the basal third of elytra, scape stout, coarsely punctured, remaining segments slender. Prothorax transverse, twice as wide as long, sides subparallel, with a number of small, uneven, spine-like teeth along the margin; apex and base sinuate; surface not coarsely punctured, without any large irregularly sculptured areas. Elytra scarcely wider than the prothorax, twice as long as broad, widest just behind the middle; costae indistinctly evident; apices rotundate-truncate, without trace of sutural spine. Tarsi moderately dilated, first segment longer than second. Fifth ventral abdominal segment transverse, densely fringed at apex with yellow hairs. Length (exclusive of mandibles) 42.5 mm.; breadth 16 mm.

*Holotype* ♂, (No. 3822 Mus. Calif. Acad. Sci.) and one *paratype*, from Mt. Washington, near Nogales, Arizona, alt. 6000 feet, July 20, 1919, J. A. Kusche collector, in the collection of Dr. E. C. Van Dyke, to whom I am indebted for the privilege of studying this species.

This, the first recorded species of *Aplagiognathus* from within the borders of the United States, seems perfectly congeneric with the Mexican *A. spinosus* Newman and *A. hybostoma* Bates. From both of these, however, *A. remotus* may be distinguished by the short, closely-placed lateral spines of the prothorax and the absence of irregular pronotal sculpture.

Stenodontes (Mallodon) masticator Thomson.

This Mexican species occurs in Arizona both in the Chiricahua Mts. (Van Dyke collection) and Huachuca Mts. (J. O. Martin collection). The species resembles a small *S. dasytomus*, but differs in the tridentate genae and the finely punctured pronotum with reduced and completely separated glabrous areas.

STENODONTES (NOTHOPLEURUS) LOBIGENIS Bates.

Mr. R. E. Blackwelder has recently submitted to me a series of over fifty examples of *S. lobigenis* from Palm Springs, California. These specimens differ from typical Mexican and Lower Californian examples, only in the shorter mandibles of the male. The subgenus *Nothopleurus* is distinguished by the arcuate met-episterna, but this condition apparently exists only in the male. In the female the met-episterna is straight, although distinctly narrower than in either *Stenodontes* (s. str.) or *Mallodon*.

TETROPIUM AURIPILIS Bates.

I have before me a beautiful *Tetropium* from the Chiricahua Mts., Arizona, taken by Mr. J. A. Kusche on Fly's Peak, alt. 9000 feet, (Van Dyke collection). The specimen is shining black, with the antennae, legs, and prothorax densely pilose, and the elytra indistinctly costate and clothed with a short, dense, golden orange pubescence. Notwithstanding a difference of over 1200 miles in distribution and the fact that one individual was captured in a locality on the edge of the tropics, Las Vigas, Mexico, and the other in a desert mountain range, the Arizona example agrees so well with Bates'[1] very brief description of *T. auripilis*, that I hesitate to describe it as new.

**Oeme californica** new species.

Elongate, testaceous, clothed with a short, dense, yellowish pubescence. Head narrower than prothorax, densely, finely punctured; front short, vertex deeply, longitudinally sulcate; eyes coarsely granulated; antennae slender, uniformly testaceous, one-half longer than the body in the male, about as long as body in the female, segments three to five or six ciliated, tuberculate on inner side; scape moderately stout, very densely and coarsely punctured, second segment small, broader than long, third segment about twice as long as scape, fourth and following segments diminishing gradually in length toward apex. Prothorax transverse, strongly constricted over basal fourth, widest just behind the middle and gradually narrowed anteriorly; apex a little wider than base; punctation fine, dense, with a narrow longitudinal polished line in the male, and a

[1] Biol. Centr.-Amer. Col. V, 1885, p. 435.

broad median vitta in the female. Elytra nearly four times as long as broad, wider than the prothorax, feebly tricostate, the two inner costae most evident; apices narrowly rounded. Body beneath finely punctured, pubescent; abdomen brownish, last segment emarginate in the male, rounded in the female. Length 20-22 mm.; breadth 4-5 mm.

*Holotype* ♂, (No. 3823 Mus. Calif. Acad. Sci.), from Yosemite Valley, CALIFORNIA, June, 1908, E. M. Erhorn collector, *allotype* ♀, (No. 3824 Mus. Calif. Acad. Sci.) Pasadena, Calif., August, 1925, A. C. Davis collector, and one *paratype*, ♂, Lake Tahoe, Calif., July, 1931, L. W. Saylor collector, in the collection of the writer. Mr. Davis' example was reared from *Pinus*.

This species has stood in collections for many years under the name *O. costata* LeConte, a species to which it bears no great resemblance. *O. costata* is nigro-piceous, with the antennae very densely ciliated on all sides, and a less pronounced basal constriction of the prothorax. *O. californica* is more closely related to *O. rigida* Say, from which it may be distinguished by its large size (20-22 mm.), more evident elytral costae, and long antennae.

**Oeme laticollis** new species.

Elongate, parallel, piceous. Head very coarsely, closely punctate, sparsely clothed with pale recumbent pubescence; maxillary palpi with last two segments somewhat flattened; antennae longer than the body in the male, shorter than the body in the female, coarsely densely punctured, ciliated within and without; scape moderately stout, two and one-half times as long as broad, second segment about as long as broad, third segment about two times as long as first, fourth and remaining segments gradually diminishing in length toward apex. Prothorax distinctly transverse, one-fifth wider than long in the male, one-third wider in the female, broadest behind the middle, constricted at base, narrower at base than at apex; apical two-thirds rounded at the sides in the male, subparallel and gradually narrowed anteriorly in the female; punctation fine, deep, close, with a short, polished, longitudinal groove at base; sparsely clothed with a pale, recumbent pile, intermixed with scattered longer suberect hairs. Elytra tricostate, shining,

coarsely but irregularly punctured, clothed with suberect pale hairs; apices broadly rotundate-truncate. Legs indistinctly paler, coarsely punctured, clothed with pale hairs; first segment of the posterior tarsi longer than the second and third segments together. Body beneath paler, moderately densely, finely punctured, shining, clothed with pale suberect hairs; last ventral abdominal segment sub-truncate at apex in male, narrowly rounded at the apex in the female. Length 18-22 mm.; breadth 4-5 mm.

*Holotype* ♂, (No. 3825 Mus. Calif. Acad. Sci.), *allotype* ♀, (No. 3826 Mus. Calif. Acad. Sci.), and several paratypes, taken in Sequoia National Park, CALIFORNIA by Mr. F. T. Scott. *Paratypes* in the collection of Mr. Scott and the writer.

*Ocme laticollis* is closely related to *O. gracilis* LeConte. However, a series of the latter species from Poway, San Diego County (type locality) in the collection of Dr. F. E. Blaisdell, show the LeConte species to be smaller and narrower, with the prothorax about as broad as long, the elytral costae only faintly indicated, and the last two segments of the maxillary palpi cylindrical. The unique type of *Paranoplium densicolle* Casey[2] is a typical *Ocme gracilis* and probably came from San Diego.

**Psyrassa brevicornis** new species.

Elongate, black, shining, head and prothorax rufous. Head moderately closely, variolately punctured; eyes black, coarsely granulated; antennae slightly shorter than the body in the male, attaining the middle of the elytra in the female, flattened, clothed with recumbent pubescence, sparsely ciliate on inner side; first two segments piceous, remaining segments black; segments three to five spinose at apex, three to nine carinate; scape stout, coarsely punctured, second segment slightly longer than broad, third segment a little shorter than scape, outer segments subequal except eleventh which is longer and more slender than tenth. Prothorax a fifth longer than broad, sparsely, shallowly, but coarsely punctate; base constricted; sides ciliate with long erect pale hairs. Elytra wider at base than prothorax, more than three times as long as broad, coarsely, closely punctured, clothed with short suberect pale hairs; apices feebly

[2] Mem. Coleopt. XI, 1924, p. 250.

emarginate-truncate. Legs slender, black, more finely punctured, clothed with long pale hairs; femora at base reddish-piceous. Body beneath clothed with pale suberect hairs; pro-, meso-, and meta-sternum reddish; abdomen piceous, fifth ventral abdominal segment of female rounded at apex, of male truncate at apex. Length 11 mm; breadth 2.3 mm.

*Holotype* ♂, (No. 3827 Mus. Calif. Acad. Sci.), *allotype* ♀, (No. 3828 Mus. Calif. Acad. Sci.), and eleven *paratypes*, taken by the writer at Brownsville, Texas, between May 28 and June 6, 1932. Additional paratypes taken with the above, in the collection of Mr. J. O. Martin. The specimens were taken at light and collected on dead branches of *Acacia farnesiana* and *Pithecolobium flexicaulis*.

Closely related to *P. basicornis* Pascoe and *P. sallaei* Bates, but differing from these in having the antennal scape and legs piceous, antennal segments three to five spinose at apex and three to nine carinate, the prothorax less coarsely punctured and more densely pilose, and the elytral apices emarginate-truncate but not bidentate. From *P. sallaei* it further differs in its larger size, and in the shorter antennae which do not reach the apex of the body in either sex.

Phymatodes blandus LeConte subsp. **picipes** new subspecies.

This species occurs in northern California on various species of *Salix*. The typical form has the head, thorax, legs, and antennal scape rufous, the elytra metallic blue, and only the abdomen piceous. In the central Sierra Nevada Mountains, this form is replaced by a race in which the head, legs, and antennal scape are entirely piceous, as well as the apical and basal margins of the prothorax. This geographical race I propose to designate as *P. blandus* subsp. *picipes* new subspecies. *Holotype* (No. 3829 Mus. Calif. Acad. Sci.) and several *paratypes* collected by the writer in Yosemite Valley, California, during May and June, 1930.

(To be continued)

## Notes on some Tropical Florida Butterflies (Lepid.: Rhopalocera).

By Marston Bates, Museum of Comparative Zoology, Cambridge, Mass.

The butterfly fauna of tropical Florida is of considerable zoogeographical interest, as representatives of three regions—the Central American, the Nearctic and the Antillean—mingle there; yet this fauna is very inadequately known, and poorly represented in most collections. It is curious that of the many species common to Florida and Cuba, but with restricted range elsewhere, almost all were first described from Cuba, and in many instances our knowledge of the life history comes entirely from Cuban sources. Florida has had no Gundlach.

Many species that have been recorded from this region have not been found in recent years, and authentic Florida records of such species would be of great interest. *Papilio devilliersi*, *Metamorpha stelenes* and *Diaethria clymena* may be cited as examples. Florida labels on such species seem often to have been faked, and must be viewed with caution; one set of Chokoloskee labels found in some museums certainly belongs in this class, and there are many isolated instances.

The notes published here were made in connection with a study of the butterflies of Cuba, and a detailed account of the nomenclatorial system used will be found in a paper shortly to be published on that fauna. The Florida forms of *Ascia*, *Precis* and certain other genera are involved in general taxonomic tangles, and it seems impossible to clear up their nomenclature without complete revision of the groups to which they belong.

Papilio polydamas lucayus.

Rothschild and Jordan, 1906, Nov. Zool., XIII, p. 521.

Florida specimens of *polydamas* agree much more closely with those from the Bahamas than with those from Cuba or Central America. The outstanding difference is in the anal spot on the underside of the hindwing: in *lucayus* the yellow is much more extensive than in *polydamas*, always extending

across vein $Cu_2$, often reaching $Cu_1$; the yellow and red bars are usually contiguous in *lucayus*, separated in *polydamas*.

PAPILIO ARISTODEMUS PONCEANA.

*Papilio ponceana* Schaus, 1911, ENT. NEWS, XXII, p. 438; Holland, 1930, Ann. Carnegie Mus., XIX, p. 191; *id.*, 1931, Butterfly Book, p. 318, pl. 70, f. 10.

There is a female of this rare butterfly in the Museum of Comparative Zoology from Coconut Grove, Florida, May 31, 1924, G. B. Fairchild. The question of subspecific versus specific rank discussed by Holland (1930) is perhaps not worth much added discussion; Holland, however, seems always to have compared the form with the Hispaniolan *aristodemus*, while it is really much more like the Cuban *temenes*, from which it differs principally in the narrower median yellow band of the upper side. *Ponceana* will probably eventually be found on some of the islands of the Bahamas.

APPIAS ILAIRE POEYI.

*Pieris ilaire* Poey, 1832, Cent., no. 12, 3 figs.
*Appias poeyi* Butler, 1872, Proc. Zool. Soc. London, p. 49.
*Tachyris ilaire*, var. *neumoegenii* Skinner, 1894, ENT. NEWS, V, p. 110.
*Melete ilaire* Holland, 1930, Ann. Carn. Mus., XIX, p. 198.
*Melete ilaire* form *neumoegeni* Holland, 1931, Butt. Book, p. 277, pl. 35, f. 5.

The series of this butterfly in the Museum of Comparative Zoology from Florida, the Bahamas, Cuba and Hispaniola seem quite uniform, and offer no justification for the separation of races, although specimens from Texas and Central America, and from Jamaica, belong to distinct subspecies. The male figured by Holland (1931) is not from Florida: in *poeyi* males the black of the wing apex above is reduced to a very fine line, and the base of the costal margin is powdered with black.

The generic position of this species has recently been discussed by Klots (1933, Ent. Am., XII, p. 208). The larva of *Appias ilaire* differs from that of *Melete salacia* in several very important respects, and the resemblance between the adults is largely superficial.

EUREMA MESSALINA BLAKEI.

*Terias blakei* Maynard, 1891, Man. N. Am. Butt., p. 216.

This is the Bahaman race of *messalina*, which may be distinguished by the reduced black markings of the female above. I have seen no Florida specimens except the type labelled "Sanford, Fla."

DANAIDA ERESIMUS.

*Papilio eresimus* Cramer, 1777, Pap. Ex., II, p. 121, pl. 175, f. G, H.

A female of this species was collected by Mr. F. E. Church on Lower Metacumbe Key, Feb. 28, 1932. It is now in the American Museum of Natural History, and I am indebted to Mr. F. E. Watson for the privilege of studying and reporting on it. To the best of my knowledge, this species has not previously been reported from our fauna, and it has only recently been found on the Greater Antilles. It is now known from Cuba, Jamaica, Hispaniola and Martinique; but although Hispaniola specimens were described by Hall (1925, Entom., XVIII, p. 165) as *Danais kaempfferi*, I can find no constant grounds for subspecific separation. There seem to be two color forms—a light and a dark—on all of these islands, the Florida specimen belonging to the lighter form. The male genitalia of specimens from Panama, Jamaica, Hispaniola and Cuba do not seem to differ materially, although specific differences in the genitalia are well marked in this genus.

*D. eresimus* has probably been overlooked in our fauna previously chiefly because of its resemblance to *berenice* on the wing. I captured it in Cuba by taking as many specimens of *berenice* as possible, and examining them carefully before freeing them.

COLAENIS JULIA NUDEOLA.

*Colaenis julia cillene* Stichel, 1907, Gen. Ins., p. 12, pl. 2, f.1.
*C. julia cillene* form *nudeola* Stichel, *l. c.*, p. 12.
*Colaenis julia carteri* Riley, 1926, Entom., LIX, p. 240, pl. II, f. 1.

Two subspecies of this butterfly occur in the United States, one in Texas, and the other in Florida. The Florida form is

similar to that found in Cuba, for which *nudeola* seems to be the oldest name, although first applied to an aberration. Cramer's name *cillene* cannot apply, as he states definitely that his specimen came from Surinam, and his figure can be matched with specimens from northern South America much more easily than with Cuban ones; furthermore, Cramer is not known to have had any Cuban specimens at all. The status of the Bahaman race described by Riley seems to me uncertain. The range of variation in the Bahamas is certainly a little different from that in Cuba, but the overlapping is large. Florida males above have the appearance of typical Cuban specimens, below they show the purplish cast found on some Bahaman specimens; if this coloring be taken as the criterion of *carteri*, Florida specimens should bear that name. Our specimens from Andros Island, however, do not show this purple, although the markings above agree well with those of New Providence specimens. The other West Indian races of *julia* are much more constant and distinct, and it seems to me best, for the present at least, to consider all specimens from Cuba, the Bahamas and Florida as forming the race *nudeola*.

This butterfly is quite common on the Florida Keys, and is quite often taken on the mainland as far north as Miami.

## Pogonomyrmex occidentalis Cresson at Taos, New Mexico. (Hym.: Formicidae.)

The writer chanced upon an area near Taos, New Mexico, where hundreds of pebble mounds of the Western Harvesting Ant, *Pogonomyrmex occidentalis* Cresson, were closely aggregated. The unusualness of the situation lies in the fact that the elevation was somewhat over 8,500 feet. These ants are seldom found in any numbers above a 4,000-foot elevation and are extremely rare above 5,000 feet. An attempt to secure a photograph of the mounds failed because of the dark rainy day. The writer was unable to locate additional grouped or scattered mounds of this harvesting ant in any part of the area. The concentration might be explained by a knowledge of the soil texture, temperature and moisture, and the predominating vegetation.

A. C. Cole, Jr., Twin Falls, Idaho.

## 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 Comparée. 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. národního 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.
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista Entomologia, São Paulo, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Stylops: a Journal of Taxonomic Entomology, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten uber morphologische und taxonomische entomologie aus Berlin-Dahlem.

## An Extraordinary Mound of the Occident Ant, Pogonomyrmex occidentalis Cresson. (Hym.: Formicidae.)

Near Seligman, Arizona, the writer chanced upon an unusually large mound of the western harvester ant, *Pogonomyrmex occidentalis* Cresson. The pebble mound was approximately three feet in height, sixteen feet in diameter and thirty-six feet in circumference. Thus the mound area was about two hundred and one square feet. Eleven entrances perforated the mound at widespread points. The nest must have housed hundreds of thousands of workers, for the cleared area surrounding the mound was literally alive with ants. This was the largest nest of this species the writer has ever observed. Large quantities of seed were stored in the nest chambers and most of the ants were carrying seeds into the nests.

A. C. Cole, Jr., Twin Falls, Idaho.

# Entomological Literature

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

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

(*) Papers containing new forms or names not so stated in titles, have an * within parentheses thus (*) following the pagination of reference to paper.

(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.** Titles of papers containing new forms or new names will be indicated by an asterisk within parentheses at end of reference, (*).

*Papers published in the Entomological News are not listed.*

**GENERAL. — Carpenter, F. M.** — Carboniferous insects from Pennsylvania in the Carnegie Museum and the Museum of Comparative Zoology. [3] 22: 323-341, ill. (*). **deLeon, D.**—An annotated list of the parasites, predators and other associated fauna of the mountain pine beetle in western white pine and lodgepole pine. [4] 66: 51-61. Es-

**sig, E. O.**—The historical background of entomology in relation to the early development of Agriculture in California. [55] 10: 1-11. **Grundel, J. G.**—Obituary. By E. C. Van Dyke. [55] 10: 48, ill. **Hering, M.**—Elevage et preparation d'insectes-mineurs. [L'Amateur de Pap.] 6: 301-309. **Leonard, M. B.**—Notes on insect conditions in Puerto Rico for the fiscal year, July, 1931, through June, 1932. [Jour. Dept. Agric. Puerto Rico] 17: 97-137. **McAtee, W. L.**—Protective resemblance in insects—Experiment and theory. [68] 79: 361-363. **Poulton, E. B.**—Entomology and human life. [Pro. R. Ent. Soc. London] 8: 165-170. **Schenkling und Horn.** Bitte des Deutschen Entomologischen Institutes um mitarbeit an der herstellung einer bibliographischen kartothek über die gesamte entomologische literatur der welt ab 1864. [109] 1: 83-84. **Schmith, K.**—Pro mimikry! [Ent. Jahr.] 1934: 198-200. **Schwartz, M.**—Dahlemer Arbeitsgemeinschaft. [109] 1: 1-6. **Wright, Grundell, Kusche.**—Necrology. By E. P. Van Duzee. [55] 10: 26.

**ANATOMY, PHYSIOLOGY, ETC.—Abbott, C. E.**—How Megarhyssa deposits her eggs. [6] 42: 127-133, ill. **Anon.**—Central nervous system of Araneida. [13] 26: 7-12, ill. **Basinger, A. J.**—Reproduction in mealybugs. [7] 27: 17-20. **Bates, M.**—The peristigmal gland cells of trypetid larvae. [7] 27: 1-4, ill. **Bostian, C. H.**—Biparental males and biparental ratios in Habrobracon. [92] 66: 166-181. **Brittain & Newton.**—Further observations on the pollen constancy of bees. [Can. Jour. Res.] 10: 255-263, ill. **Brumpt, E.**—Le gynandromorphisme chez les Ixodines. Un curieux cas obtenu dans un elevage d'Amblyomma dissimile. [54] 12: 98-120, ill. **Collenette, C. L.**—On the sexes of some South American moths attracted to light, human perspiration and damp sand. [9] 67: 81-84. **Drilhon, A.**—Sur le milieu inferieur des lepidopteres. [C. R. Soc. Biol.] 115: 1194-1195. **Eastman, L. E. S.**—Metachronal rhythms and gill movements of the nymph of Caenis horaria in relation to water flow (Ephemeroptera). [Pro. R. Soc. Lond.] Biol. Ser. 115: 30-48, ill. **Fulton & Chamberlin.**—An improved technique for the artificial feeding of the beet leaf hopper, with notes on its ability to synthesize glycerides. [68] 79: 346-348, ill. **Grandjean, F.**—Les organes respiratoires secondaires des Oribates. [24] 103: 109-146, ill. **Nicholson, A. J.**—The influence of temperature on the activity of sheep-blowflies. [22] 25: 85-99. **Ochmann, A.**—Falters

kämmchen und haarbürste. [18] 28: 13-18, ill. **Santschi, F.**—Sur l'origine de la nervure cubitale chez les Formicides. [41] 15: 557-566, ill. **de Vries, A. H.**—A cheap and effective blowfly trap. [Dept. Agric. Union So. Africa] Reprint 50: 3 pp., ill. **Whiting, Greb, Speicher.**—A new type of sex-intergrade. [92] 66: 152-165, ill. **Whiting, P. W.**—Egg-trinuclearity in Habrobracon. [92] 66: 145-151, ill. **Wigglesworth, V. B.**—The mechanism of stretching in the cuticle of Rhodnius prolixus. [Pro. R. Ent. Soc. London] 8: 141. **Wilson, S. J.**—The anatomy of Chrysochus auratus, Coleoptera: (Chrysomelidae) with an extended discussion of the wing venation. [6] 42: 65-84, ill. **Zacwilichowski, J.**—Ueber die innervierung und die sinnesorgane der flugel der honigbiene (Apis mellifica). Ueber die innervierung und die Sinnesorgane der flugel von köcherfliegen (Trichoptera). [Bull. Ac. Polonaise Sci.] B, 1933: 275-289; 305-319, ill.

**ARACHNIDA AND MYRIOPODA.—Chamberlin & Ivie**—A new genus of theridiid spiders in which the male develops only one palpus. [Bull. Univ. Utah] Biol. Ser., 2, No. 4: 18 pp. (S). **Chickering, A. M.**—Araneae from the Northern peninsula of Michigan. [Pap. Mich. Ac. Sci.] 19: 577-580. **Ebeling, W.**—A new predacious mite from southern California. (Erythraeidae.) [55] 10: 33-34, ill. **Gertsch, W. J.**—Some American spiders of the family Hahniidae. [40] 712: 32 pp., ill.* **Jacot, A. P.**—The Galumnas of the northeastern United States. [6] 42: 87-124, ill.

**THE SMALLER ORDERS OF INSECTS.—Cowley, J.**—Notes on Odonata (Corduliidae) of the neotropical region. [107] 3: 91-95, ill.*

**ORTHOPTERA.—Rehn & Rehn**—The Eumastacinae of southern Mexico and Central America. [Mem. Am. Ent. Soc.] No. 8: 84 pp., ill.*

**HEMIPTERA.—Beamer, R. H.**—A new genus and two new species of leafhoppers from California (Cicadellidae). [55] 10: 43-44. **Davis, W. T.**—New Cicadas from North America. [6] 42: 37-62, ill. **Essig, E. O.**—Note on the alder scale. [55] 10: 44. **Gould, G. H.**—A new genus of Veliidae. [103] 7: 56-61, ill. **Harris & Andre.**—Notes on the biology of Acantholoma denticulata. (Scutelleridae.) [7] 27: 5-15, ill. **Maxson, A. C.**—Four new pemphigids from Colorado (Aphidae). [7] 27: 34-42, ill. **Parish, H. E.**—Biology of

Euschistus variolarius (Pentatomidae). [7] 27: 50-54. **Van Duzee, E. P.**—A new Brochymena. [55] 10: 22.

**LEPIDOPTERA.—Benjamin, F. H.**—Notes on the genus Rothschildia in the United States. (Saturniidae.) [55] 10: 12-16.* **Forbes, W. T. M.**—A grouping of the Agrotine genera. Supplement on some S. Am. types, including new names. [70] 14: 38 pp., ill. **Hoffmann, F.**—Beiträge zur naturgeschichte brasilianischer schmetterlinge. [Ent. Jahr.] 1934: 102-106. **Le Cerf, F.**—Deux Saturnoides nouveaux du Museum de Geneve. [Rev. Suisse Zool.] 41: 263-266, ill. (S*). **Lindinger, L.**—Das verhältnis der motte pronuba zu den Yucca-arten. [Ent. Jahr.] 1934: 85-93. **Romieux, M. J.**—Notes biologiques sur une Lycénide et une Hespéride du Brésil. [41] 15: 505-526, ill.

**DIPTERA—Alexander, C. P.**—New or little-known Tipulidae from Chiriqui, Panama. [7]: 55-73. **Bromley, S. W.**—The robber flies of Texas (Asilidae) [7] 27: 74-113, ill. (*). **Huckett, H. C.**—A revision of the North American species belonging to the genus Coenosia and related genera. Part 1. The subgenera Neodexiopsis, Coenosia, Hoplogaster and related genera Allognota, Bithoracochaeta and Schoenomyza. [1] 60: 57-119, ill. (*). **Kuster, K. C.**—A study of the general biology, morphology of the respiratory system of certain aquatic Stratiomyia and Odontomyia larvae. [Pap. Mich. Ac. Sci.] 19: 605-658, ill. **Malloch, J. R.**—A new species of the genus Xanthaciura (Trypetidae). [107] 3: 78-79, ill. (S). **Painter, R. H.**—Two new species of North America Exoprosopa (Bombyliidae.) [103] 7: 68-70. **Paramonow, S. J.**—Ueber einige exotische (hauptsächlich sudamerikanische) Bombyliiden. [56] 13: 22-34. (*). **Smart, J.**—Notes on the biology of Simulium pictipes. [4] 66: 62-66, ill. **Smith, H. M.**—Notes on some bat-flies of southern Kansas and northern Oklahoma. [103] 7: 62-64. **Tomaszewski, W.**—Zur taxonomie der kohlfliegen Chortophila brassicae und Ch. floralis. [109] 1: 60-66, ill.

**COLEOPTERA.—Brown, W. J.**—The American species of Dalopius (Elateridae). [4] 66: 66-72. (*). **Chamberlin, W. J.**—New species of the genus Chrysobothris, with a key to the species of Horn's group IV. (Buprestidae). [55] 10: 35-42, ill. **Fall, H. C.**—On certain North American Elateridae, new and old. [6] 42: 7-36. **Hayes & Kearns**—The Pretarsus (Articularis) in Coleoptera. [7] 27: 21-33, ill. **Hinton, H. E.**—Helichus punctipollis in Arizona (Dryopidae). [4] 66: 72. **Hinton, H. E.**—A new species of West

Indian Tytthonyx (Cantharidae). [55] 10: 30-32. **Hinton, H. E.**—Two genera of Aphodiinae new to Mexico. (Scarabaeidae.) [55] 10: 27-30, ill. (*). **Horn, W.**—Revision der gattung Pogonostoma (Cicind.) [109] 1: 7-34, ill. **Korschefsky, R.**—Weitere bemerkungen über Crotch' sche typen und beschreibung einer neuen Oryssomusart aus dem Deutschen Entomologischen Institut. [109] 1: 35-36. (S*). **Leng & Mutchler**—Saprinus dimidiatipennis. [6] 42: 86. **Linsley, E. G.**—A short review of the genus Atimia with the descriptions of two new species. [55] 10: 23-26. **Méquignon, A.**—Sur les Chelonarium des Antilles avec description d'espees nouvelles (Byrrhidae). [25] 39: 54-55. (S*). **Nunenmacher, F. W.**—Studies amongst the Coccinellidae, No. 6—New species. [55] 10: 17-21. **Pic, M.**—Neue exotische Coleopteren (Malacodermata) [26] 14: 45-47, cont. (S*). **Sabrosky, C. W.**—Notes on the larva and larval habit of Isohydnocera curtipennis (Cleridae). [103] 7: 65-68. **Schürhoff, P. N.**—Beiträge zur kenntnis der Cetoniden III. [Ent. Nachrich.] 7: 89-96, ill. (S*). **Tanner, V. M.**—Coleoptera of Zion National Park. No. II. [7] 27: 43-49.* **Twinn, C. R.**—The dermestid, Trogoderma versicolor a new pest of dried milk products. [4] 66: 49-51.

**HYMENOPTERA.—Lindquist, A. W.**—Notes on two Vespula nests from Kansas. [103] 7: 51-55, ill.

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**SPECIAL NOTICES.**—Arbeiten ueber morphologische und taxonomische Entomologie aus Berlin-Dahlem. Arbeiten ueber physiologische und angewandte Entomologie aus Berlin-Dahlem. These two new serials are published by the Deutschen Entomologischen Institut der Kaiser Wilhelm-Gesellschaft, Berlin-Dahlem. Band 1, Nr. 1, of both have just been issued March 5, 1934. **Melanges entomologiques.** Memoire 5. Par Henri Gadeau de Kerville. Containing six papers reprinted from the Bulletin de la Societe des Amis des Sciences naturelles de Rouen, Annees 1930 et 1931, p. 269-492, ill.

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### Pyrameis cardui on New Year's Day. (Lepid.: Nymphalidae.)

On the first of January, 1934, in Boulder, Colorado, my wife and I saw an unusually small specimen of *Pyrameis cardui*. It lit on the sidewalk in front of us, and flew over into an adjacent garden.—T. D. A. Cockerell.

# EXCHANGES

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

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

**Wanted**—Names and addresses of those desiring Coleoptera, Lepidoptera and Hymenoptera of Pennsylvania and New Jersey. R. C. Cassebeery, 71 E. Price Ave., Lansdowne, Pa.

**Exchange**—Texas Orthoptera. F. B. Isely, Trinity University, Waxahachie, Texas.

**Wanted**—Names and addresses of those desiring insects from Colorado. Charles H. Hicks, P. O. Box 262, Boulder, Colorado.

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# ENTOMOLOGICAL NEWS

**JULY, 1934**

Vol. XLV No. 7

SMITHSONIAN INSTITUTION
JUL 27 1934
NATIONAL MUSEUM

HARRISON GRAY DYAR.
1866-1929.

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

Advisory Committee: Philip Laurent, J. A. G. Rehn, Chas. Liebeck, J. Chester Bradley, Ph.D., Frank Morton Jones, Sc.D., John C. Lutz, Max Kisliuk, Jr., Wm. W. Chapman.

The subscription price per year of ten (10) numbers is as follows:

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| United States and possessions, Central and South America . . | $3.00 |
| Canada . . . . . | 3.15 |
| Foreign . . . . . | 3.25 |

Single copies 35 cents.

ADVERTISING RATES: Full width of page. Payments in advance. One issue, 1 in., $ 1.20, 2 in., $ 2.40, half page, $ 4.00, full page, $ 7.00
Ten issues " 11.00, " 20.00, " 35.00, " 60.00

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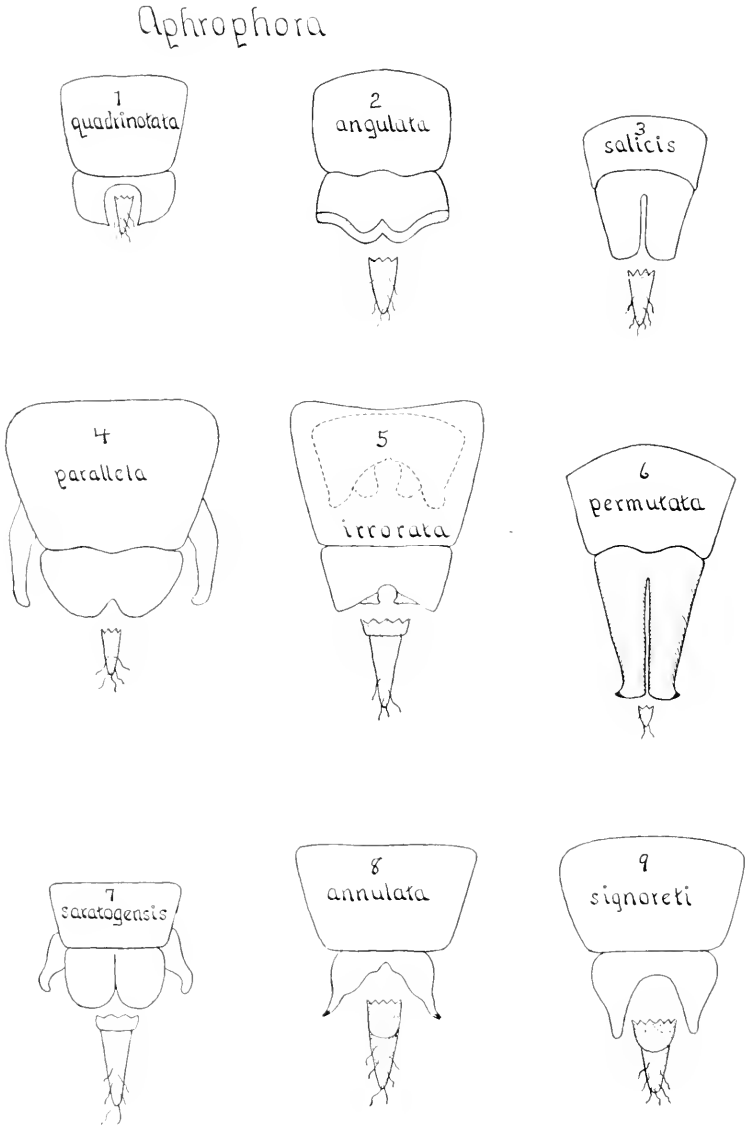
Aphrophora
1
quadrinotata
2
angulata
3
salicis
4
parallela
5
irrorata
6
permutata
7
saratogensis
8
annulata
9
signoreti

E. D. BALL.

# ENTOMOLOGICAL NEWS

VOL. XLV. JULY, 1934 No. 7

## The Spittle Insects of the Genus Aphrophora Occurring in the United States (Homoptera: Cercopidae).

E. D. BALL, University of Arizona, Tucson.

(Plate I.)

This is a strikingly distinct group of large forms easily recognized by the slightly angulate anterior margin of the pronotum. Nine species are at present recognized from the United States (omitting Alaska), one of these is a recent European introduction and another one will probably prove to be an older introduction when the two faunas are critically compared. Contrary to the usual rule in Cercopidae, the male genital plates are strikingly distinct in pattern and may be relied upon to determine accurately the material in that sex. The writer in 1898 constructed a key to the eight species then known and correctly described the genital structures (but did not figure them). Stearns (1923) confused two species and drew a genital structure unlike either one (see Ball '28). Walley in 1928 reviewed the genus, added three new species and gave genital figures of all but one. Unfortunately he did not recognize the necessity of keeping the plates horizontal while under the microscope with the result that he misinterpreted two of the genitalia and all three of his new species appear to be synonyms. Miss Doering in 1930 accepted Walley's classification in toto, noting, but not including in the key, *A. salicis* the recently introduced species.

The writer appends a brief key to the species and revised figures of the male genitalia. These figures are self-explanatory and show (in white) the structures as they appear when the microscope is in focus on the plates and in shade those

structures that appear if the focus is lowered. The apex of the abdomen is shown as broken, in order to allow a clear outline of the notch in the plates. In No. 5 (*irrorata*) the inset shows the appearance of the plates and the structures below if the plate is slightly tilted, as it was shown in Walley's figure. The key and drawings, together with the relatively restricted distribution given for most of the species should enable one to place accurately the species found north of the Mexican border.

*Abbreviated Key to the Species.*

A Ground color dirty straw, usually with two white areas on the expanded costal margin separated by an oblique dark band. Weeds, shrubs or willows (not pine).
  B Elytra broad, costa ampliate with two large white spots.
    C Small (8.5 mm. or less) pronotum with uniform slope.....(Eastern) 1. *quadrinotata* Say
    CC Large (10 mm. or over) anterior half of pronotum depressed.....(West Coast) 2. *angulata* Ball
  BB Elytra narrow elongate unmarked (Introd. East) ..... 3. *salicis* De G.
AA Ground color brown or tan. Wavy oblique markings on elytra and frequently a median white line on vertex and pronotum (adults on pine).
  D Ground color usually dark brown.
    E Front greatly inflated visible from above—nymphs on pine.....(Northeastern) 4. *parallela* Say
    EE Front less inflated nymphs feeding on the ground .....(Western local) 5. *irrorata* Ball .....(Western abundant) 6. *permutata* Uhl.
  DD Ground color light brown or tan ornamented.
    F A medium white line on vertex and pronotum broadening posteriorly. Ovipositor very long and slender.... ..... 7. *saratogensis* Fh.
    FF White line wanting or reduced. Ovipositor little longer than the pygofers. (Northeastern) 8. *signoretii* Fh. .....(Western) 9. *annulata* Ball

Notes on Distribution of the Species.

1. A. QUADRINOTATA Say (North and East) from Nova Scotia to northern Florida west to the Dakotas, Nebraska and Kansas, (Tennessee). Not known from central or southern

Florida nor the southwestern plains region. Nymphs and adults abundant on weeds and shrubs.

2. A. ANGULATA Ball (Pacific Coast) found along the California coast from San Francisco south. Nymphs in froth masses in the sheaths of the Giant Umbellifera and adults on willows.

3. A. SALICIS De Geer (Introduced into Eastern United States) feeds on willow.

4. A. PARALLELA Say (North East) from Nova Scotia and Ontario to northern Wisconsin and Northeastern Minnesota. South in the Appalachians to Ohio, West Virginia and Maryland. Miss Doering states that this species has the same distribution as *quadrinotata;* instead it is found feeding, both nymphs and adults, on the pine and apparently is strictly limited to the pine region around the Great Lakes and the upper part of the Appalachian Mountains.

5. A. IRRORATA Ball (= *princeps* Walley) Black Hills region of Dakota and Nebraska, higher mountain regions of Colorado and Utah, and the coast region of British Columbia and Washington, south to central Arizona and California mountain regions. The male plates of this species have a bilobed appendage arising on the upper surface and extending posteriorly so as to be slightly visible from a ventral view. Still more of these lobes are visible if the segment is tilted. An examination of paratypes of *princeps* Walley together with a study of his drawings indicates that failure to differentiate the two structures and a tilted segment in the example of *irrorata* from which he made his drawing were responsible for the synonomy. Adults taken from pine, no nymphs observed.

6. A. PERMUTATA Uhl (Western mountains) abundant from British Columbia to Southern California east to Montana and Colorado on pine. Has not been taken south of Utah or Manitou, Colorado, or east of the main range of the Rocky Mountain. Miss Doering reports an example from Michigan, but on examination it proved to be a female of *signoreti.* Adults on pine, nymphs around the crowns of an aster and a lupine growing beneath the pines.

7. A. SARATOGENSIS *Fitch* (= *canadensis* Walley) (= *puncticeps* Walley) abundant along the Appalachian Mountains from Ontario and Nova Scotia to southern Florida west through Pennsylvania and New York and to Northern Wisconsin where it is abundant in the pine barrens, then to Vancouver, British Columbia, Berkeley and Fresno, California. Walley was evidently led astray by his own figure of the male plates of *saratogensis* which were either distorted or tilted so as to give an inaccurate outline. His figure (8) of the plates in *canadensis* is much more nearly typical of *saratogensis* than his figure 2. *A. puncticeps* was described from a single male with the same type of genitalia, but was differentiated by a rounding posterior margin to the pronotum and a median carina on the posterior half. These characters can be duplicated in any long series of this species. Adults on pine, nymphs on ferns.

8. A. ANNULATA Ball (Western Mountains). Higher elevations in main range of Rockies in Colorado and New Mexico, main range Wasatch in Utah and the main ranges of the Sierras in California. Stearn's record (1923 of this species from New Hampshire and North Carolina was apparently a mistake as he has no material in his collection and was not able to refer the writer to material in any other collection. A search of other collections has not revealed any eastern material and Dr. Z. P. Metcalf has no material from North Carolina of Stearn's determination. Stearn's figure of the male genitalia is not typical of any species and he does not describe the genitalia but quotes the writer's description which he did not do where material was available. Adult on pine, nymphs on crown of sage.

9. A. SIGNORETI Fitch. This rare species was described by Fitch in a New York Report without giving any locality but remarking that the nymphs were injurious to grapes. All of the earlier collections of this species were from a restricted district in the peninsular region of Ontario east of Lake Huron and it is probable that Fitch's material came from adjacent grape growing region near Buffalo. Miss Doering has recently

reported this species from Michigan; an examination of her material (and that which she reported as *permutata*) gives the following additional records: Huron 8-8-26, Douglas Lake 7-12-30, Cheybogan 7-17-30, all localities along the shore of Lake Huron in the "thumb" of Michigan and just across from the region of abundance in Ontario. Miss Doering also records this species from South Dakota, but the material proved to be a female of *irrorata* which is abundant in the Black Hills. The writer has collected in southern and western Michigan and extensively in Wisconsin without finding this species. The known distribution is therefore limited to the peninsula region of Ontario and the opposite shores of Lake Huron in Michigan, and probably a similar situation on the shores of Lake Erie or Ontario in New York (Fitch). Adults from pine, nymphs from grapes.

## The Importance of Considering the Season of Appearance in Collecting Species of Orthoptera.

By Morgan Hebard, Philadelphia, Penna.

On July 31, 1919, Rehn and Hebard found *Melanoplus femur-nigrum* Scudder on the San Francisco Peaks in Arizona in maximum adult abundance from 9200 to 10,000 feet, but on the lower slopes more immature females than adult females were present. This again impressed us with the fact that, though Orthoptera might be expected to become adult earlier in the season in the warmer portions of each species distribution, quite the reverse is true. The reason for this is the fact that, in more rigorous environment the season for insect life is shorter and most if not all species respond to the situation by much more rapid growth. Were it not for this, many species could not possibly reach maturity and deposit their eggs for the next year before the advent of killing frosts in the more northern or more elevated portions of their range.

The working of this law first impressed us greatly in 1909, when we started on a collecting trip westward. One of us began on July 24th at Ude, Minnesota, the other on July 11th

at Halsey, Nebraska, and we met at Billings, Montana, on July 28th. Though two weeks of work had been accomplished at more southern localities, four days at more northern localities had produced quite as valuable results, for in Nebraska and eastern Wyoming all of many species were still immature and in other cases only rare adults were to be found, whereas from Minnesota through eastern Montana near the end of July all of the species encountered were present as adults in goodly numbers.

From years of field experience we now know that the great majority of Orthoptera can best be secured adult in the United States after the first of August, though in the northern sections the last two weeks of July may prove satisfactory. The latter is certainly not the proper time to collect further south, as we found another year in the Piedmont of the southeastern United States from July 20th to the end of the month, when the results were discouraging but where it was evident that a few weeks later many species would have been present as adults in goodly numbers.

Still further south in Florida and on the Mexican border, much of value can be found throughout July but the greatest number of species of Orthoptera are to be found adult during September and early October. Later in those regions, but particularly in the West, bad weather may seriously interfere. In almost all western field work, moreover, it is necessary to investigate the fauna found at high elevations and there snow is likely to fall, except in the most southern portions, in late September, terminating such possibilities.

One other situation must, however, be considered by the student. Due to the fact so much field work has been done in the United States in the Summer and Fall, the early appearing species which become scarce or have disappeared by July are in many cases absent from, or poorly represented in, most collections. In specialized field work we would therefore urge the student to do more collecting with a view to securing such species. Their period of greatest adult abundance is, in most cases, from May to late June.

## Notes and Descriptions of West American Cerambycidae (Coleoptera).

By E. Gorton Linsley, Oakland, California.

(Continued from page 165.)

**Phymatodes propinquus** new species.

Elongate, slender, black, head and prothorax rufo-testaceous. Head moderately densely, coarsely punctured, with scattered erect pale hairs on front; antennae shorter than the body, black, not densely or coarsely punctured, sparsely clothed with pale hairs; scape short, not stout, second segment about twice as long as broad, third segment about three times as long as second, remaining segments diminishing gradually in length toward apex. Prothorax rufo-testaceous, transverse, shining, sparsely and not coarsely punctured, rounded at the sides, constricted at base. Elytra two and one-half times as long as broad, parallel-sided, densely, coarsely, and somewhat rugosely punctured, clothed with short suberect hairs; apices rounded. Legs black, sparsely clothed with pale hairs. Length 5 mm.; breadth 1.3 mm.

*Holotype* ♀, (No. 3830 Mus. Calif. Acad. Sci.) and two *paratypes* (in the collection of the writer) taken in Santa Ana Canyon, Orange County, California in March, 1933, by Mr. Kenneth Sloop, who very kindly presented them to the writer.

This species is related to *P. blandus* Lec., especially the subspecies *picipes*, from which it differs in the long slender form, finer and sparser punctation of the prothorax, and the parallel-sided elytra which are black instead of mettallic blue. *P. propinquus* also resembles the dark phase of *Callidium hirtellum*, but its characters are typically those of *Phymatodes*.

**Phymatodes concolor** new species.

Elongate, slender, uniformly pale testaceous, sparsely clothed with pale sub-erect hairs. Head finely punctured; eyes black; antennae slender, finely punctured, sparsely ciliate; scape slender, second segment about twice as long as broad, third segment not quite three times as long as second, fourth segment shorter than third, fifth segment subequal to third, remaining segments decreasing gradually in length toward apex. Prothorax slightly transverse, moderately finely, not densely punctured, pubescence sparse. Elytra about three times as long as broad, densely, coarsely punctured, punctures becoming

less dense at base; sides subparallel; apices rotundate-truncate. Legs slender, finely punctured, sparsely clothed with suberect pale hairs; first segment of posterior tarsi equal in length to second and third segments together. Lower surface moderately finely, not densely punctate. Length 5 mm; breadth 1.3 mm.

*Holotype* ♂, (No. 3831 Mus. Calif. Acad. Sci.) and *allotype* ♀, (No. 3832 Mus. Calif. Acad. Sci.) taken at Big Pine, Inyo County, CALIFORNIA, June 7, 1929, and three *paratypes* taken at the same locality on June 17 and 19, 1929, by Mr. E. P. Van Duzee. Two additional paratypes, from Lone Pine, Inyo County, June 8-10, were taken by Mr. Van Duzee and Mr. Robert L. Usinger. One paratype is deposited in the collection of the writer and the remainder in the collection of the Calif. Acad. of Sciences.

This species also belongs to the *P. blandus* group, but may be easily separated from the other known species by the uniformly pale testaceous color and the fine punctation of the head.

ADETUS BROUSI Horn.

*Sicyobius brousi* Horn, 1880, Trans. Am. Ent. Soc. VIII, p. 137.

The genus *Sicyobius* of Horn apparently differs in no appreciable way from *Adetus* Lec. Horn states that the anterior coxal cavities are not angulated externally and places the genus in the Hippopsini. I find, however, in a specimen at hand from Brownsville, Texas, that the anterior coxal cavities are distinctly angulated and characters typically those of *Adetus*.

**Leptostylus falli** new species.

Robust, piceous, densely clothed with white, brown, and yellowish scale-like pubescence. Head about as long as broad, densely pubescent with white and brownish hairs, intermixed with yellow on vertex; front nearly flat, with a narrow longitudinal groove; antennae reddish-brown, longer than the body in both sexes, densely pubescent, segments one to four sparsely ciliate within; scape slender, not quite attaining the lateral thoracic tubercle, second segment slightly longer than broad, third segment a little longer than scape, remaining segments gradually decreasing in length toward apex. Prothorax nearly twice as wide as long, with an obtuse lateral tubercle behind

the middle; coarsely, regularly, and moderately densely punctured; densely pubescent with white, brownish, and yellowish hairs. Elytra one-half longer than broad, subparallel over basal two thirds thence gradually arcuately rounded to the apex; pubescence short, dense, scale-like, intermixed with short, suberect brownish hairs on disk; pubescence brownish over basal and apical thirds, whitish in median area, a large black subglabrous spot as sides; costae evidenced by three longitudinal lines of yellow pubescence; apices obliquely truncate. Legs short; tibiae annulated with black; posterior tarsi with first segment not quite equal to second and third together. Body beneath more or less evenly clothed with white pubescence. Length 8 mm.; breadth 4 mm.

*Holotype* ♂, (No. 3833 Mus. Calif. Acad. Sci.), *allotype* ♀, (No. 3834 Mus. Calif. Acad. Sci.), and a long series of *paratypes* beaten from dead branches of *Rhus* in Carr Canyon, Huachuca Mts., ARIZONA, July, 1930, 1932, by Mr. J. O. Martin and the writer. Several paratypes are deposited in the collection of Dr. H. C. Fall, to whom this fine species is respectfully dedicated as a slight tribute for the assistance and encouragement he has given to the writer.

In Horn's[3] table of *Leptostylus* this species would run to *L. albidus* Leconte, because of the hairy legs and ciliate antennae. It differs from that species, however, in being darker, with a black subglabrous spot at the sides of the elytra, and with shorter erect hairs on the upper surface. In *L. albidus* these hairs are present on the lateral elytral declivity as well as on the disk, and are about as long as the thickness of the antennal scape. I am indebted to Dr. Fall for comparing this species with the unique type of *albidus*.

**Cylindrataxia** new genus.

Body elongate, slender, slightly flattened. Front longer than broad, very slightly convex; palpi not slender, apical segment pointed; antennal tubercles prominent; eyes emarginate, coarsely granulated; antennae long, slender, annulated; scape short, stout, about two-thirds as long as third segment which is incurved; segments following third diminishing gradually in length to eleventh which is distinctly longer than tenth. Pro-

[3] Trans. Am. Ent. Soc. VIII, 1880, p. 119.

thorax cylindrical, laterally unarmed, distinctly broader than long. Elytra very elongate, sides arcuate inward. Anterior and middle coxae moderately separated, cavities angulated, open externally, closed behind; mesosternum with a faint longitudinal groove; mesosternal piece parallel between the coxae, rounded behind. Ventral abdominal segments approximately equal in length. Legs short, subequal in length; middle tibiae tuberculate externally near apex; tarsi as long as tibiae, first segment of posterior pair not as long as the two following together, last segment nearly as long as preceding three united, ungues divergent.

*Genotype: Cylindrataxia salicicola*, new species.

The true affinities of this genus are somewhat uncertain. It shows a definite relationship with *Dorcasta* and *Hippopsis*, but as most of its characters are those of the Ataxiini, it seems best placed in this tribe. In the Ataxiini, the narrow form of *Cylindrataxia*, the laterally unarmed prothorax, and the long slender antennae, will immediately separate it from all of the genera except *Aporataxia* Ham. The latter genus, however, is robust, the elytra shorter, the sides not incurved, the mesosternum deeply and very conspicuously grooved longitudinally, and the mesosternal piece truncate behind. In *Cylindrataxia*, the front is nearly flattened, and the disc of the elytra distinctly so.

**Cylindrataxia salicicola** new species.

Brownish piceous, rather sparsely clothed with brownish and grayish-white pubescence. Head finely punctured, pubescence grayish white; antennae nearly twice as long as the body (♂), or distinctly longer than the body (♀), basal portion of segments 3-11 white, apical portion of segments dark brown. Prothorax finely punctured, sparsely clothed with grayish-white hairs. Elytra more coarsely punctured, the pale pubescence condensed into five or six irregular and indistinct longitudinal vittae; apices rounded. Body beneath finely punctured, sparsely clothed with pale hairs; fifth ventral abdominal segment of male truncate at apex, of female distinctly cleft at apex. Length 9.5 mm.; breadth 2.3 mm.

*Holotype*, ♂, (No. 3835 Mus. Calif. Acad. Sci.) and *allotype*, ♀, (No. 3836 Mus. Calif. Acad. Sci.), collected by the

writer at Brownsville, Texas, June 23-25, 1930. *Paratypes* in the collections of Mr. J. O. Martin (now deposited in the California Academy of Sciences) and the writer, taken in Brownsville, June 23-25, 1930, and May 29-June 10, 1932. All specimens were beaten from dead branches of *Salix* sp.

This species has a superficial resemblance to *Aporataxia lineata* which is also found in Brownsville, but in addition to its more slender form, flattened appearance, and incurved sides of the elytra, *C. salicicola* has, in life, a very characteristic manner of placing the middle pair of legs and antennae, and as a result the two species may be readily distinguished even in the field. *Aporataxia lineata* is nearly always found on jungle vines and other plants in the semi-tropical areas of Brownsville. *C. salicicola* is found on storm broken branches of *Salix*, and is commonly taken along with *Ecyrus cornutus* Linsley. The species appears to be rather constant in size, and although examples in my series vary from 6.5 to 10 mm., most of them are 8.5-9 mm. in length.

## Corethrella appendiculata Grabham from Louisiana (Diptera: Culicidae-Chaoborinae).

By E. Harold Hinman.*

A single male specimen of *Corethrella appendiculata* Grabham† was reared from a larva collected at Fort Jackson, Louisiana, on March 27, 1933. Fort Jackson is a deserted fort on the west bank of the Mississippi River, sixty-five miles south of New Orleans. It is surrounded by a moat overgrown with water-hyacinth (*Piaropus crassipes*) from which the *Corethrella* was obtained. Anopheline larvae (*crucians and quadrimaculatus*) also occur in the moat. The pupal period occupied less than seventy-two hours.

This species of Chaoborinae was described from Jamaica, the larvae being recovered from the water in a hollow tree.

* From the Department of Tropical Medicine, Louisiana State University Medical Center, New Orleans, La.

† The writer is indebted to Dr. Robert Matheson of the Department of Entomology, New York State College of Agriculture, Cornell University, Ithaca, N. Y. for identification of this specimen.

The larvae were observed feeding on crustaceans and usually remained at the bottom. The pupal stage was said to last three weeks. Dyar and Shannon (1924) state that larvae have been found in tree holes and bamboo joints and list the distribution as Jamaica, Santo Domingo and Panama. Dyar (1926) examined material of this species from Gatun, Panama, and described a closely related species from the leaf bases of the wild pineapple.

So far as is known this is the first record of the species from the United States. It seems quite probable that one or more adults were introduced by ships from the West Indies and succeeded in establishing themselves at least temporarily in this unusual habitat. Larvae of another, unknown, *Corethrella*, have been frequently taken from this same breeding place but great difficulty has been encountered in rearing them through to maturity.

This record points to the strong possibility of the accidental introduction of other species of mosquitoes from Central or South America through shipping. Beyer (1923) states that he has found adult *Anopheles albimanus* on and about fruit vessels from Central and South America along New Orleans docks time and again. The introduction of some dangerous disease-transmitting mosquito is probably only a matter of time and record. Since the transportation of *Anopheles gambiae* in Brazil (Shannon, 1932, etc.) has been definitely established, we can expect similar occurrences in other parts of the world.

## References.

Beyer, G. E.: The mosquitoes of Louisiana. Quart. Bull. La. State Bd. of Health. *14*: 54-84, 1923.

Dyar, H. G., and Shannon, R. C.: The American Chaoborinae (Diptera, Culicidae). Ins. Ins. Mens. *12*: 201-216, 1924.

Dyar, H. G.: Note on *Corethrella appendiculata* Grabham (Diptera, Culicidae). Ins. Ins. Mens. *14*: 150, 1926.

Grabham, M.: A New Corethrella from Jamaica. Ent. News *17*: 343-345, 190.

Shannon, R. C.: *Anopheles gambiae* in Brazil. Amer. Jour. Hyg. *15*: 634-663, 1932.

## Studies in the Genus Corticeus Pillar and Mitterpacher (Syn. Hypophloeus Fabricius) (Coleop.: Tenebrionidae).

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

In the *Biologia Centrali-Americana* the generic term *Hypophloeus* Fab. has been submerged and replaced by *Corticeus* Piller and Mitterpacher. This change in nomenclature has been discussed in London at the British Museum, by Mr. K. G. Blair and Dr. Edwin C. Van Dyke very recently, while the latter was visiting and studying at that institution. Their research found the change correct. Mr. E. P. Van Duzee has also very kindly looked up the references and agrees fully with the acceptance of *Corticeus*. The following bibliographical references while not exhaustive, will be sufficient for any one to verify the above as given in the *Biologia* by Mr. Champion.

Genus Corticeus Pillar and Mitterpacher.

1783. *Corticeus* Piller et Mitterpacher, Iter per Poseganam Slavoniae, p. 87.
1870. *Corticeus* Crotch (= *Hypophloeus* Fab.), Trans. Ent. Soc. London, 4me. Série, 3, p. 46.
1886. *Corticeus* Champion, Biol. Centr.-Amer., Coleop. IV, pt. 1, June, p. 171.
1920. *Corticeus* ‡ Leng, Crotch, Trans. Ent. Soc. London, 3 (nec 1), p. 46.
1791. *Hypophloeus* (Hellwig.), Fabricius in Schneider's Neu Mag. Ent. i. 1., p. 24. Ent. Syst., i., p. 500.
1854. *Hypophloeus* Mulsant, Col. de France, Latigenes, p. 250.
1859. *Hypophloeus* Lacordaire, Gen. Col. V, p. 338.
1870. *Hypophloeus* Crotch, (*Corticeus* Pill.), Trans. Ent. Soc. London, 4th Series, 3, p. 47.
1870. *Hypophloeus* Horn, Amer. Philos. Soc., vol. XIV, p. 386. Rev. Tenebr. of Amer. N. of Mex.
1920. *Hypophloeus* Leng, Cat. Col. Amer. N. of Mex., p. 234.
1893. *Paraphloeus* Seidlitz, Naturg. Ins. Deutschl., V, 1893-1896, p. 553.

The study of the different specific phases of *Corticeus* is difficult on account of the lack of data concerning the identifi-

cation of sex. Without doubt a number of new species are awaiting differentiation and description. The species recently described by Mr. J. B. Wallis of Winnipeg, Manitoba, Canada (Can. Ent., LXV, Nov., 1933, pp. 247-249.) are valid.

It is desirable at the present time to describe the following as another addition to the genus:

**Corticeus strublei** new species.

Form somewhat stout, elongate, parallel and subcylindrical. Color moderately dark rufous; mesosternum, metasternum, parapleurae and epipleurae more or less nigro-piceous; abdomen somewhat tinged with piceous. Luster shining, head rather alutaceous.

Head distinctly triangular before the posterior border of the eyes, the latter moderate in size, facets rather coarse, arising abruptly from the surface, in prominence arcuately continuing the sides, the latter strongly convergent anteriorly and nearly straight, feebly sinuate across the oblique suture, very feebly reflexed; epistomal apex arcuato-truncate, angles obtusely rounded; frons convex anteriorly, epistoma less so, rather feebly and somewhat broadly impressed on the frontal suture, as well as within and parallel to the sides; interocular impression well marked between the posterior margins of the eyes; surface very finely punctate anteriorly, epistomal punctures more or less poorly defined, interocular impression and vertex more coarsely punctate. Labrum transverse, arcuate apically. Antennae moderate in stoutness, in length quite equal to width of pronotal apex; segments six, seven and eight widest and equal, seventh in width equal to one-seventh of the pronotal apex, fifth, ninth and tenth a little narrower and subequal, eleventh short oval and slightly narrower; second segment subquadrate, third slightly elongate and obconical, fourth subconical and as long as wide.

Pronotum as long as wide, apex arcuato-truncate between the short, slightly prominent and very narrowly rounded angles, one-seventh wider than the head; sides evenly and less than moderately arcuate, marginal beads fine and reflexed, submarginal impression scarcely widened apically and basally; base broadly and moderately arcuate, somewhat feebly sinuate laterally, about one-seventh wider than the apex, angles small, very distinct and rectangular; disk evenly and moderately strongly convex, beads clearly visible from above, rather coarsely punctate, punctures rather irregular, separated by a distance equal to one to three times their diameters, a narrow and smooth median line more or less evident. Prosternum and

prothoracic sides coarsely and densely punctate, punctures more or less coalescent and with some rugulae evident.

Elytra oblong and parallel, about twice as long as wide and fully two-and-one-seventh times as long as the pronotum; base transverse, humeri obtusely rectangular; sides straight, becoming gradually arcuate in apical third, continuously so with the broadly and moderately arcuate apex; disk feebly convex in the central area, gradually more strongly arcuate and precipitous laterally and apically; coarsely punctate as on the pronotum, punctures separated by a distance equal to one to four times their diameters, strial series not evident. Scutellum slightly transverse, sides straight and rather convergent basally; apex arcuate to slightly ogival, surface with few coarse and well defined punctures.

Mesosternum, metasternum and parapleurae densely punctate, punctures moderately coarse.

Abdomen moderately strongly convex, lateral impressions rather strong on last three segments; moderately strongly and closely punctate laterally and on first two segments, punctures smaller in the central area and on apical segments. First segment behind the coxae as long as the third, second slightly longer than the fifth and one-half longer than the fourth. Pygidium evenly punctate, punctures moderately small and strong.

Legs moderate in length and slenderness; metatibia as long as its femur, metatarsi about three-fifths as long as their tibia; fourth metatarsal segment a little longer than the first three together; second and third subequal, each about one-fifth as long as the fourth, first scarcely as long as the two following.

Measurements: (Type) Length 4 mm.; width 1.4 mm.

*Holotype*, female, No. 3723, in the collection of the Museum of the California Academy of Sciences. Sex determined by the protruded aedeaga. Collected at Pine crest, Marin County, California, from Red Fir (*Abies magnifica* Murr.), by G. R. Struble, to whom the species is dedicated. A pin label bears the number 191710. One identical female *paratype* taken with the type. Several smaller specimens are associated with the types, they were secured under the same conditions and time. Two of them have dark sterna and measure 3.2 mm. in length, and .9 mm. in width, one is a female. The males have not been identified, although one male has the aedeagus exposed and was collected at Cazadero, California. There are some differences in sculpturing which cannot be correlated.

*Strublei* is coarsely punctate, except on the front of the head where the punctures are very fine; the punctuation of the under surface of the body is dense and, typically the mesosternum, metasternum, parapleurae and epipleurae are more or less nigropiceous. *Strublei* is less convex than *glaber* Lec. and the pronotal apical angles are more prominent and narrowly blunt. In both *substriatus* Lec. and *parallelus* Melsh. the pronotal apical angles are larger, prominent and acute. In form *strublei* is larger (types) and somewhat stouter than *subopacus* Wallis. In the latter the head and prothorax are more or less piceous and alutaceous; the punctation is less coarse, distinctly coarser on the front of the head than in *strublei,* besides the pronotal apical angles are more broadly rounded.

### Comments on the technique of orientation.

To correctly describe the outlines of the body of a species, when drafting a description, it is necessary, in order to obtain perfect symmetry, to have the line of vision at right angles to the transverse horizontal plane. This is particularly true of the pronotum. Its four angles must be on the same horizontal plane so that they shall appear equally well defined in the microscopic field. This is absolutely necessary for making camera lucida drawings. With proper orientation the pronotal apex, base and sides will then be as they should appear when viewed from above—in the position for correct description. For the larger species the microscope is not necessary and is replaced by the hand lens for ordinary work.

Applying the above rules, the apical and basal pronotal margins, will be in the best position for determining the degree of truncation or arcuation. To test out the fallacies that arise during careless examination note the following: should the apical margin be arcuate and the pronotal apex be gradually tilted upwards, it will be observed that the arcuation slowly disappears and is replaced by truncation; or should the apex be truncate, it will appear emarginate. So it is with the base when the inclination is reversed.

In the species of *Corticeus* belonging to the *tenuis* group, the pronota are of greater convexity anteriorly and the surface

arcuately declivous antero-laterally. Measured in the manner described above, the pronotal length on the median vertical plane, will be found to be greater than that of the sides from the apical to the basal angles. In the *parallelus* group the differences are less on account of the prominent apical angles and the more or less emarginate pronotal apex.

The above technique, when applied to *Corticeus occidentalis* Wallis, in which both the pronotal apex and base are arcuate, shows that the length on the median vertical plane is about one-fourth longer than the sides from the apical to the basal angles. A paratype and three other specimens of *Corticeus subopacus* Wallis, kindly given to me by my friend Ralph Hopping, have the pronotal apex transverse and the base arcuate; the difference in length on the median vertical plane, is about one-ninth greater than that of the sides from angle to angle. The difference in length is due to the basal arcuation.

## Collecting Notes on Oeneis katahdin Newcomb (Lepid.: Satyridae).

By W. Prescott Rogers, Fall River, Massachusetts.

Mt. Katahdin is located in the central part of northern Maine. There are two good methods of approach by motor car. The first is from Bangor to Millinocket and then by the Sandy Stream tote road, on which road the civilian Conservation Corps did extensive work during the summer and autumn of 1933 so that it is now reasonably passable for automobiles. The other approach is by Greenville, Maine, down the Great Northern Paper Company's private road to Ripogenus Dam. The C.C.C. has also been working on this road. From this dam it parallels the Soudnahunk Stream, a branch of the Penobscot River, is known as the Soudnahunk-Millinocket tote road and joins the Sandy Stream tote road below Togue Pond Camp at a point designated on the maps as Pittman's Garage. This latter is a shed for the private storage of a few automobiles. It is in no sense a garage and nobody lives there.

The Hunt and the Abol trails, both of which start from the

Soudnahunk tote road, may be used by insect collectors to reach the tableland summit of the mountain. The trail used by the writer is a third method of approach. We motored to Togue Pond and then walked up the Sandy Stream tote road to Basin Ponds, then to Chimney Pond, where that unique character of the mountain, LeRoy Dudley, with Mrs. Dudley, maintains a comfortable camp for mountain climbers about three miles from the summit. Collectors and mountain climbers alike are welcomed under all weather conditions. From Chimney Pond Camp one may ascend the Parson's Trail to the Saddle, a satisfactory method of reaching the collecting grounds.

The summit of Mt. Katahdin is a long and wide plateau narrowing in the middle and broader at both ends. It might be compared roughly with an hourglass with a hook at the base. The top part of the hourglass corresponds to the Northern and Hamlin Peaks. The narrow part corresponds to that area known as the Saddle and the bottom part of the hourglass is that area on which are located Monument or Baxter, and South Peaks, extending westward to Witherle Ravine and the Gateway. Our "hook" begins at the South Peak and is a fascinating and jagged ridge extending around and terminating at Pamola Peak. This is known as the Knife Edge.

The butterfly *Oeneis katahdin*, first described by Mr. H. H. Newcomb, in 1901, may be said to inhabit the entire plateau and may even be taken on the Knife Edge in the little dip between Chimney and Pamola Peaks. These notes are offered for others who might wish to visit that picturesque region.

About June 24, 1933, it is reported Mr. Cary from Philadelphia, starting from Chimney Pond, ascended the Parson's Trail and succeeded in taking three specimens at the Saddle. July 4th Messrs. Charles Warner and Ronald Gower, during an exploring expedition, ascended the plateau by way of the Northern Peaks, thence past Hamlin Ridge and down the Parson's Trail to Chimney Pond. Several specimens of *O. katahdin* were noted on the plateau between the Northern Peaks and Hamlin Ridge. On July 6th Mr. L. P. Grey of Lincoln, Maine, ascending by the Hunt Trail with Mr. C. F. Dos Passos, took numerous specimens on the plateau all the way from Gov-

ernor's Spring to Monument Peak. Both sexes were in abundance and about this date one may figure the species is present in the greatest numbers. On July 14th, with two sons and LeRoy Dudley as our guide, the writer, ascending by the Parson's Trail, took a dozen somewhat rubbed and worn specimens. The first captures were made a half mile above the Saddle and successively all the way up to Monument Peak at an elevation of 5268 feet. Proceeding along the Knife Edge specimens on the wing were occasionally noted as far as Chimney Peak. Dropping down into the little grassy hollow that separates Chimney Peak from Pamola, we lunched. A remarkably clear day without wind was of material benefit in our collecting. We took six presentable specimens at this point. Proceeding up Pamola Peak additional specimens were seen and taken all the way down to Index Rock which is at an elevation of approximately 3700 feet.

On August 1st, Mr. D. W. Farquhar ascended by the Abol Trail to find a cloud on the summit and reported he saw no specimens of *O. katahdin* flying. Although not a fair day to test collecting, Mr. Farquhar believes the season for the butterfly had terminated.

If one is so fortunate as to get favorable weather in the early part of July the time devoted to search for this species is an interesting adventure. From the Northern Peaks to Monument Peak, around the Knife Edge to Pamola and halfway down there are inspiring views of the Great Basin which will well repay a visit. Some day it will be interesting to discover if this species inhabits the top of Traveller Mountain whose summit is at the same elevation as Index Rock on Pamola.

## A New Buprestid Beetle from the Florida Keys (Coleoptera).

By H. C. Fall, Tyngsboro, Massachusetts.

**Paratyndaris suturalis** n. sp.

Of the usual robust, cylindrical, slightly attenuate form; sparsely clothed throughout with short, silvery white, decumbent pubescence. Color black with obscure violaceous and (on

the elytra) greenish reflections, the elytral suture narrowly more brightly violaceous becoming cupreo-aeneous at the middle of its length.

Head broadly convex, lightly transversely impressed on the vertex, surface shining, rather coarsely closely punctate. Antennae slender, black, serrate from the fifth joint.

Prothorax about one-sixth wider than long, widest at the middle, sides rather strongly rounded, more narrowed in front, the lateral margin faintly sinuate before the somewhat obtuse but sharply defined hind angles; disk evenly and strongly convex and without trace of impressed line, the extreme hind margin with a slight median impression; punctures rather fine, not dense, and at middle of disk showing some tendency to arrange themselves in short transverse lines.

Elytra about four-fifths longer than the thorax and at base as wide as the base of the latter; only slightly attenuate, apices broadly truncate; each with a somewhat oblique ante-median impression, the two confluent on the suture; striae shallow and somewhat confused toward the suture, deeper and more regular at sides, the humeral and submarginal intervals more convex; strial punctures moderate.

Body beneath rather densely and coarsely punctate, shining, with violaceous reflections; last ventral segment acutely pointed but not spiniform at tip. Tarsal joints less slender than in *olneyae*, though not cordiform; claws thickened at base but without any appreciable dentiform prominence.

Length (to tip of elytra) 8 mm.; width 3.4 mm.

Described from a single specimen, probably a female, bearing locality label "Big Pine Key, FLORIDA, VII-20-29."

I am indebted to Mr. C. A. Frost for the privilege of retaining the unique type of this rare and interesting species. Mr. Frost writes that he received it from Mr. C. G. Siepmann, of Rahway, New Jersey, by whom it presumably was collected.

There can hardly be a doubt I think that the present species should be considered congeneric with our several previously described Texas and Arizona species. These, with a single exception, were all originally referred to *Tyndaris*, but have been separated by Mr. W. S. Fisher (Proc. Ent. Soc. Wash., 1919, p. 92) under the new generic name *Paratyndaris*, the chief distinguishing characters of which are said to be—the

more cylindrical form; prothorax not twice as wide as long; antennae more slender, the serration beginning with the sixth or seventh joint (instead of the fifth joint as in *Tyndaris*); tarsal joints not cordiform; abdomen, which is longer than the elytra, terminating in a spine, and is visible from above. All the known species of true *Tyndaris*, about five in number, are from far down in South America (Chile, Argentina, Paraná).

Strictly interpreted, certain of Fisher's points of distinction between *Tyndaris* and *Paratyndaris* are more or less weakened in the light of the structure of the present species. In it, *e.g.*, the serration of the antenna begins with the fifth joint as in typical *Tyndaris*, and the last ventral segment is no more acute at apex than in the South American *T. planata*. In the latter moreover, judging from a specimen in the museum at Cambridge, although the joints of the four anterior tarsi are evidently cordiform, those of the hind tarsus are not perceptibly different from those in our Florida species, in which the tarsi as a whole are less slender than in our western species of *Paratyndaris*.

The occurrence in the Florida Keys of a species of either *Tyndaris* or *Paratyndaris* is both notable and wholly unexpected, the more so in that Fisher's Revision of West Indian Buprestidae contains no species of either genus, nor is there a single species given in the *Biologia*.

By its entire lack of maculation *P. suturalis* is at once separable from our previously known species, all of which are ornamented with red or yellow spots or stripes. There are numerous other distinguishing characters, as a perusal of the description will show.

In his description of his *P. coursetiae* Mr. Fisher alludes to a broadly rounded lobe on the hind margin of the third ventral segment. I have noticed such a lobe in both *olneyae* and *chameleonis*, but on the second ventral rather than the third. This structure is probably a male sexual character as suggested by Fisher.

# Entomological Literature

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

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

(*) Papers containing new forms or names not so stated in titles, have an * within parentheses thus (*) following the pagination of reference to paper.

(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.** Titles of papers containing new forms or new names will be indicated by an asterisk within parentheses at end of reference, (*).

*Papers published in the Entomological News are not listed.*

**GENERAL.—Birdsong, R. E.**—Insects of the Bible. [19] 29: 102-106. **Boldt, R.**—Nicht-Entomologen als Insektenspezialisten. [14] 48: 17-19. **Carpenter, F. M.**—Carboniferous insects from Pennsylvania in the Carnegie Museum and the Museum of Comparative Zoology. F. M. Carpenter. [Ann. Carnegie Mus.] 22: 323-341, ill. **Carpenter, G. D. H.**—Mimicry in insects. [31] 133: 761. **Cockerell, T. D. A.**—What is a locust? [68] 79: 481. **Engelhart, G. P.**—The winter of 1933-34, and insect occurrence. [19] 29: 115. **Howard, L. O.**—More about the beginnings of the Society. [10] 36: 51-55. **Knight, P.**—The problems of insect study. Edwards Bros., Inc., Ann Arbor, Michigan. Lithoprint, one side, 118 sheets. **Navás, L.**—Insectos Suramericanos. [Rev. Acad. Cien. Exactas fisico-quimicas y Nat. Madrid] 31: 9-28, ill. (*). **Norwegian North Polar Expedition** with the "Maud." Sci. Results V. No. 16 a-d. Anoplura pinnipediorum, Culicidae u. Oestridae. Von L. R. Natvig. No. 16a, 20 pp. Collembola von W. M. Linnaniemi. No. 16b, 4 pp. Lepidopteren von K. Haanshus. No. 16c, 1 p. Spinnen (Araneae) von M. Dahl. No. 16d, 2 pp. [Med. Zool. Mus. Oslo.] Nos. 34-37. **Popenoe, C. H.**—Obituary by Graf and White. [10] 36: 67, ill. **Proper, A. B.**—Obituary by T. H. Jones. [5] 41: 49. **Rohwer, S. A.**—Remarks on changes in the Entomological Society of Washington during the last quarter of a century. [10] 36: 55-59. **de la Torre-Bueno, J. R.**

—Disinfection of collections. [19] 29: 98. **de la Torre-Bueno, J. R.**—Methods and technique for the collector. [19] 29: 125. **de la Torre-Bueno, Engelhardt, Siepmann.**—Report of the Publication Committee of the Brooklyn Entomological Society for 1933. [19] 29: 116-119. **Wickham, H. F.**—Obituary by L. L. Buchanan. [10] 36: 60-64, ill.

**ANATOMY, PHYSIOLOGY, ETC.—Becker, E.**—Zur frage ueber den bau des postantennalorgans bei Collembola. [Zool. Jour., Moscow] 12: 130-135, ill. **Brues, C. T.**—Growth and determinate size in insects. [5] 41: 42-48. **Hall, J. A.**—Observations on the behaviour of newly hatched codling moth larvae. [4] 66: 100-102. **Hrabe, S.**—Das mundorgan von Enchytraeus albidus, Achaeta bohemica und einigen anderen Enchytraeiden. [34] 106: 245-251, ill. **Lemche, H.**—Einige faelle von flügelreduktion bei Selenia bilunaria nach fütterung mit mangan-inkrustierten blättern. [97] 53: 591-600, ill. **von Lengerken, H.**—Ist beim Pillendreher ein sozialer instinkt entwickelt? [2] 30: 74-76, ill. **Philip, U.**—Spontaneous crossing-over between X- and Y-chromosomes in Drosophila melanogaster. [31] 133: 726. **Pflugfelder, O.**—Bau und entwicklung der spinndruse der blattwespen. [94] 145: 261-282, ill. **Pinkus, L. F.**—Spider bite by Oligoctenus (Ctenidae) [5] 41: 36-37. **Stewart, M. A.**—The therapeutic behavior of Lucilia sericata larvae in osteomyelitis wounds. [68] 79: 459-460. **de la Torre-Bueno, J. R.**—Decapitation of Notonecta insulata by Dineutes. [19] 29: 119. **Usinger, R. L.**—Blood sucking among Phytophagous Hemiptera. [4] 66: 97-100. **Wigglesworth, V. B.**—Factors controlling moulting and "metamorphosis" in an insect. [31] 133: 725-726.

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SPECIAL NOTICES.—**Animalium Cavernarum Catalogus.**—Auctore B. Wolf. Pub. by W. Junk, Berlin. This is a catalog of cave animals arranged geographically and systematically and includes a bibliography. It is to appear in three series or bands: 1. containing the bibliography, 2. the geographical and 3. the systematical arrangement. Part 1 containing 16 pp. of Bd. 1., 32 pp. of 2 and 64 pp. of 3 has just appeared.

# OBITUARY.

JOHN MERTON ALDRICH.

In the untimely death of this great dipterologist, May 27, 1934, science has lost one of its few conservative, constructive students of Diptera, his colleagues a valued friend and mentor and his immediate associates and family a beloved character.

Dr. Aldrich was born January 28, 1866 in Little Valley, Olmstead County, Minnesota, received his education in a number of institutions including the South Dakota State College (B.S., 1888, M.S., 1891); Michigan State College; University of Kansas (M.S., 1893); Stanford University (Ph.D., 1906). He taught at the South Dakota College and was professor of biology at the University of Idaho, 1893-1913. In the latter year he joined the staff of the Federal Bureau of Entomology with his first assignment at Lafayette, Indiana, and in 1919 was appointed associate curator in charge of the Division of Insects at the United States National Museum, Washington.

Dr. Aldrich early made Diptera his special study and published many taxonomic papers on the various families. In 1905 he gave us the results of many years' work, in his monumental "A Catalogue of the North American Diptera", a volume of 680 pages now procurable only through second hand dealers. Lately and until his death he was making a special study of the difficult family Tachinidae, a field where his characteristic conservatism was greatly needed. His untimely death has interrupted and will probably long delay the much needed revision of that greatly abused group of parasitic flies. The world can little afford to lose such characters or science such students. Conservative builders are what the world needs now.

E. T. CRESSON, Jr.

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We regret to learn of the death, April 21, 1934, of the well known student of the dipterous family Dolichopodidae, MILLARD C. VAN DUZEE, many of whose papers appeared in the NEWS.

We also learn, to our regret, of the death of F. S. CARR, Inspector of Schools, at his home at Medicine Hat, Alberta, Canada, on May 16, 1934, at the age of fifty-two years, after a long illness of five and a half months. His wife survives him. He was interested in North American Coleoptera.

Dr. HENRY WORMSBACHER, of Lakewood, Ohio, one of the better known of the old school of Lepidopterists, passed away in the third week of June of this year, as we regretfully hear from Mr. C. W. Baker, who informs us that he leaves a wonderful collection of Lepidoptera which numbers approximately 30,000 specimens, both boreal American and exotic.

# EXCHANGES

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

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

**Wanted** — Names and addresses of those desiring insects from Colorado. Charles H. Hicks, P. O. Box 262, Boulder, Colorado.

**Geometers Wanted** for cash, or in exchange for West Coast Butterflies, Noctuids or other Geometers. Edward Guedet, P. O. Box 305, Napa, Calif.

**Wanted**—Papilios, Ornithoptera, Uranias, Morphos, Theclas, uniques, and many other attractive butterflies. Also living cocoons and pupae. A. Glanz, 740 New Lots Ave., Brooklyn, N. Y.

**Exchange**—Pachysphinx modesta. Progeny of modesta imperator (female) and normal male to exchange for Erinnys or other southern Sphingids. Heodes dorcas and others offered for Florida Theclas or Hesperiidae. Perfect specimens only. H. M. Bower, 1302 Davis Street, Evanston, Illinois.

**Exchange**—Will collect insects of Connecticut this season and desire to get in touch with collectors desiring this material, either in exchange or for cash. Harry L. Johnson, So. Meriden, Conn.

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Vol. XLV No. 8

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PHILADELPHIA, PA.
THE ACADEMY OF NATURAL SCIENCES,
Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

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| Canada . . . . . | 3.15 |
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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1934, on the fourth Thursday of each month excepting February, June, July and August, and on the third Thursday of February.

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. XLV. OCTOBER, 1934 No. 8

## A New Membracid Collected by Charles Darwin (Homoptera).

By W. D. FUNKHOUSER, University of Kentucky, Lexington.

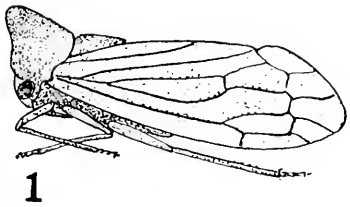
In the routine work of determining museum material, one experiences somewhat of a thrill to find a specimen bearing the label: "Collector, C. Darwin."

The species here described as new was collected by Charles Darwin on the now famous voyage of the Beagle and has remained unnamed in the British Museum for over one hundred years. Through the courtesy of Mr. W. E. China the writer has had the opportunity of examining the specimens taken by Darwin at Chiloe, when H. M. S. Beagle visited that island in November, 1832.

The new species may be described as follows:

**Orekthen darwini** sp. nov.

Small, reddish-brown, concolorous, coarsely punctate; pronotum projecting in a short, porrect horn; scutellum entirely ex-



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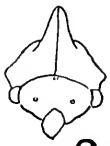

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*Orekthen darwini* Funkh. 1. Lateral view—adult. 2. Frontal outline—adult. 3. Lateral view—nymph. 4. Frontal outline—nymph.

posed; no posterior process; head not sulcate; tegmina smoky hyaline; undersurface and legs reddish-brown.

Head subtriangular, roughly sculptured, brown, punctate, not pubescent; base arcuate, depressed at center; eyes large, dark brown; ocelli small, amber-colored, twice as far from each other as from the eyes and situated below a line drawn through centers of eyes; clypeus rounded, about as wide as long; inferior margins of genae sinuate.

Pronotum uniform reddish-brown without markings, coarsely punctate, not pubescent; pronotal process porrect, short, not as long as its width at base, extending forward and upward, tip rounded; humeral angles small, triangular, blunt, extending outward only a little farther than the eyes; metopidium straight; median carina strongly percurrent; scutellum entirely exposed, triangular, tip sharp; no posterior process.

Tegmina wrinkled, smoky-hyaline; tips broadly rounded; veins strong and punctate; five apical and two discoidal cells; no limbus; base coriaceous. Wings with four apical cells.

Sides of thorax, undersurface and legs uniform reddish-brown.

Length from front of head to tips of tegmina 4.6 mm.; from tip of pronotal process to tips of tegmina 5.2 mm.; width between humeral angles 1.4 mm.

*Type:* female.

Near *O. osborni* Funkh., but smaller, differing in color, pronotal horn much shorter and without markings, humeral angles much less produced, slightly different wing venation and clypeus differently shaped.

Described from two females and a nymph collected by Darwin on Chiloe Island and one female from the same locality taken by F. and M. Edwards on November 20, 1926. Type, paratype and nymph in British Museum collection; one paratype in author's collection.

The nymph, which is apparently in the last instar, has a fully formed pronotal process, well developed wing-buds, distinct mesothorax and metathorax, seven abdominal segments and a strongly binodular head.

The writer is greatly indebted to Mr. W. E. China, not only for the privilege of studying this material, but for the many courtesies extended to him on the occasion of his five weeks' stay in London in the summer of 1933.

## Notes on Basilarchia lorquini Bdv., form fridayi Gun. (Lepid.: Nymphalidae).

By C. Brown, San Diego, California.

From July 13th to 16th in 1933 Mr. Creelman, his son Bob and I made a special collecting trip to secure this form of *Basilarchia* (Can. Ent., p. 284, Dec. 1932) at its type locality on the west shores of Mono Lake in Mono County, California. We found the best locality for it to be just north of the little village of Mono Lake, along the asphalt road where willows abound. More specimens were taken around noonday before the afternoon winds came up. Some 130 *Bas. weidemeyerii nevadae* B. & Benj. and 55 *Bas. lorquini*, form *fridayi* Gun. were taken, together with a sprinkling of what can be termed straight *Bas. lorquini* Bdv. It seemed difficult to net perfect examples without wing damage. This will probably always be the case as the individuals are hardy and long-lived, regardless of their habitat. In both sexes of *lorquini* and *fridayi* an occasional *cavesii* Hy. Edw. was taken; this is the form of *lorquini* in which a reddish row of spots occur on the upper side of the secondaries. I understand from Mr. Gunder that *cavesii* rarely shows up in true *nevadae* at its type locality which is on Mt. Charleston in southern Nevada (only a slight trace was noticed on one female). It may be interesting to note that race *nevadae* occurring at Mono Lake has wider white bands than the type locality specimens, yet not as wide as species *weidemeyerii* from Colorado. The *cavesii* tendency is supposed to be fairly constant in Colorado specimens as Edwards has shown it in both sexes; yet I do not think this is always the case. Utah examples of *weidemeyerii*, by the way, are banded as wide as, if not wider than, the Colorado ones.

The most noticeable feature of *fridayi* is its Mendelian appearance, combining the characters of both *lorquini* and *nevadae*. I think there is no doubt but that it is a perfect case of cross-breeding between these closely related, yet divergent groups. *Fridayi* is like *nevadae* in its greater wing expanse, the males varying from 2" to 2 5/16" and the females from 2 3/8" to 2 6/8". In color and design most of the specimens

approach more closely to *nevadae* in appearance than to *lorquini*. This can be readily understood as due to the fact that there are many more *nevadae* in the region than *lorquini*. One specimen, however, did approach very close to *lorquini*, the only obvious difference being the development of the submarginal row of white dots on the upper side. Some of the *nevadae* caught present slight details that show them to be partially crossed with *lorquini*. One without the brown apical tip of *fridayi* has the development of a brown submarginal line on the under side instead of the customary black one of *nevadae*. In all specimens of *fridayi* the apical area color is a deep reddish-brown, whereas in *lorquini*, it is an orange-brown shade. As in *lorquini* the area of this "colored-tip" varies from a small amount to a pronounced extension. In *lorquini* this color is always present and a feature of the species; in *fridayi* it may show up simply as a trace of color, represented by a few of the colored scales at the very tip. The under-side brown color of *fridayi* is much diminished compared to *lorquini*, the limbal area brown giving away to the grayish-white found in *nevadae*. The under-side marginal band of brown on *lorquini* is reduced to a thin submarginal line on *fridayi*. In some cases (two) this line is black as in *nevadae;* or, in other cases, it may be partially black and partially brown. The development of black in this line is the exception rather than the rule. The brown of the general basal area is much reduced as compared to *lorquini*. Some approach closely to *lorquini* and many approach closely to *nevadae*.

Race *burrisonii* Mayn. of *Bas. lorquini* Bdv. occurs in Washington and British Columbia, the best examples probably occurring on Vancouver Island. It is not in any way directly allied with form *fridayi*. All grades of *burrisonii* can be found in intermediate territory towards the south. I am told (Gunder) that the lightest colored examples of *lorquini* are to be found in Kern County, California, and Mr. W. N. Burdick of Los Angeles has taken very lightly colored specimens in the White Mountain region of Mono County; this is just south of the Mono Lake district as it happens. In his lot were two *fridayi* which shows that *nevadae* penetrates this general region neighboring on Mono Lake.

## Notes on Coleoptera, No. 4.*

By J. N. Knull, Ohio State University, Columbus.

The following are a few miscellaneous rearing records and observations which have been made in the last three years. Most of the rearing was done in-of-doors and the dates of emergence are omitted unless the insects developed under natural field conditions. All of the observations were made in Pennsylvania unless otherwise stated.

### Carabidae.

Scaphinotus viduus Dej. Six adults of this rare beetle were taken under boards near an abandoned sawmill in Horse Valley, Franklin County, on Oct. 9. Small cells had been made in the forest litter to accommodate the insects. The beetles are capable of stridulating by rubbing the sides of the abdomen on the sides of the elytra.

### Cleridae.

Cymatodera bicolor Say. Pupae of this beetle were found on Feb. 23, in a living hickory tree in Bear Valley, Franklin County, where the larvae had been feeding on the immature stages of *Encyclops coerulea* Say and *Microclytus gazellula* Hald.

Thanasimus trifasciatus Say. Many adults of *Tetrastichus thanasimi* Ashm. were found in the pupal cells of this Clerid in Clark's Valley, Dauphin County, on Aug. 15. The *Tetrastichus* are parasites of the beetle larvae. Determination by Dr. A. B. Gahan.

Ploeopterus thoracicus Oliv. Larvae of this insect were found feeding on *Agrilus defectus* Lec. larvae in dead white oak (*Quercus alba*) branches in Horse Valley.

Enoclerus liljebladi Wolc. A prepupal larva of this rare beetle was found in a dead shortleaf pine (*Pinus echinata*) at Mont Alto, on March 18. The Clerid larva had been feeding on *Dendroctonus frontalis* Zimm. which had killed the tree. Numerous adults of this Clerid have been taken at various points in Pennsylvania on dead trees without bark. The beetles can be seen traveling up and down the trunks in the bright sunlight and might be mistaken for Mutillids.

* For Nos. 1, 2 and 3 see Can. Ent. Vol. 57, p. 112-115, 1925; Ent. News, Vol. 41, p. 82-86, 101-102, 1930; Vol. 43, p. 42-45, 62-67, 1932.

## Elateridae.

Adelocera marmorata Fab. Beetles were reared at Hummelstown, from larvae collected in decayed elm infested with *Buprestis rufipes* Oliv. and *Anoplodera minnesotana* Csy. The adults mature in August and pass the winter in their pupal cells.

Athous cucullatus Say. Adults reared from larvae found in decayed elm at Hummelstown, infested with *Anoplodera minnesotana* Csy. The adults mature in July.

Lepturoides productus Rand. On April 24 a pupa of this insect was found under the loose bark of a dead black oak in Horse Valley. The adult matured May 4.

Elater sanguinipennis Say. Numerous adults were found in pupal cells in bald cypress (*Taxodium distichum*) stumps in a swamp at South Mills, North Carolina, on Dec. 7.

E. aerolatus Say. On Feb. 8, a living adult of this beetle was found under the tight bark of a living pitch pine (*Pinus rigida*) infested with *Dendroctonus frontalis* Zimm., at Mont Alto. Two living adults were also found under the loose bark of a hickory in Bear Valley.

Anchastus digitatus Lec. An adult was taken from its pupal cell in a decayed bald cypress (*Taxoxium distichum*) log at Cape Henry, Virginia, on Dec. 6.

## Buprestidae.

Buprestis rufipes Oliv. Adults were observed ovipositing in weathered elm snags without bark at Hummelstown on July 24. This confirms my assumption that the species is a dead wood feeder and that decaying trees are oviposited in year after year.

Anthaxia quercata Fab. This species was reared on July 4, from dead branches of pitch pine (*Pinus rigida*) collected at Mont Alto.

Chrysobothris sexsignata Say. Adults were reared from dead branches of black spruce (*Picea mariana*) collected at Mildred and dead branches of pitch pine (*Pinus rigida*) collected at Mont Alto.

Agrilus audax Horn. This insect was found breeding in living slippery elm (*Ulmus fulva*) at Kansas City, Missouri. The larvae work through the sapwood of the infested branches and construct their pupal cells in the wood. The old pupal cells are soon covered by the living wood, but the emergence holes on the bark persist for several years after the adults escape.

Work was found in branches four inches in diameter. The height at which these infested branches occur might account for the beetle being rare in collections.

Brachys aerosus var. rufescens N. & W. The adults of this color variety were abundant on the foliage of slippery elm (*Ulmus fulva*) at Hummeltown in June. They frequently gather on the leaves in numbers and feed extensively, cutting irregular holes.

### Ostomidae.

Airora cylindrica Serv. Adults were reared from larvae found in the galleries of *Anoplodera minnesotana* Csy. and *Buprestis rufipes* Oliv. in decayed elm trees at Hummelstown. The larvae make irregular galleries in the wood in search of their food.

### Coccinellidae.

Epilachna corrupta Muls. Numerous specimens of this beetle have been taken early in the spring from trees in wooded areas with the beating umbrella, before the beans in the adjacent sections have come up. Several of the captures were made in the mountainous sections many miles from the nearest bean patch.

### Anobiidae.

Vrilletta laurentina Fall. Many living adults were taken from irregular galleries in partly decayed linden (*Tilia americana*) branches in Bear Valley, on Feb. 26.

### Bostrichidae.

Stephanopachys cribratus Lec. Living adults were taken from the outer bark of a living pitch pine tree at Mont Alto, on January 12. The tree had gone through a fire, although no visible damage had resulted. Determined by W. S. Fisher.

Dinoderes minutus Fab. This insect was found working extensively in bamboo which had been imported into Pennsylvania. Determination by W. S. Fisher.

### Cerambycidae.

Hypermallus villosus Fab. Adults have been reared from branches of witch hazel (*Hamamelis virginiana*) collected at Mont Alto. The living branches were infested.

Gaurotes cyanipennis Say. Adults were observed ovipositing in fire killed red oak (*Quercus rubra*) in Horse Valley.

Leptura lineola Say. Reared from dead ironwood (*Ostrya virginiana*) collected at Mont Alto.

L. EMARGINATA L. Reared from decayed American elm (*Ulmus americana*) log at Hummelstown.

ANOPLODERA MUTABILIS Newn. Reared from dead branch of ironwood (*Ostrya virginiana*) at Mont Alto.

A. MINNESOTANA Csy. Reared in large numbers from decayed American elm (*Ulmus americana*) log at Hummelstown.

STRANGALIA ACUMINATA Oliv. Reared from dead branch of ironwood (*Ostrya virginiana*) collected at Mont Alto.

ENCYCLOPS COERULEA Say. This insect was found working in the bark of a living pignut hickory, (*Carya glabra*) in Bear Valley.

PHYMATODES TESTACEUS L. On April 24, prepupal larvae and pupae were found in white pine (*Pinus strobus*) and pitch pine (*Pinus rigida*) slabs in a wood pile at an abandoned sawmill in Horse Valley. The pupal cells were under the bark.

XYLOTRECHUS QUADRIMACULATUS Hald. Many pruned blue beech (*Carpinus caroliniana*) branches were observed near Cross Forks. The damage was done by the larvae of this insect.

ANTHOBOSCUS RURICOLA Oliv. Reared from dead branch of ironwood (*Ostrya virginiana*) collected at Mont Alto.

CLYTUS MARGINICOLLIS Cast. This insect is rather rare in collections due to its habits. The adults collect on the under surfaces of small, cut, hard pine branches which receive full sunlight. The insects can be collected by carefully turning the limbs over. Traps for collecting the beetles can be arranged in this way. The branches should be cut in April.

MICROCLYTUS GAZELLULA Hald. This insect was found working in the bark of living pignut hickory (*Carya glabra*) in Bear Valley.

CYRTOPHORUS VERRUCOSUS Oliv. Reared from a dead ironwood (*Ostra virginiana*) branch collected at Mont Alto.

TILLOCLYTUS GEMINATUS Hald. Adults were reared from a dead wild grape vine collected at Mont Alto.

PURPURICENUS AXILLARIS Hald. An adult was reared at Mont Alto from a small chestnut (*Castanea dentata*) branch one inch in diameter which had been killed by the chestnut blight. The branch had not been girdled by the larva as is customary.

DORCASCHEMA ALTERNATUM Say. Adults emerged from injured branches of ossage orange (*Maclura pomifera*) at Hummelstown.

AEGOSCHEMA DECIPENS Hald. Reared from the sapwood of dead tulip poplar. (*Liriodendron tulipifera*) branch collected at Mont Alto.

LEPTOSTYLUS COLLARIS Hald. Found breeding in small dead white oak (*Quercus alba*) and red oak (*Quercus rubra*) branches in Horse Valley.

ASTYLOPSIS MACULA Say. Reared from dead branches of linden (*Tilia americana*) collected in Bear Valley and dead branches of buckeye (*Aesculus glabra*) collected in Greene County.

LEIOPUS LATERALIS Hald. Reared from dead branches of black alder (*Alnus rugosa*) at Hummelstown.

LEPTURGES SYMMETRICUS Hald. Reared from the dead branches of linden (*Tilia americana*). Collected in Bear Valley.

POGONOCHERUS PENICELLATUS Lec. Reared from small branches of drought-killed black spruce (*Picea mariana*) collected at Mildred.

MECAS VITTICOLLIS Csy. Recently a specimen which agrees with the Casey type was collected in the Chiricahua Mountains, Arizona, August 23, by Dr. E. D. Ball.

### MYLABRIDAE.

MYLABRIS MIMUS Say. Reared from the seeds of black locust (*Robinia pseudo-acacia*) collected at Gettysburg.

### PLATYSTOMIDAE.

ALLANDRUS BIFASCIATUS Lec. Reared from dead linden (*Tilia americana*) branches collected in Bear Valley.

### CURCULIONIDAE.

CRYPTORHYNCHUS PAROCHUS Hbst. On May 8 hundreds of adults were observed on freshly cut butternut (*Juglans cinerea*) logs in Bear Valley. When the adults were placed in cyanide bottles they made a peculiar noise by rubbing the ends of the abdomens against the sides of the elytra.

### SCOLYTIDAE.

SCOLYTUS RUGULOSUS Ratz. On Oct. 13 a cut American elm (*Ulmus americana*) branch was found at Cold Springs, New York, with living brood of this insect.

CRYPTURGUS CORRUGATUS Sw. Adults were collected from a dead pitch pine (*Pinus rigida*) branch at Mont Alto on May 1; also from a dead red spruce (*Picea rubra*) branch collected at Tamarack on May 6.

CHRAMESUS CHAPUISI Lec. Reared from dead branches of Hackberry (*Celtis occidentalis*) collected at Hummelstown.

MONARTHRUM MALI Fitch. Adults were collected from a hemlock (*Tsuga canadensis*) stump on May 29, at Laporte.

STEPHANODERUS GEORGIAE Hopk. and S. CHAPUISI Eich. Adults were found in the dead stems of supple jack (*Berchemia scandens*) at St. Bernard, Louisiana, on Dec. 14. Determined by Dr. M. W. Blackman.

PITYOPHTHORUS PUBERULUS Lec. This insect was found breeding in the small dead tips of Japanese red pine (*Pinus densiflora*) at Reading.

P. PULICHARIUS Zimm. Found breeding in the small dead branches of Japanese black pine (*Pinus thunbergi*) at Trough Creek, Huntingdon County.

XYLEBORUS FITCHI Hopk. Many adults of both sexes were taken from the sapwood of dead standing pitch pines (*Pinus rigida*) on the Mont Alto State Forest in January. The adults had made extensive burrows through the partly decayed sapwood of the trees. Determination by Dr. M. W. Blackman.

## Strymon ontario in Missouri (Lepid.: Lycaenidae).

By HAROLD O'BYRNE, Webster Groves, Missouri.

*Strymon ontario* Edw., originally described from Port Stanley, Ontario, has long been considered very rare, as only a few specimens are known. The localities from which it has heretofore been recorded are along the Atlantic Coast. Recently the writer collected some specimens in Missouri, of which examples sent to Mr. Austin H. Clark, of the U. S. National Museum, were identified by him as this species. Because of the rarity of the species and because the capture of specimens in Missouri greatly extends its known range, data on the Missouri specimens are given below.

Ranken (St. Louis County), May 24, 1932, 1 male; June 3, 1933, 1 male. Meramec State Park (Franklin County), June 2, 1933, 6 males. All collected by the writer and in his collection, except two of the Maramec State Park males, which are now in the collection of the U. S. National Museum.*

Inquiry among local collectors has yielded the following additional records of this species in St. Louis County, Missouri: Meramec Highlands, June 3, 1900, and Cliff Cave, May 27 and

*Since this paper was accepted for publication, the following records have been obtained: Meramec State Park, May 29, 1934, 7 males and 3 females; Allenton (St. Louis County), June 3, 1934, 4 males and 1 female.

June 17, 1906, 1 specimen on each date collected by Dr. E. P. Meiners, of St. Louis; Barrett's, May 28, 1933, 1 specimen collected by Mr. P. S. Remington, Jr., of St. Louis.

The specimens collected by the writer show considerable variation in the amount of orange on the upper surface; one looks much like Holland's figure of *S. favonius* Sm. & Ab. (Butterfly Book, pl. xxix, fig. 22), while some have little or no orange. All were taken on rocky, oak-covered hillsides, such as are familiar to every frequenter of the Ozarks, and were flying in company with the very abundant *S. calanus* Hbn., from which they could be distinguished, even while flying, by their smaller size. Since most of the specimens were badly worn, emergence undoubtedly begins some time earlier than the above records indicate. Further search in southern Missouri at the proper season should reveal the presence of *ontario* in other localities.

## Two New Generic Names (Diptera: Tachinidae, Dexiidae.

By Charles H. T. Townsend.

**Rohdendorfia** gen. nov. (Miltogrammini).

Proposed for *Miltogramma* s. str. of Rohdendorf (1930-Lindner, Fliegen pal. Region, Lief. 39). Genotype *Tachina oestracea* Fall. Differs from *Miltogramma*, genotype *M. punctatum* Meig., by frontalia almost equally broad, cheeks at most scarcely over one-sixth of eye-length, distinct median marginal bristles on second segment, vertex of both sexes two-fifths and face one-third of head width, fourth joint of male front tarsi lacking long hairs but with several, long, bent spines protruding upward between claws.

**Alitophasia** gen. nov. (Melanophorini).

Proposed for *Litophasia albisquama* Vill. from Pyrenees of Spain. Differs from *Litophasia* by distinct median marginal pair of bristles on third segment, squamae moderately large, parafacialia narrow, costal border of wings infuscate. This is the smallest muscoid fly known, measuring only one and one-half millimeters.

## Records of Florida Dragonflies—1.*

By C. Francis Byers.

In 1929, the author (Byers, 1930) finished writing an account of the Odonata of Florida which contained all of the information on that subject known to the writer at that time. During the five subsequent years, the Florida dragonfly list has received important changes and additions. It is the purpose of this paper to record these modifications.

New information has been made available through the activities of two field expeditions, the sporadic efforts of the author and the work of graduate students at the University of Florida:

1. The Byers-Spieth expedition, financed by the University of Michigan, collected insects in southeastern United States during the summer of 1930. Collections were made in Baker, Alachua and Liberty Counties, Florida (Byers, 1931).

2. The Williamson-Ditzler expedition of 1932 collected over much of the same territory. (Williamson & Gloyd, 1933. Gloyd 1933).

3. The author made several trips into eastern and southern Florida at various dates.

4. Graduate students of the University of Florida have added considerably to the number of specimens and records of Odonata from Alachua County. In this connection mention should be made of the work of Mr. R. P. Trogdon, who has succeeded in rearing a large number of Zygoptera in connection with his work on certain ecological aspects of Lake Warburg.

In the following list all of the specimens captured in new localities and on different dates than recorded in the 1930 publication (Byers, 1930) are not given. Only those records are listed that are pertinent to the understanding of the occurrence, distribution and life-histories of dragonflies in Florida. The new additions are as follows:

### Part I.

1. Negomphoides ambigua (Selys). Dade County, Royal Palm Park, June, 1930, (1 ♂). Alachua County, Newnans Lake, July, 1932, (1 ♀). The Williamson-Ditzler expedition took a large series of what appears to be this species from Liberty County.

* Contribution of the Department of Biology, University of Florida, Gainesville.

2. Progomphus obscurus (Rambur). Alachua County, Newnans Lake, May, 1930, (4 ♂ ; 1 ♀) ; Newnans Lake, May, 1931, (1 ♂) ; Magnesia Springs, May, 1932, (2 ♂). The nymphs of this species have been found to be very common in most all of the clean sand bottom streams and lakes in Alachua County.

3. Anax longipes Hagen. Alachua County, May, 1930, (1 ♂). Nine nymphs of what are probably this species were taken in a small pond near Gainesville, February, 1931.

*4. Macromia georgina (Selys). Alachua County, Gainesville, July, 1930, (16 specimens). Taken near the city limits flying in an open pine woods some distance from a small stream.

*5. Somatochlora linearis (Hagen). Liberty County, "Camp Torreya", July, 1925, (1 ♀). Captured by Dr. T. H. Hubbell, who notes that it was taken, "Playing in a ravine woods near small sand bottomed swift creek." E. B. Williamson also records the presence of this species in the same county, 1932, (Williamson & Gloyd, 1933).

6. Erythrodiplax umbrata (Linne). Dade County, Royal Palm Park, October, 1930.

7. Brachymesia gravida (Calvert). Alachua County, Newnans Lake, September, 1930, (1 ♂ ; 1 ♀) ; July, 1932, (1 ♀).

8. Macrodiplax balteata (Hagen). St. Johns County, May, 1930, (1 ♀). Taken from the radiator of an automobile near St. Augustine.

*9. Lestes rectangularis Say. Alachua County, Gainesville, April, (1 ♂).

10. Argiallagma minutum (Selys). Dade County, Royal Palm Park, October, 1929, (1 ♂ ; 4 ♀).

11. Enallagma laurenti Calvert. Alachua County, May, 1930, (3 ♂ ; 4 ♀). Mr. R. P. Trogdon has reared a number of this species from nymphs taken at Lake Warburg, March and April, 1934.

*12. Telebasis salva (Hagen). Alachua Cunty, University of Florida Campus, May, 1932, (4 ♂). Marion County, Micanopy, May, 1930, (3 ♂). Mr. Trogdon has also reared a number of this species from Lake Warburg material.

13. Ischnura ramburii Selys. This is one of the most common species of damselflies in Florida, yet little was known in regard to the nymph until Mr. Trogdon's work mentioned above.

*14. I. kellicotti Williamson. Alachua County, May, 1934 (6 ♂ ; 12 ♀).

Part II.

In this portion of the list are given records taken from the

literature only. The author has not seen the specimens indicated.

*15. Somatochlora calverti Williamson & Gloyd. Described as a new species from Florida (Williamson & Gloyd, 1933). Taken in Liberty County, August, 1932.

*16. Somatochlora provocans Calvert. Liberty County, August, 1932 (Williamson & Gloyd, 1933).

17. Somatochlora filosa (Hagen). Liberty County, August, 1932 (Williamson & Gloyd, 1933).

*18. Tetragoneuria sepia Gloyd. Madison County, Greenville, September, 1932, (1 ♂). Described as a new species from Florida (Gloyd, 1933).

The species added to the Florida list in the foregoing (*) bring the total number of species occurring, or said to occur, within the state to 127.

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## A Note on the Disposition of Type Material.

The writer recently received a letter from a correspondent who was contemplating work on some parasitic wasps sent him by several field stations in the southwest. He states therein that he had written to a professor of a western college, where the types of nine of the species of the genera involved were recorded as having been deposited, but received no response to his request. Later he wrote again asking that a genotype species be examined for him, but again no reply or acknowledgment of his letter. More recently he sent specimens to a student in Holland who has access to a collection containing some types and received reply that "it will be two years before he [the student] will be able to devote himself to the study of this group," not even offering to take a few minutes to make the comparisons.

My correspondent closes by saying "Two examples of what happens when types are deposited in institutions where there is no specialist in the order or even a working entomologist."

Although it may be considered as ideal to have all types deposited in a certain place where there is every possibility of their being properly cared for; it is not always desirable or safe to have all the eggs in one basket. On the other hand they should be deposited only in internationally-known institutions which have been established for the purpose of preserving natural history material, and not in those established primarily for instruction or for the exhibition alone of such material and dependent upon appropriations granted by political assemblies. —E. T. Cresson, Jr.

## A Reminder.

It might be well to call attention again to a very important amendment to Article 25 of the International Rules of Zoological Nomenclature adopted by the International Zoological Congress X. Budapest, September, 1927.

This article 25 (Law of Priority) as amended, reads as follows:

A valid name of a genus or species can be only that name under which it was first designated on the condition * * * (a) That 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. 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).

We here find that any genus erected after 1930 for two or more species without a specifically designated genotype has no status. Consequently anyone subsequently may take the credit for this genus merely by designating a genotype and he may have no knowledge of the group involved. The same may be the fate of a genus or species described if no mention is made as to how it differs from another known or properly described genus or species.—E. T. Cresson, Jr.

# Entomological Literature

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

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

(*) Papers containing new forms or names not so stated in titles, have an * within parentheses thus (*) following the pagination of reference to paper.

(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.** Titles of papers containing new forms or new names will be indicated by an asterisk within parentheses at end of reference, (*).

*Papers published in the Entomological News are not listed.*

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Malloch, 32 pp., ill. (*). Hymenoptera, by W. D. McIlroy, Jr., 2 pp. V. Mallophaga, by H. S. Peters, 3 pp. [Mem. Carnegie Mus.] 12: 1-37, ill. **Van Duzee, M. C.**—In Memoriam. By E. P. Van Duzee. [55] 10: 90-96, ill. **Williamson, E. B.**—Obituary by F. M. Gaige. [Univ. Michigan Off. Publ.] 1933: 7-24, ill.

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A Monograph of the Collembola of Iowa. By Harlow B. Mills. 143 pages, including 12 plates. Collegiate Press, Inc., Ames, Iowa. Price, $2.25.—The collector who wishes to name and to know more about the Collembola that he comes across, can do so with the aid of this book; for the commonest species of Iowa are also common in most of the United States and Canada, and in Europe as well; while not a few of them are cosmopolitan. Dr. Mills has "broken the record" by recording 132 species from Iowa. Seventy-nine species and 9 varieties have been listed from New York and 58 species from Minnesota. The classification adopted is a conservative one, which serves its purpose, yet avoids an undue splitting of groups. The system is, of course, essentially that of Börner, who made few taxonomic mistakes. This book, like Guthrie's Collembola of Minnesota, is a useful comprehensive manual, and an excellent introduction to the works of specialists. Credit is due to the editor and the publisher for producing a first class book at a reasonable price. Collembola are now known to be of no little economic importance. Their depredations have often been attributed to other causes. Of some 2,000 species that have been named, about 50 have been proved to be injurious, and a few of these are at times even pests.—J. W. Folsom.

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Entomology with special reference to its ecological aspects by Justus Watson Folsom, Sc.D., Senior Entomologist, U. S. Bureau of Entomology, revised by R. A. Wardle, Professor of Zoology, University of Manitoba, Winnipeg, Canada. Fourth revised edition. Five plates, 308 text-figures.

Philadelphia. P. Blakiston's Son & Co., Inc. Copyright 1934. 8vo. Pp. x, 605. $4.00.—Reviews of the first, second and third editions of this excellent text-book appeared in the NEWS for September, 1906, page 262; November, 1913, page 424; and April, 1923, page 127. This new edition has slightly more than 100 pages more than the third, due partly to the fact that the type-form is nearly one-half inch narrower and one-half inch shorter, and partly to the revision's having added many paragraphs. Very few changes in the text-figures have been made. The number and titles of the chapters remain as in the third edition, with one slight abbreviation. The contents of all of them have been altered to a greater or less degree; a section on Physiology of Nutrition, based on Uvarov's summary of 1929, in Chapter II is new; Chapter IX, Insects and Disease, the sections on temperature and on moisture of XIII, Ecology, and those on Introduction and spread of injurious insects and on Economic Entomology in North America of XIV, Insects in relation to Man, have been rewritten. Among the smaller changes or additions are those on the hypotheses concerning the evolution of insects (pp. 6-8), the interrelationships of the insect orders (pp. 24-29, with a new fig. 33), hypotheses on the origin of wings (pp. 60-62), chitin (78-80), structure of muscle (90-91), taste (100), smell (102), hearing (110-111), peritrophic membrane (123-4), details of respiration (147-148), various details of embryology (155-165) and external metamorphosis (165-192). The whole of the reviewer's copy is similarly marked, but the list given is sufficient to indicate how extensive the revision has been. The third and fourth editions have come from the press with two references, *pg*, in fig. 45, instead of *p* and *pg*, as correctly given in the first two editions. Dimmock's transverse section of the mouth parts of the female mosquito has been retained (p. 47) in spite of Thompson's criticism (Proc. Boston Soc. Nat. Hist. 32: 149, 1905). The statement on page 155 seems to imply that *all* the daughter nuclei in the process of maturation of the egg are expelled as polar bodies. The terms *pre-maturation period* and *maturation period* employed (p. 166) to designate post-embryonic stages are pre-occupied by their use in gameto-genesis. The first two lines of the fourth and of the fifth paragraphs on p. 329 seem to be contradictory. On page 354 we read, "The term *multiparasitism* may be used to indicate the coincident parasitism of an insect by two or more parasites of *different species*," and "Superparasitism refers to the infestation of a host by two or more parasites, or of course parasitoids,

*of the same species.*" The term superparasitism has been used in different senses. Thus, the Century Dictionary of 1906 gave it as "The infestation of parasites by other parasites; hyperparasitism." Fiske believed he was proposing the term superparasitism in 1910 and gave this definition: "Superparasitism results when any individual host is attacked by two or more species of primary parasites, or by one species more than once. It differs materially from secondary parasitism, or hyperparasitism as it is variously called, although both are, strictly speaking, double parasitism of an individual. In superparasitism the parent females are both attracted to the primary host primarily for its own sake. In hyperparasitism one of them is attracted to the primary host secondarily and incidentally, and for the sake of the primary parasite which it harbors." (Jour. Econ. Ent. 3: 89-90). The word superparasitism as here used by Prof. Wardle would seem to be superfluous; if only one individual of species A infests a host we have simple parasitism; if two individuals of A infest it we would have superparasitism. We regret, too, that *parasitoid* is adopted and used in contrast with *parasite* (pp. 347 *et seq.*), although employed also by Dr. Wheeler. The parasitoid condition, as defined by Prof. Wardle, is more justly appreciated as a degree of intensity of parasitism. We would have liked a fuller summary of the physiology of the nervous system, of Harvey's results in photogeny, of Goldschmidt's work on intersexes in *Lymantria*, of mention of Hale Carpenter, Heikertinger and F. M. Jones in connection with adaptive coloration. We are evidently insatiable! The literature list at the end of the book has always been an important and valuable feature of "Folsom." It, too, has necessarily been revised. Prof. Wardle's preface tells us "the Russian and German literature, in particular, may have been incompletely surveyed." "The titles are arranged in chronological order"; this does not apply to the section Bibliographical Works. It holds true for that on Systematic Entomology, where it results in scattering the references to each systematic group throughout nearly three pages of smaller type. A taxonomic arrangement here would surely have been more useful, while one by topics would apparently be better in the sections Autecology, Synecology and perhaps some others. But while we have pointed out some errors or defects—as they appear to us—we emphasize again, as we have done on three earlier occasions, the great value, wide outlook and readability of this book, to which, as Dr. Folsom says in a prefatory note, Prof. Wardle has greatly added.—P. P. Calvert.

A General Textbook of Entomology including the anatomy, physiology, development and classification of Insects. By A. D. Imms, D.Sc., F.R.S., University Reader in Entomology, Cambridge. New York, E. P. Dutton and Co., Inc. Pp. xii, 727, 624 figs.—Although jacket and a preface announce this as a third edition, no mention of this fact and no date of publication are given on the title-page. The preface cited is dated Cambridge, March, 1934. The jacket describes the volume as "a comprehensive reference textbook of Entomology" and claims, probably correctly, that it "covers more ground and gives more detailed information than any other work of a similar character published in the English language." The first edition appeared in 1925, the second in 1930; they were noticed, respectively, in the News for November, 1925, and October, 1930. The book has been sufficiently long before the public to become well known, so that the present interest lies largely in the changes appearing in the present edition. "Some 37 new illustrations have been included and, of these, 20 replace figures that have done duty previously, while the remainder are additional." The titles and numbers of the chapters are the same as before. Additions to the references to literature over and above those given in the second edition appear at the end of each section. The text shows a greater number of changes from, and additions to, that of the second edition than the latter does from the first. All through Parts I, Anatomy and Physiology, and II, Development and Metamorphosis, these are numerous, if not extensive. The only noteworthy omission seems to be Lehmann's researches (Jena, G. Fischer, 1925) in connection with the arrangement and distribution of the tracheae among the different groups (p. 120). In Part III, The Orders of Insects, are more detailed classifications of Dermaptera, Ephemeroptera, Strepsiptera and Symphytous Hymenoptera, very extensive alterations in that of Lepidoptera, division of the Diptera into three suborders, Nematocera, Brachycera and Cyclorrhapha, union of the Muscidae with the Anthomyidae under the latter name (although the generic name *Musca* does, while *Anthomyia* does not, appear in the tenth edition of the *Systema Naturae*), union of the Sarcophagidae and the Calliphorinae with the Tachinidae under the last name, thereby reducing the number of families of Calypterae to three, with much of the text on these rewritten. Somewhat similar treatment has been accorded the Vespidae and allies. The name Pantophthalmidae is used instead of Acanthomeridae, and a few lines are devoted to the Helotrephidae, an addition to the Hemiptera. Dr. Imms has succeeded admirably in bringing his great work up to date. P. P. Calvert.

# EXCHANGES

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HARRISON GRAY DYAR,
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Logan Square

Entered at the Philadelphia, Pa., Post Office as Second Class Matter.
Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

published monthly, excepting August and September, by The American Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

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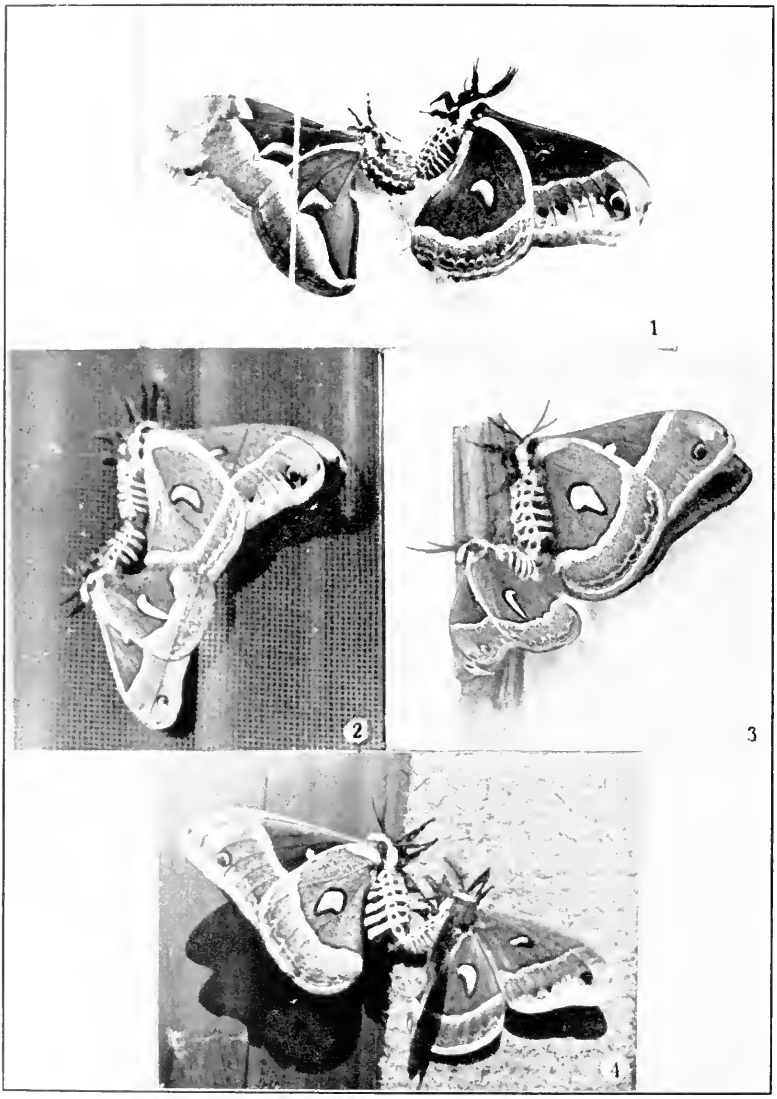


PLATYSAMIA CROSS-MATINGS—SWEADNER

# ENTOMOLOGICAL NEWS

VOL. XLV. NOVEMBER, 1934 No. 9

## "Species" through Hybridization ? (Lepid.: Saturniidae.)

By WALTER R. SWEADNER, University of Pittsburgh.

(Plate II.)

In their article "Observations in the Genus Samia" in the March 1933, issue of ENTOMOLOGICAL NEWS, the Misses Wickwire and Calale raised a number of questions growing out of the observed cross-mating of species of this genus. The writer has been working on this problem for the past four years and a preliminary report of the results of his investigations may partially answer their questions.

The observation that *Samia* (or *Platysamia*) *gloveri* females readily attract and mate with wild *P. cecropia* males may be extended to include the entire genus and even some members of allied genera. In the Spring of 1931 the writer crossed females of *Platysamia gloveri*, *P. euraylis* and *P. nokomis* with wild *P. cecropia* males near Slippery Rock, Pennsylvania. In 1932, while studying the zone of contact between *Platysamia euryalis* and *P. gloveri* in Northern Idaho and Western Montana, sixty-one cross matings were secured by using the method of "tying out a female." These crosses included matings of females of *Platysamia cecropia*, *P. gloveri*, *P.* hybrid *gloveri-cecropia* and *Callosamia angulifera* with males of the species known as *Platysamia euryalis* variety *kaslocnsis* (Cockerell) and matings of *P. cecropia* and *P. gloveri* (Utah) females to *P. gloveri* (Montana) males. At Bradley, Montana, in *gloveri* territory, a *P. cecropia* female was mated to a *P. gloveri* male while a *P. gloveri* female a few feet away remained unmated. The *gloveri-cecropia* males were mated to their sisters or backcrossed to both parent species. In 1933 a similar survey was made in Michigan, Manitoba and Ontario. Twenty-two matings were secured using *P. cecropia* and *P. gloveri* females and

wild *P. columbia* and *P. nokomis* males. A few miles west of Winnipeg, a pair of *P. cecropia* females, tied to the same bush, mated to a *P. cecropia* and a *P. nokomis* male on the same night. Similarly, *P. cecropia* females mated with both *P. cecropia* and *P. columbia* males near North Bay, Ontario. The larvae from these two hybrid matings were among those successfully reared. The imagos showed a greater variability than the previously produced hybrids. The females were sterile but the males, mated to *P. cecropia* females, produced normal, healthy, but extremely variable larvae that are now hibernating as pupae. In about seventy per cent of all the above crosses the eggs were fertilized, although in some of the species crosses, in the *Callosamia angulifera-Platysamia kaslocusis* cross and in all of the matings involving hybrid females, the embroyos developed part way but failed to hatch.

Two zones of contact between the various species of the genus *Platysamia* have been established for a relatively long time, namely: the home of *Platysamia euryalis* var. *kaslocusis* in Northern Idaho, Western Montana and Southern British Columbia, a zone of contact between *P. euryalis* and *P. gloveri;* and in Northern Michigan, Manitoba, Ontario, Quebec and Maine, a zone of contact between *Platysamia nokomis* or *P. columbia* (both offshoots of *P. gloveri*) and *P. cecropia.* In recent years *P. cecropia* has invaded the territory of *P. gloveri* in Colorado, probably having been assisted in crossing the Great Plains by the tree-planting activities of the settlers. This invasion, reported by Dr. T. D. A. Cockerell, should be carefully studied by someone in that district.

Judging from the ease with which crosses have been secured in Nature, it may be inferred that the species of the genus *Platysamia* inter-breed freely in the zones of contact. The females of the hybrids as yet produced have proven sterile, but the males are fertile when crossed back to either of the parent species. The intergradation derived from such back-crossing is well illustrated by a series of thirty males taken at Lookout Pass in the Bitterroot Mountains on the Idaho-Montana state

line. These intergrades range from a slightly aberrant *P. gloveri* to almost typical *P. euryalis*. A series of eighty-four specimens taken in this zone of contact shows a continuous trimodal distribution ranging from moths taken along the Continental Divide showing mostly *gloveri* characters to specimens from near the Washington state line having mostly *euryalis* characters. Many of these wild intergrades, particularly the mid-intergrades, have been matched exactly in form and color by primary hybrids between *P. euryalis* and *P. gloveri*. In the *cecropia-nokomis* and *cecropia-columbia* contacts there were no intergrades found, but about half of both *P. columbia* and *P. nokomis* show color characters that can be explained most conveniently on the basis of a trace of *cecropia* ancestry. This lack of intergradation indicates that *cecropia* has been separated from the *gloveri-columbia-nokomis* group longer than has *euryalis* in spite of the latter's greater divergence. The lack of intergrades also indicates weak or infertile primary hybrids which should have a diminishing effect on both species. The almost complete extinction of *P. columbia* east of Lake Superior is due largely to the destruction of its food plant by the larch sawfly, but it is interesting to note that *P. nokomis* occupies only a small part of the northern range of its food plant (*Elaeagnus*), the southern portion being exclusively occupied by *P. cecropia*. Either the presence of *P. cecropia* prevents the invasion of the territory by *P. nokomis* through crossing with it, or the former has driven out the latter by the same process as it advanced northward. If the second alternative is true, both *P. nokomis* and *P. columbia* and possibly *P. gloveri* are doomed to extinction.

The characters introduced into a species by a single alien specimen would soon be swamped. The collection of Mr. J. W. Sugden, of Salt Lake City, contains a specimen that emerged in 1927 from a *gloveri* type cocoon collected in that city that has the appearance of a primary hybrid between a *P. gloveri* female and a *P. cecropia* male (the reciprocal crosses produce slightly different hybrids). From a batch of cocoons collected

in the same territory in the Spring of 1932 there emerged a specimen showing a slight trace of *cecropia* characters.

The present distribution of the *Platysamia* and the different degrees of intergradation at the points of contact indicate to a certain extent the origin of the species. I would suggest that during the Ice Age the genus existed as two probably homogenous groups:* the progenitors of *P. cecropia* in the southeast in the pocket formed by the ice sheet and the very wide Mississippi River at that time; and the ancestors of *P. curyalis, P. gloveri, P. nokomis* and *P. columbia* in Northern Mexico. Following the retreat of the glaciers, this latter group became separated into *P. curyalis* and *P. gloveri* by the deserts of the Great Basin, while *P. cecropia* continued its isolation due to the barrier of the treeless plains. *Nokomis* and *columbia* became separated from *gloveri* by food plant specialization after that species reached Canada.

EXPLANATION OF PLATE II.

Some of the Cross Matings.

Fig. 1. *Philosamia cynthia* ♀ × *Platysamia cecropia* ♂
Fig. 2. *P. curyalis* ♀ × *P. cecropia* ♂
Fig. 3. *P. gloveri* ♀ × *P. curyalis* ♂
Fig. 4. *Platysamia gloveri* ♀ × *P. cecropia* ♂

## Two New Species of the Genus Hydrellia from Mount Desert, Maine (Diptera : Ephydridae).

By EZRA T. CRESSON, JR., Philadelphia, Penna.

The species of this genus appear to be leaf-miners and there are records of their mining the leaves of grasses and various aquatic plants. In North America we have *H. scapularis* Loew reported as a serious miner of rice in California.[1] Miss Emmeline Moore[2] reared a species of this genus from *Potamogeton*, pond-weed, which may be *H. cruralis* Coq. and which species I have before me, reared by Miss Gertrude Auxier from the same plant at Marlington, West Virginia. Others, *H.*

* There is a possibility that *curyalis* was isolated during the Ice Age.
[1] Jour. Econ. Ent., XV, p. 432, (1922).
[2] U. S. Bur. Fisheries Bull., XXXIII, pp. 259-291, (1915).

*griseola* Fab. and *leucostoma* Meig., have been reported in Europe from grasses and other plants. The following species add two more to the list of the known habitats of North American species.

**Hydrellia proctori** new species.

Similar to *H. cruralis* Coq., but the third antennal segment and the tibiae are black and the general color is darker than in that species.

Palpi and all tarsi tawny. Haltere knobs pale lemon-yellow. Wings hyaline with dark veins.

Frons uniformally opaque, not velvety, black to dark ochraceous, depending upon the aspect, but at no time showing any demarcation of the frontalia. Face, lunule and cheeks evenly dark ochraceous; lower occiput more grayish. Mesonotum including humeri, notopleura, scutellum and metanotum, black, subopaque, overcast with brown, somewhat of olive tone. Pleura grayish, color sharply limited at notopleural suture. Abdomen concolorous with mesonotum, not grayish laterally, becoming slightly ochreous gray ventrally. Femora and tibiae grayish.

Frons much broader than long; lunule well developed; anteocellar distance slightly greater than that between anterior ocellus and post-ocellar bristles; latter bristles very strong. The two frontorbitals subequal in length, the posterior one caudolaterally inclined. Face scarcely one-third width of head, in profile vertical and weakly convex; parafacialia linear; facialia rather marked, about twice as broad as the parafacialia, with about six long, thin up-curved bristles, the two uppermost above line of buccal orbit; cheeks scarcely as broad as third antennal segment. The latter slightly longer than broad; arista with six hairs. Mesonotum with about fourteen pairs of acrostichals; the two pairs of dorsocentrals widely separated, forming a quadrangle. Scutellum flat, triangular with four marginals. Abdomen ovate with convex lateral margins; segments two to four subequal or four slightly the longest; fifth acutely triangular, slightly longer than fourth. Hypopygium small, about twice as long as broad. Legs normal. Wings with third costal section slightly longer than second.

Length, 2.5 to 2.7 mm.

*Type*.—Male; Bar Harbor, Mt. Desert, MAINE, May 7, 1933. (William Proctor; on *Nymphaea advena*. [A.N.S.P., no. 6152]

*Paratype*.—1 ♂; Topotypical.

**Hydrellia advenae** new species.

In general color and structure this species is similar to *H. serena* Cresson, but much smaller, lunule smaller, anteocellar distance longer, face broader and flatter with yellowish tone, arista with fewer hairs, mesonotum and abdomen more olivaceous and not so shining, the dark color of mesonotum but slightly enroaches onto the mesopleura.

Palpi and bases of tarsi tawny. Haltere knob pale lemon-yellow. Wings sub-hyaline with black veins.

Frons uniformly opaque black to slightly grayish, depending upon the aspect, leaving small wedges of the frontalia and sometimes the parafrontals black. Face and lunule somewhat golden becoming whitish above and laterally including cheeks. Mesonotum including humeri, notopleura, scutellum and metanotum, uniformly subopaque dark grayish olive. Pleura contrastingly paler, more grayish. Abdominal dorsum concolorous with mesonotum; venter concolorous with pleura. Fore coxae, femora and tibiae whitish gray.

Frons broader than long, depressed at antennae, lunule very small with anteocellar distance much greater than distance between anteocellus and postocellar bristles; orbits slightly converging; posterior frontorbital laterally inclined. Face one-third width of head, in profile evenly convex, slightly prominent below middle; parafacials linear; facialia not discernible, with four upcurved bristles of which the uppermost is distinctly above line of buccal orbits. Cheeks about as broad as width of third antennal segment. The latter not longer than broad, subconical, rounded apically; arista with four to five hairs. Mesonotum with about ten to twelve pairs of acrostichal setulae; both pairs of dorsocentrals approximate, the antesutural much the smaller. Scutellum slightly convex with four marginal bristles. Abdomen elongate with lateral margins subparallel; fifth segment trapezoidal, slightly longer than fourth; hypopygium narrow, twice as long as broad. Legs normal. Wings with second and third costal sections subequal in length. Length, 1.5 to 1.8 mm.

*Type.*—Male; Bar Harbor, Mt. Desert, MAINE, May 7, 1933. (William Proctor; on *Nymphaea advena*). [A.N.S.P., 6513].

*Paratype.*—1 ♂; Topotypical.

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GENERA INSECTORUM, Tervueren, Belgium, has issued a list of the fascicles published to date (1902-1934), which number 199, with 489 colored plates and 136 plain plates and maps.

## A List of Scarabaeidae Collected at Clemson College, South Carolina (Coleoptera).

By O. L. Cartwright, Clemson College, South Carolina.*

The species of Scarabaeidae named in this local list were collected within a mile radius of the Main Building of Clemson College, the Agricultural and Engineering College of South Carolina. Briefly described, this small area in the eastern corner of Oconee County is not unusual or very different from many other localities in North Carolina, South Carolina and Georgia. It is situated in the foothills of the southern Appalachian Mountains at an elevation varying from 600 to 845 feet. (Sassafras, South Carolina's highest mountain, 3,548 feet, lies slightly east of north, 27.5 miles away. Rabun Bald Mountain, 4,700 feet, one of Georgia's higher mountains may be seen in the northwest only 34 miles away; Satulah and other North Carolina mountains are visible on clear days). The mean annual temperature is 60.70° F. Official weather bureau records over the last 38 years have shown extremes of —7° and 104°. Frosts occur on an average about November 2 and until April 1. Rainfall is well distributed, monthly amounts varying between the averages 2.86 inches in November and 5.38 inches in February and averaging a total of 53.42 inches yearly. Snowfall averages only 2.6 inches per year. The Seneca River, boundary of one side of the area, flows into the Savannah River and thus on to the Atlantic Ocean 220 miles away. The soils, over a subsoil of Cecil red clay, are acid except in fields limed for cultivation. Natural forest is of the oak-hickory association with an admixture of short leafed pine. Willows, poplars, and some sycamores occur in the river bottoms.

The list presented has been made possible largely through determinations, verifications and other assistance by Philip Luginbill, J. B. Wallis, H. C. Fall, W. J. Brown, E. A. Chapin and R. J. Sim. All have helped the writer most generously in his study of South Carolina Scarabaeidae and their aid is gratefully acknowledged. With very few exceptions all species

* Technical Contribution No. 34 from the South Carolina Experiment Station, Clemson College, South Carolina.

have been recorded since 1925. Practically all specimens have been collected by the members of the entomological staff of Clemson College.

The list comprising 147 species of 48 genera of Scarabaeidae is as follows:

Leng No.

13038 CANTHON NIGRICORNIS (Say) Rare. 2 records 1916, 1931.

13042 C. PROBUS (Germ.) Not uncommon. Apr. 3 to Sept. 28.

13047 C. VIGILANS Lec. At light. Uncommon. May 24 to July 26.

13052 C. VIRIDIS (Beauv.) 11 records. Feb. 2 to Aug. 11.

13053 C. PERPLEXUS Lec. Rare. 2 records. May 17 and 28.

13054 DELTOCHILUM GIBBOSUM (Fab.) Rare. A single record. July 5.

13057 CHOERIDIUM HISTEROIDES (Web.) Common. Mch. 9 to Dec. 20.

13058 C. LECONTEI Harold. 7 records. June 9 to Sept. 12.

13059 PINOTUS CAROLINUS (L.) Common. Apr. 17 to Oct. 18.

13062 COPRIS MINUTUS (Drury) Common. Records every month except May, June and Nov.

13072 PHANAEUS VINDEX MacL. Not common. May 1 to Nov. 18.

13078 ONTHOPHAGUS PROTENSUS Melsh. Rare. 3 records. Apr. 9, 15 and July 16.

13080 O. HECATE Panz. Abundant Feb. 18 to Dec. 1.

13084 O. JANUS Panz. Common under rotting fungi. Jul. 6 to Dec. 3.

13084a O. STRIATULUS Beauv. Common under rotting fungi. Apr. 13 to Dec. 23.

13086 O. PENNSYLVANICUS Har. Common under excrement. Mch. 10 to Dec. 1.

21168. O. OKLAHOMENSIS Brown. Uncommon. 3 records. Aug. 24, Sept. 18 and 28.

13087 O. CRIBRICOLLIS Horn. Rare. One record. Feb. 7.

13090 O. TUBERCULIFRONS Har. 3 records. Feb. 28, Apr. 15 and Nov. 19.

13102 AEGIALIA CONFERTA Horn. Rare. One record. April 10.

13111 APHODIUS HAEMORRHOIDALIS (L.) Common. Feb. 28 to Nov. 19.

13119 A. FIMETARIUS (L.) Common every month except June, July and Aug.

13127 A. RURICOLA Melsh. 2 records. April 28 and May 16.

13131 A. GRANARIUS (L.) Common. Jan. 28 to May 1.

13132 A. VITTATUS Say. March 13 to May 1.
13134 A. LIVIDUS (Oliv.) Common. April 13 to Dec. 23.
13147 A. LUTULENTUS Hald. A fall and winter species. Nov. 13 to Jan. 23.
13148 A. STUPIDUS Horn. Nov. 13 to Feb. 18.
13159 A. RUBEOLUS Beauv. 3 records. April 15, May 1, and Aug. 21.
13161 A. CAMPESTRIS Blatchley. Rare. One record, June 23.
13162 A. STERCOROSUS Melsh. 6 records. April 1 to Dec. 1.
13180 A. BICOLOR Say. Oct. 14 to Dec. 23. Not common.
13182 A. SERVAL Say. Rare. One record. April 2.
13184 A. DISTINCTUS (Müll). Common. Nov. 13 to April 24.
13189 A. TERMINALIS Say. Not uncommon. Dec. 1 to March 1.
13201. A. FEMORALIS Say. 6 records. Feb. 10 to April 24.
13204 A. OBLONGUS Say. Rare. One record. March 14.
13216 ATAENIUS ABDITUS (Hald.) 2 records. April 19 and May 3.
13220 A. IMBRICATUS (Melsh). 4 records. May 16 to Nov. 13.
13226 A. GRACILIS (Melsh). 3 records. May 4, June 5, and 14.
13227 A. FIGURATOR Harold. 3 records. June 30, July 11 and Aug. 1.
13231 A. STRIGATUS (Say). 2 records. Apr. 28 and Oct. 14.
21219 A. CONSORS Fall. One record. July 14.
21220 A. ANTICUS Fall. One record. Sept. 28.
13263 OCHODAEUS MUSCULUS (Say). Trap light. 9 records. May 18 to Aug. 23.
13273 O. FRONTALIS Lec. Rare. One in trap light. May 29.
13277 HYBOSORUS ILLIGERI Reiche. 4 trap light records. June 7 to 23.
21231 ODONTAEUS THORACICORNIS Wallis. 3 records. April 16, Oct. 2, and Nov. 24.
21235. O. DARLINGTONI Wallis. 4 records. Jan. 3 to April 13.
13288 BOLBOCEROSOMA FARCTUM (Fab.) 11 records. June 30 to Oct. 30.
13289 EUCANTHUS LAZARUS (Fab). Trap light. April 26 to Sept. 17. Not uncommon.
13291 GEOTRUPES HORNI Blanchard. 8 records. Under fungi. May 26 to Jul. 30.
13293 G. BLACKBURNI (Fab.) Very common. Oct. 13 to March 17.
13294 G. EGERIEI Germ. Not common. 3 records. July 6, 16, and 30.

13299 G. SPLENDIDUS (Fab.) Not uncommon. July 9 to Feb. 26.
13315 LICHNANTHE VULPINA Hentz. One record. June 15.
13320 CLOEOTUS APHODIOIDES (Ill.) Trap light. April 19 to July 23.
13321 C. GLOBOSUS (Say) Trap light. May 15 to June 29.
13329 TROX MONACHUS Hbst. Common. May 13 to Aug. 27.
13330 T. ASPER Lec. 4 records. May 18 to July 23.
13331 T. SUBEROSUS Fab. 3 records. May 16, 18 and 22.
13333 T. TUBERCULATUS (DeG.) 6 records. Feb. 11 to Dec. 19.
13336 T. ERINACEUS Lec. 6 records. April 7 to Dec. 20.
13338 T. UNISTRIATUS Beauv. 2 records. May 16 and Aug. 27.
13340 T. INSULARIS Chev. 4 records. April 13 to May 21.
13341 T. TERRESTRIS Say. One record. April 4.
13342 T. AEQUALIS Say. One record. April 26.
T. sp. (A). Three records. May 18, 16 and 20.
T. sp. (B). One. 14 July.
13354 SERICA VESPERTINA (Gyll.) April 21 to May 16.
13354½ S. ATRICAPILLA Kirby. 3 records. April 21, 26 and 28.
13357 S. INTERMIXTA Blatchley. April 21 to May 13.
13364 S. SERICEA (Ill.) One record. April 16.
13364½ S. PARALLELA Casey. Common. April 16 to June 1.
13372a S. TROCIFORMIS BLATCHLEYI Dawson. 4 records. April 27 to May 31.
19959 S. LECONTEI Dawson. 3 records. April 11, May 10 and 26.
19970 S. MYSTACA Dawson. One record. April 28.
13376 DIPLOTAXIS SORDIDA (Say). Common. March 18 to Oct. 8.
13410 D. LIBERTA (Germ.) Common. March 16 to Nov. 6.
13414 D. EXCAVATA Lec. One record. May 19.
13455 D. HARPERI Blanch. Common. May 2 to July 7.
13496 PHYLLOPHAGA GRACILIS (Burm.). Common. At light. June 26 to Oct. 6.
13496a PH. ANGULATA Glasgow. One record. July 8.
13508 PH. MICANS (Knoch). Common. April 7 to July 21 (Oct. 16).
13509 PH. DIFFINIS (Blanch.). 5 records. (Jan. 6) Mch. 20 to April 28.
13511 PH. FUSCA (Froe.) 8 records. April 15 to May 26.
13512 PH. ULKEI (Smith) Common. April 21 to June 11.
13516 PH. ANXIA (Lec.) Common. April 15 to Aug. 3.

(To be continued)

# The Nearctic Species of Nitela, with a Description of a New Species of Solierella (Sphecidae: Hymenoptera).

V. S. L. Pate, Cornell University.

It was not until Rohwer in 1923 described *Nitela virginiensis* that it was known this genus was represented in the Nearctic fauna. Recent examination of material at the United States National Museum has revealed the presence of another indubitably discrete species which is described herewith.

**Nitela floridana** sp. nov.

♀. 4-4.5 mm. long. Black. Head and pro- and mesonotum nigroaenaeruginosous; pleura and abdomen black nitidous. Clypeus apically, mandibles, palpi, antennae (flagellum infuscated apically), tegulae, and all the legs fulvous. Abdominal sternites fuscous apically.

*Wings* with the nervures testaceous, stigma fuscous. Forewing with the submarginal cell subrectangular, twice as long as broad.

*Head* opaque, microscopically shagreened; clypeus sharply tuberculate discally, rounded out and nitidously subbevelate medioapically; malar space very short, compound eyes almost reaching the base of the mandibles; eyes converging somewhat above; ocelli arranged in a high subequilateral triangle, the ocellocular line about one-third the postocellar line; the scapal basins on the front broadly and shallowly excavate; temples shining, with fine scattered punctures.

*Thorax* with the pronotum, mesonotum and scutellum opaque and microscopically shagreened; pronotum slightly wrinkled transversely, not carinate anteriorly, dorsal surface wide, the length about one-half the ocular line. Mesonotum without either foveate triangular impressions laterally or a fan of rugulae medioapically, subfoveolate there at most. Pleurae shining, subshagreened. Propodeum dorsally with numerous rather regular longitudinal carinulae; posterior face shining, with transverse rugulae, no cuneate enclosure but merely a longitudinal elliptical sulcus medially; lateral faces shining, with a few longitudinal rugulae.

*Abdomen* shining, impunctate, no pygidial area.

♂ unknown.

*Holotype.* ♀, Orange County, FLORIDA. March 9, 1930 (N. W. Knowles) [United States National Museum, Catalogue No. 50487].

*Paratypes.* FLORIDA ♀, Duval County, April 17, 1930 (R. S. Thomas) [U. S. N. M.]; 2 ♀♀, Hillsboro County, January 25, 1930 and March 1, 1930 (B. P. Moora) [U. S. N. M.;] ♀, Citrus County, March 12, 1930 (V. H. Robinson) [U. S. N. M.]; ♀, Volusia County, March 8, 1930 (P. A. Ausley, Jr.) [U. S. N. M]. All the material was taken by the Florida Fruit Fly Trap Survey.

Since the description of *virginiensis* a number of specimens of this species have come to hand which give an idea of the range of the species. These data are consquently recorded below together with several additional characters not given by Rohwer in his original description.

NITELA VIRGINIENSIS Rohwer.

1923. *Nitela virginiensis* Rohwer, Proc. Ent. Soc. Wash. XXV: 100; ♀.

The mesonotum has laterally on each side a triangular foveate depression; the malar space is broad, fully one-half the length of the scape; and the posterior face of the propodeum has a broad cuneate enclosure.

*Distribution.* VIRGINIA ♀, Chain Bridge, September 18, 1921 (J. R. Malloch) [U. S. N. M. Cat. No. 25846]; GEORGIA, 2 ♀♀, Milner (Tanglefoot Trap Posts), June 26, 1933 (T. L. Bissell) [U. S. N. M.]; FLORIDA, 1 ♀, Orange County (Florida Fruit Fly Trap Survey), June 12, 1929 (C. Nelson) [U. S. N. M.]; 1 ♀, Orlando, "In nests of Ants," June 15, 1908 (H. M. Russell) [U. S. N. M.]; NEW JERSEY, 1 ♀, Palisades, "Nest in dead tree", September 12, 1920 (Jos. Bequaert) [Cornell University]; NEW YORK, 1 ♀, Ithaca, July 13, 1925 (P. P. Babiy) [C. U.]

The known Nearctic species may be readily distinguished by the following key. As yet no males are known but they should be separable upon the characters given below.

Pronotum transversely carinate; mesonotum laterally on each side with a triangular foveate depression; submarginal cell rhomboidal; legs black ..... *virginiensis* Rohwer.
Pronotum rounded anteriorly, not transversely carinate; mesonotum without lateral foveate impressions; submarginal cell rectangular, twice as long as broad; legs fulvous ..... *floridana* sp. nov.

Nothing definite is known of the ethology of the American species of *Nitela*. A specimen of *virginiensis* caught by Dr. Bequaert at Palisades, New Jersey, bears the notation "nest in dead tree"; while a specimen of the same species taken by H. M. Russell at Orlando, Florida, has a label "in nests of ants." Dr. Harold Morrison of the Bureau of Entomology has very kindly supplied from its files the information that the latter specimen was collected on pecan twig and that the ant associated with it was *Crematogaster lincolata* (det. Pergande). Probably this association was a purely adventitious one. The European species construct their nests in the stems of briars or in the deserted galleries of wood boring insects and provision the nests with aphids.

**Solierella (Silaon) mirificus** sp. nov.

♂. 5 mm. long. Black; the mandibles whitish yellow, the apices red; antennae with the scape fulvopiceous, pedicel fulvous, flagellar segments one to seven whitish yellow, segments four to six piceous beneath, segments eight to ten piceous, apical segment fulvopiceous; an elongate transverse spot laterally on each side of the pronotum, posterior margins of the pronotal tubercles, the tegulae and axillary sclerites, the postscutellum, the tarsi, all the tibiae externally, greater part of the fore femora save basally above, middle femora apically and beneath, whitish-yellow. Head, thorax and abdomen with short appressed silvery pubescence.

*Wings* clear hyaline, nervures piceous. In the fore wing the basal and transverse median nervures are interstitial and the first recurrent is received by the first submarginal cell. In the hind wing, there are three longitudinal fuscous bands, the first along the anterior margin from the proximal end of the hamuli to the apex, the second and third starting from the transverse cubital nervure and running to the margin following the course of the marginal and cubital nervures respectively.

*Head* opaque, with fine close puncturation. Clypeus medio-apically produced, the produced portion tumid discally and obtusely tridentate apically, discally with a low, polished longitudinal ridge which becomes a sharp keel between the bases of the antennae, becoming weaker above and terminating dorsally in the apex of the V-shaped upper portion of the front which is thus formed by the deeply excavate antennal fossae; a shallow furrow from the anterior ocellus to the apex of the V-shaped upper portion of the front; a low polished ridge dorsally along the inner margins of the compound eyes. Antennae with flagellar segments one to three short and subequal, cylindrical, segments four to six becoming increasingly longer and almost square in cross section and with an increasingly longer spine apically beneath, that of the sixth over half as long as the seventh segment, seventh segment subcubical and longer than the sixth, eighth, ninth and tenth segments subcylindrical and progressively shorter, the apical segment long and tapering, fully as long as the four preceding segments, and with a deep longitudinal sulcus above.

*Thorax* opaque, finely punctate like the head, metapleura and lateral faces of the propodeum glabrous and shining, the latter with fine longitudinal striae; triangular area of the dorsal face of the propodeum glabrous and with a fan of fine wrinkles radiating from the posterior border of the postscutellum; posterior face of the propodeum with a deep shining perpendicular median sulcus. Anterior coxae deeply and roundly excavate internally; each anterior trochanter with a strong incurved hair.

*Abdomen* subshining, with fine puncturation; moderately constricted between the first and second segments; hypopygium with a subquadrate emargination apically.

♀ unknown.

*Holotype:* 1 ♂, 30 miles east of Quijotoa, Pima County, Arizona, 28-29 August, 1927 (J. C. Bradley) [Cornell University, Type No. 1320].

This species belongs to the *chilensis*-group and is apparently most closely related to *S. lucidus* Rohwer but may be readily distinguished from that species as well as any others of the group by the singular structure of the antennae and the anterior coxae and the pattern of the hind wing.

## A New Species of Eperigone (Araneae).

By Helen M. Zorsch and C. R. Crosby.

Since the revision of the genus *Eperigone* by Crosby and Bishop (N. Y. State Mus. Bul. 278, 1928) the following new species has come to hand.

**Eperigone albula**, new species.

Figure 1. *Eperigone albula*. A, palpus of male, mesoventral view; B, embolic division of male palpus; C, tibia of male palpus, dorsal view; D, epigynum.

♂. Length, 1 mm. Cephalothorax pale straw-yellow, broadly

oval, the sides evenly rounded the whole length, the front angles rounded, straight across the front; viewed from the side, steeply ascending behind and then gently arched to the eyes, armed with a median row of 3 stiff, erect hairs. Clypeus nearly straight, slanting slightly forward, armed in the middle with one stiff hair. Sternum very pale straw-yellow, sparsely clothed with fine, stiff, black hairs directed towards the middle. Endites oblique, convergent, tinged with orange. Chelicerae armed with a lateral row of 4 small teeth. Legs and abdomen pale straw-yellow.

Posterior eyes in a straight line, equal, the median separated by the radius and a little nearer to the lateral. Anterior eyes in a very slightly procurved line, the median smaller than the lateral, all subcontiguous.

Femur of palpus nearly straight, armed with a ventral row of 4 stiff hairs. Patella evenly convex above but slightly angulate near tip below. Ratio of length of femur to that of patella as 20 to 7. Tibia deeply excavated dorsally, the part lying next to the cymbium thin and semitransparent, the part back of the excavation produced into a stout process rounded at tip; laterally from this process there is a deep rounded excavation which is bounded on the lateral side by a thin, erect ridge. Paracymbium stout, strongly curved with a slight notch before the tip. The embolic division has the mesal face of the scaphium smooth, triangular, without a mesal tooth; the posterior tooth is lacking, the median tooth black, rectangular when viewed from below, slightly notched at tip; from the base of this tooth a black ridge extends across the body of the scaphium to the anterior tooth where the duct opens just before the beak-like tip.

Female. Length, 1.1 mm. Similar to the male in color, sometimes the abdomen is more or less darkened by the internal organs which show through the integument. The chelicerae lack the lateral row of teeth.

The epigynum is a large, slightly convex plate bounded behind by a raised brownish ridge, the receptacles show through at the sides in front.

*Holotype*, ♂; *allotype*, ♀. Tallulah, Louisiana, Dec. 4, 1933. Four female paratypes from the same place, Mar. 21, 1934. Collected in a Berlese funnel by Dr. J. W. Folsom.

## Dates on which the Immature or Mature Sexual Phases of Ants have been Observed (Hymen.: Formicoidea).

M. R. Smith, State College, Mississippi.

Ants, because of their striking polymorphism, offer many difficulties to the taxonomist. It is especially unfortunate that practically all the keys and descriptive matter on these insects have been based on the workers. Queen ants, it is true, can very often be placed specifically with little or no difficulty because of the strong similarity which they bear to the workers. In many cases, however, this resemblance to the workers is more or less elusive and one would not be courageous but foolhardy in attempting to determine queens specifically, unless one knew that they came from the same colony as did the workers, and that they were not temporary or permanent parasitic forms.

As an illustration of the confusion existing in connection with the proper assignment of males and females to the correct species, no group of ants offers a better example than the driver or legionary ants of the subfamily Dorylinae. In this group there are numbers of species known only from one caste, such as the worker, the queen, or the male. Until the sexual phases are taken in the colony with the workers this confusion will continue to exist. Taxonomists are gradually clearing up this perplexing problem by assigning many species to synonymy as they finally link up the various castes of a species. As a typical example one might cite the case of *Eciton* (*A.*) *pilosus*, which was described by F. Smith from worker specimens in 1858. A year later Smith erected another species, *E.* (*A.*) *mexicanum*, from a collection of male specimens only. For many years the two species stood in literature until 1921 when Wheeler detected that *E.* (*A.*) *mexicanum* was the male of *E.* (*A.*) *pilosus*. Since the latter name was published first, the name *E.* (*A.*) *mexicanum* was very properly relegated to synonymy.

The males of ants are much more difficult to place specifically than either the workers or queens. At the present time one should be very cautious in assigning males to the species unless

one is very sure that they were taken along with the workers of their species. Very probably the specific determination of male ants in the future will be based almost, if not entirely, on a study of their genitalia. Even now there are certain species of ants, for example, *Paratrechina* (*Nylanderia*) sp. the workers and queens of which cannot be specifically determined except by the presence of males, and the determination of the males is based for the greater part on the genitalia.

This paper is being published with the idea that it will make known to some extent the approximate dates of the year in which the sexed forms of many Southern ants have been found. The dates of the appearance of the sexual phases of a given species will vary greatly, depending on the season, the latitude, the altitude, the topography of the soil, and other factors. However, in spite of all these, the records here given should offer some information in regard to the approximate periods in which the sexual phases are to be found.

As one will note in examining the records, the sexual phases have been taken under a number of variable circumstances, which might best be enumerated as follows: (a) periods in which both the pupae and adult stages of the sexual phases have been found in the colony or nest, (b) periods in which the male or the female, or both are found in the colony or nest, but not the sexed pupae, (c) nuptial flights, when either sex or both are leaving the nest, and (d) isolated individuals of one sex, or both, taken singly or in numbers away (remotely) from the nest, as at lights, crawling on the ground, etc. When the ants are found under condition (a) above then there is no doubt that the colony is producing its sexual phases at this time. When the ants are found under condition (b) cited above this seems to be indicative that virgin queens, and unmated males instead of taking their nuptial flight immediately are postponing it until late in the season or until the spring or summer of the following year. Colonies of certain species if examined during the winter will often be found to contain overwintering males or queens under the condition cited under (b). Nuptial flights are generally thought of as mating flights

of the sexual phases of the current year, but perhaps the only safe criterion for establishing this point would be to follow the history of the colony or else examine the nest carefully to see if sexual pupae were present. If sexual pupae were present, one could safely say that a part, if not all, of the adult sexual forms arose from pupae produced during the current season.

A large number of these observations were made by the author. In addition observations have also been made by the following: Messrs. G. W. Haug, E. E. Byrd, J. W. Ward, H. Dietrich, J. P. Kislanko, G. L. Bond, G. C. Broome and others. To these gentlemen I wish to express my appreciation for permission to publish their records.

The Alabama records given in this list were made by Dr. A. H. Sturtevant, the single Louisiana record by Professor O. W. Rosewall. I am very much indebted to both of them for the use of their records.

The symbols used below have the following meaning: M. P. means male pupae; M. means males; Q. P. means queen pupae; and Q. means winged queens.

*January 1-15: Ponera opaciceps* (M., Q.) McHenry; *Crematogaster ashmeadi* (M.) State College; *Camponotus caryae* var. *decipiens* (M., Q.) State College.

*January 16-31: Solenopsis xyloni* (M. P.) State College; *Crematogaster opaca depilis* var. *punctulata* (M.) State College; *Dorymyrmex pyramicus* (M., Q.) State College; *Camponotus caryae discolor* var. *cnemidatus?* (Q.) State College; *caryae* subsp. *rasilis* (M.) Wiggins; *C. caryae* var. *decipiens* (M., Q.) Longview; *C. castaneus* (M., Q.) Starkville; *Prenolepis* (*Nylanderia*) species (M., Q.) State College.

*February 1-15: Camponotus caryae* subsp. *rasilis* (M.) State College; *C. caryae* var. *decipiens* (M., Q.) Ackerman.

*February 16-29: Ponera opaciceps* (M.) Perkinston; *Dorymyrmex pyramicus* (M., Q.) State College; *Camponotus caryae* subsp. *rasilis* (Q.) Moss Point; *Prenolepis* (*Nylanderia*) *vividula* var. (M., Q.) Sessums; *P.* (*N.*) species (M., Q.) Sessums.

*March 1-15: Leptothorax curvispinosus* (Q. P.) State College; *Crematogaster victima* subsp. *missouriensis* (M.) State College; *C. opaca depilis* var. *punctulata* (Q.) State College; *Camponotus caryae* subsp. *rasilis* (M., Q.) Starkville.

*March 16-31: Crematogaster opaca depilis* var. *punctulata*

(Q.) State College; *Pseudomyrma brunnea* (Q.) Lucedale; *Camponotus castaneus* (M., Q.) Ocean Springs; C. *castaneus* subsp. *americanus* (Q.) Quitman; *C. herculeanus* subsp. *pennsylvanicus* (M.) State College.

*April 1-15: Dorymyrmex pyramicus* (M., Q.) State College; *Camponotus castaneus* (M., Q.) Starkville; *Prenolepis* (*Nylanderia*) species (Q.) Adaton; *P.* (*N.*) *parvula* (Q.) State College.

*April 16-30: Solenopsis xyloni* (Q. P.) State College; *Monomorium minimum* (Q. P.) State College; *Crematogaster laeviuscula* var. *clara* (Q. P.) State College, Cedar Bluff; *Iridomyrmex humilis* (Q. P.) Ackerman, (M. P., Q. P.) Columbus; *Tapinoma sessile* (M. P.) Cedar Bluff, Starkville, (Q. P.) Longview, Cedar Bluff, (M., Q.) Longview; *Dorymyrmex pyramicus* (Q.) State College; *Camponotus caryae rasilis* var. *pavidus* (M.) Cedar Bluff; *Lasius* (*A.*) *interjectus* (Q.) Chalybeate, Starkville.

*May 1-15: Leptothorax curvispinosus* (Q.) State College, (M., Q.) Kushla, Alabama; *Solenopsis xyloni* (M., Q.) State College, (M.) Kushla, Alabama; *Aphaenogaster lamellidens* var. *nigripes* (Q.) State College; *Monomorium minimum* (M.) Longview; *Crematogaster victima* subsp. *missouriensis* (M., Q.) Kushla, Alabama; *Iridomyrmex humilis* (M., Q.) Louisville, Columbus; *I. pruinosus* var. *analis* (M., Q.) Starkville, (M. P., Q. P.) Louisville; *Tapinoma sessile* (M., Q.) Longview; *Dorymyrmex pyramicus* (M., Q.) Kushla, Alabama; *Dolichoderus taschenbergi* var. *atterima* (Q.) Kushla, Alabama; *Lasius* (*A.*) *interjectus* (Q.) Booneville; *Prenolepis* (*Nylanderia*) species (Q.) Columbus.

*May 16-31: Ponera trigona* var. *opacior* (M., Q. P., Q.) Aberdeen; *Leptothorax* (*D.*) *pergandei* (M. P., M., Q. P.) Mayhew; *Solenopsis xyloni* (M., Q.) State College (Q.) Starkville; *S. picta* var. *moerens* (M.) Kushla, Alabama; *Aphaenogaster treatae* (Q. P.) Adaton; *Monomorium minimum* (M.) Starkville; *Crematogaster laeviuscula* (M.) Cedar Bluff; *C. victima* subsp. *missouriensis* (Q. P.) Cedar Bluff, State College, Mayhew; *C. lineolata* (Q. P.) Aberdeen; *Pheidole pilifera* (Q. P., Q.) Cedar Bluff; *Ph. dentata* (Q.) Cedar Bluff; (Q. P., Q.) State College, Columbus, (M. P., M., Q. P., Q.) Mayhew, (Q. P.) Louisville; *Ph. vinelandica* (M. P., Q. P.) Cedar Bluff, (M. P., M., Q. P., Q.) State College; *Pseudomyrma pallida* (M. P., Q.) Kushla, Alabama; *Iridomyrmex humilis* (Q.) Meridian; *I. pruinosus* var. *analis* (M. P., M., Q. P. Q.) State College, (M., Q.) Eupora; *Dorymyrmex pyramicus* (M. P., M., Q. P.) State College; *Camponotus caryae* (Q.) State

College; *C. castaneus* (M., Q.) Adaton, Kushla, Alabama; *C.* (*C.*) *mississippiensis* (M. P., M., Q. P.) Cedar Bluff; *Lasius* (*L.*) *interjectus* (M., Q.) State College; *Prenolepis* (*Nylanderia*) species (Q. P., Q.) State College, (Q.) Columbus.

*June 1-15: Ponera trigona* var. *opacior* (M., Q.) Sibley; *Leptothorax curvispinosus* (Q.) Ripley; *Solenopsis xyloni* (M. P., Q. P., M., Q.) Columbus, Wiggins (Q.) Columbus (M., Q.); *Aphaenogaster lamellidens* var. *nigripes* (M.) Starkville; *A. fulva* subsp. *aquia* (Q.) Ripley; *Crematogaster laeviuscula* (M., Q.) Ripley; *C. victima* subsp. *missouriensis* (M., Q.) Columbus; *Pheidole dentata* (M. P., Q. P., M., Q.) Starkville; *Iridomyrmex humilis* (M.) Columbus; *I. pruinosus* var. *analis* (M., Q.) Columbus, Ripley; *Prenolepis* (*Nylanderia*) species (*M.*) Starkville.

(To be continued.)

## Capture of a Species of Colaenis New to the United States (Lepid.: Nymphalidae).

Lately I received from a sister in England a book entitled "The Butterflies of the British Isles" by Richard South, F. E. S. It is a handy little volume containing excellent colored plates illustrating all the species, together with many of the caterpillars and chrysalids as well as the plants upon which they feed. The author states in preparing the book he has been largely guided by a recollection of the kind of information he sought when he himself was a beginner, now some fifty odd years ago. Many captures are reported, with date and locality for the various species.

I believe it would be desirable to obtain, for this country too, a more complete knowledge of the distribution, habits and dates of occurrence of our butterflies. Entomologists should be encouraged to report their captures, especially their rarer ones. Published lists, such as that of Virgil F. Calkins which recently appeared in this periodical, are especially to be commended.

With this prelude I wish it to go on record that on December 19th, 1933, I captured at Sarita, Kenedy County, Texas, a perfect specimen of *Colaenis phactusa*. This is a gaudy insect and even a novice would recognize it as belonging to the Colaenis group. As far as I am able to ascertain this is the first recorded capture within the United States. Dr. Benjamin, who made the identification, says he knows of no previous record of its capture for our region. A. Avinoff says the finding of *C. phactusa* in the limits of the States is certainly a remarkable addition to the fauna of this country.

Apart from the thrill of the capture, what interests me most is, how it came to be so far from its habitat; it must be borne in mind this is a perfect specimen, it would appear to have just emerged from the pupae. Avinoff considers it a wind-blown specimen from Mexico, but remarks, "one would surmise it would be battered and worn and that is why it seems remarkable your specimen is in such a good state of preservation." The writer has had a good deal of experience with wind blown specimens from Mexico, such as *A. amryllis, A. fatima, A. petreus,* and others, but they have always been battered and torn, for this reason I am prone to accept the wind blown theory, and I think John A. Comstock's opinion about solves the problem, when he says, "I see no reason why an original wind blown female specimen from Mexico may not have planted a colony, from which your specimen hatched, especially as other members of the genus feed on *Bassiflora* and think it is safe to presume that it is also one of the Passion Vine feeders, a plant that is common in Texas."

H. Glazbrook, Sarita, Texas.

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### Larva of Nathalis iole Boisd. (Lepid.: Pieridae).

Having reared most of the butterflies found here, I became very desirous of rearing *Nathalis iole.* I had read, or been told, that its food plants were spanish needles and wild marigold but no amount of searching ever led to finding larvae on either of these plants. One day, lifting a chickweed plant which grew by the roadside, I saw a larva feeding and, as in everything but size and in having a rosecolored mid-dorsal stripe it resembled a sulphur larva, I judged it must be near the sulphurs and, as it seemed to be full grown, knew it must be a dwarf, so at once thought "this may be *iole.*" It very soon pupated and later the *iole* butterfly emerged. Later, in October I think, I watched a female ovipositing on chickweed, and secured an egg, finding it light yellow, smooth and spindle shaped.

In the summer of 1933 no *iole* were seen flying until mid August. The first eggs were secured September 20th on robust chickweed plants at the edge of a sandy bean field. The first egg hatched September 22d and the larva was light green with black head and two rows of bristles on dorsal side. It was very difficult to determine the first moults, owing to the very small size of the hatchling, but on October 7th a moult, probably the first, occurred and then the pink mid-dorsal stripe appeared. The next, 2d moult, appeared to be on October 17th and now the larva was quite rosaceous. On the 22d, at 3d

moult, it was 3/8 inch long and very pink. Owing to frosts and scarcity of food supply, the larva did not become a pupa until November 12th, remaining a long time horizontally suspended on a silk mat and supported by a silk thread. The pupa was largely rosecolor at first, later changing to a mealy russet. Other pupae were green or yellowish changing to almost black.

LULU M. BERRY, Vinton, Iowa.

# Entomological Literature

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

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

(*) Papers containing new forms or names not so stated in titles, have an * within parentheses thus (*) following the pagination of reference to paper.

(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.** Titles of papers containing new forms or new names will be indicated by an asterisk within parentheses at end of reference, (*).

*Papers published in the Entomological News are not listed.*

**GENERAL.—Davis, J. J.**—Insects of Indiana for 1933. [Pro. Ind. Ac. Sc.] 1933: 195-201. **Ferris, G. F.**—Setae. [4] 66: 145-150, ill. **Hearle, E.**—Obituary. By A. Gibson. [4] 66: 169-171. **Hicks, C. H.**—Some reared insect parasites and their hosts. [Univ. Col. Studies] 21: 265-271, ill. **Howard, L. O.**—Leland Ossian Howard, Gentleman and Entomologist. By A. W. Lindsey. [BIOS] 5: 37-43, ill. **von Löben Sels, E.**—Some observations on Phalacrus politus and other inhabitants of the heads of the New England aster. [6] 42: 319-327, ill. **Roberts, R. A.**—Some insects collected in Mexico mostly in association with man and animals or animal products. [6] 42: 249-262. **Schafner & Griswold.**—Macrolepidoptera and their parasites reared from field collection in Northeastern part of the U. S. [U. S. Dept. Ag. Misc. Pub.] 188: 160 pp. **Struckland, E. H.**—Parasites, friends of mankind. [76] 1934: 252-264. **Tremo-**

leras, J.—Algo mas sobre la fecha de publicacion de los Carabidos del "Voyage" de D'Orbigny. [104] 6: 37-38.

ANATOMY, PHYSIOLOGY, ETC.—**Bayford, E. G.**—Viviparity in cockroaches. [8] 70: 210. **Butt, F. H.**—The origin of the Peritrophic membrane in Sciara and the honey bee. [5] 41: 51-56, ill. **Flanders, S. E.**—The secretion of the colleterial glands in the parasitic chalcids. [12] 27: 861-862. **George, C. J.**—Excretion in Melipona during metamorphosis. [Jour. Univ. Bombay] Biol. Sci. 1, pt. 5: 58-61, ill. **Haymaker, J. I.**—Swarming beetles. [68] 80: 248-249. **Jorg, M. E.**—La estructura citologica del esbozo ganglionar supraesofagico y de la Cadena neuroganglionar ventral de la oruga de Hylesia nigricans (Hemileuc.). [104] 6: 41-48, ill. **Ludwig, W.**—Die einteiligen genkurven bei Drosophila. [88] 22: 647-648. **Mayer, K.**—Die metamorphose der Ceratopogonidae (Diptera). [52] 3: 205-288, ill. **Myers, J. G.**—Hive-bees do not necessarily sacrifice their lives when they sting. [31] 134: 290. **Petrunkevitch, A.**—New observations on moulting and mating in Tarantulae. [6] 42: 289-296, ill. **Pospelov, V. P.**—The conditions of sexual maturation in the migratory locust. [22] 25: 333-338. **Roonwal, M. L.**—Respiratory system of the white-fly (Dialeurodes dissimilis) (Aleurodidae). [31] 134: 218-219, ill. **Schread & Garman.**—Some effects of refrigeration on the biology of Trichogramma in artificial breeding. [6] 42: 263-283. **Schwanwitsch & Sokolov.**—Wing pattern in butterflies. [31] 134: 420. **Shepard, H. H.**—Relative toxicity at high percentages of insect mortality. [31] 134: 323-324. **Steen, E. B.**—The effect of ultraviolet irradiation upon fecundity of Drosophila melanogaster. [Pro. Ind. Ac. Sci.] 1933: 224-227. **Sweetman, H. L.**—Regeneration of appendages and molting among the Thysanura. [19] 29: 158-161. **Thomas, M.**—A propos de l'instinct et de la psychologie des Papillons. [Lambillionea] 1934: 184-189. **Veronica, Sister.**—Sparrows and bees. [31] 134: 420.

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**The Macrolepidoptera** of the World. Engl. Ed. By A. Seitz. Vol. 6. Fauna Americana, pp. 1065-1072, closes the index to the original descriptions of the Notodontidae and begins the text of the family Megalopygidae, by Walter Hoff; also includes plates 98F, Sphingidae and 152, Notodontidae. Vol. 10, Fauna Indoaustralica, pp. 897-909, closes index to this volume and includes title-page and index to the plates. (The above have just been received at our office.)

## OBITUARY.

The undersigned regrets to announce the decease of Professor Dr. Angel Gallardo, ex-Director of this Museum (1911-1916) and lately Honorary Chief of the Section of Entomology, which occurred suddenly on May 13 last.

The obsequies of Prof. Gallardo, in which the supreme authorities of the government took part, gave place to an imposing manifestation of national grief in homage to his eminent personality (former Minister of Foreign Affairs, Ambassador of the Argentine at Rome, Rector of the University of Buenos Aires, etc.) and whose scientific work in Entomology and general Biology is well known. The *Anales del Museo* will publish his biography in the near future and for this purpose the undersigned will heartily thank those persons who, having had relations, scientific or otherwise, with Prof. Gallardo, will send to him letters or information concerning the deceased.—Martin Doello-Jurado, Director of the Museo Argentino de Ciencias Naturales, Casilla Correo 470, Buenos Aires.

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Acceptance for mailing at the special rate of postage prescribed for in Section 1.
Act of October 3, 1917, authorized January 15, 1921.

# ENTOMOLOGICAL NEWS

**published monthly, excepting August and September, by The American** Entomological Society.

Philip P. Calvert, Ph.D., Editor; E. T. Cresson, Jr., R. G. Schmieder, Ph.D., Associate Editors.

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## Notes on a New Manual of North American Diptera, Comments and Criticisms.

By EZRA T. CRESSON, JR., the Academy of Natural Sciences of Philadelphia.

Of the past students of American Diptera, four stand out pre-eminently as founders and builders: Baron C. R. Osten-Sacken, Dr. Hermann Loew, Dr. Samuel W. Williston and Dr. John M. Aldrich. Osten-Sacken, by his epistolary and personal contact with many of the foremost European dipterists, developed a conservative and prophetic attitude which inspired him to secure North American material, to have it studied by the famous dipterist Loew, and to deposit it in an American institution, the Museum of Comparative Zoology. This collection, which otherwise would have probably remained in Europe and have been inaccessible to most American students, is the most valuable type-collection of North American Diptera. The published records of the labors of these two students are the three volumes of "Monographs of the Diptera of North America," the ten numbers of "Diptera Americae Septentrionalis Indigena," the "Prodrome of a Monograph of North American Tabanidae," and the two editions of the "Catalogue of the Described Diptera of North America." This collection may be considered the foundation of, and these published workers the first important stones in building, American Dipterology. Williston laid another such stone in publishing his "Manual of North American Diptera," which went through three editions and was in such demand that it became unprocurable, except from second hand dealers, about ten years after the appearance of its last edition. The growing interest in this order, in consequence of the appearance of these classics, resulted in the discovery of many new and unrecorded genera and species, a situation which made necessary a revision of our

catalogue. This, another important stone, was laid by Dr. Aldrich with his "Catalogue of North American Diptera," the demand for which was such that it was practically out of print in less than twenty years. These four students, by their works and profound opinions in this field have given us a nucleus to which it will be well for us to adhere, to follow the precepts they have given us, ignoring the frivolities and erraticisms which are so prevalent today and which threaten to weaken the structure began by these excellent builders.

We now have in embryo another stimulus in "The Families and Genera of North American Diptera," by C. H. Curran. This work, modeled in many respects after Williston's Manual, will, or should, be another important stone in our building, and will no doubt have much influence in the study of this order. It is a large octavo size book of 512 pages and very well printed, with the great majority of its illustrations clear and instructive. Many of the latter are taken *in toto* from Williston's Manual, many are from the pen of the author, others from recently published synopses. A colored plate illustrates a few of the conspicuous species of several families. There are chapters on collecting, the care of collections, on some economic species, morphology, classification, and finally a glossary of terms used in dipterology, the latter comprising fourteen pages and some pertinent illustrations. The copious index of seventeen pages not only refers to the page on which a particular genus is given, but the more important synonyms are referred to the proper genus.

The keys had, of necessity, to be enlarged to include the many additional families and genera, and here we have a very commendable feature—the references, by footnotes, to the published revisions of some of the genera, thus giving the student access to the literature by which he may be able to carry his identifications to species. It also was a laudable gesture on the part of Dr. Curran to place the excellent portrait of Dr. Williston as the frontispiece. In dedicating "this book to his memory" the author pays him, as he rightly should, due respect, by acknowledging the influence that profound student

and teacher has exerted. Such a work as this would be almost that of a life-time were it not that Williston had paved much of the way. It is refreshing to see that the well-known Meigen 1803 generic names, upon which many families are based, are retained; thus placing a damper on the recent attempts to overthrow many of these long established names. I am also glad to see that the author prefers to follow the simple nomenclature of Osten-Sacken and Williston as opposed to the recent endeavors to homologize the morphological parts in the various orders of insects, resulting in the creation of many long and unfamiliar terms.

Students, particularly the novitiate, will probably encounter some difficulties working with the keys. Some of the terms used are not self-explanatory, nor are they to be found in the appended glossary (*e.g.*, stigmatical bristles), and some of the characters used are not very satisfactory. However the latter cannot always be avoided, although the advice of students who are known to be authorities in the groups concerned would have probably materially reduced the number of such cases. The author's remarks under classification will bear much consideration and the student or reader will at once be aware of incongruities after a perusal of the mainpart of this work. His definition of good and bad descriptions is well stated, but I cannot see that he had followed his precepts in regard to the new genera and species he herein proposes. He says "there is nothing more pleasing than a good description and nothing more aggravating than a poor one." In my opinion, a good description not only contains a statement of the essential morphological and color characteristics, but includes information as to what the specimen is, when and where captured and by whom, and where at present deposited, if these data are available, as they usually are. Many of the new genera herein erected are based on poorly described genotypes of which nothing is stated except "n.sp." and with a general locality as its habitat, the latter sometimes omitted, leaving the assumption that the specimen is at least from somewhere in North America. He warns against too great specialization, but states that the

collector (he probably means student) of a single family "may produce a monumental work . . . while the general worker is not liable to accomplish lasting results." This is well taken and the idea should be seriously deliberated on by some of our taxonomists. Apropos of this sentiment, let us take a serious student, who, in working up a faunistic collection, encounters species with which he is not materially familiar and must rely on the literature alone, and his acquaintance with the latter may not be very extensive. Would it not be better for him to turn such material over to the proper authorities for identification with the privilege of describing the new forms? This is rather idealistic but if actually followed would do much towards the advancement of our science. Dr. Curran's attitude toward subgenera, subspecies and varieties is of course unreasonable. At least such opinions should not be so positively expressed in a work of this nature. These terms when properly used, which we must acknowledge is not always the case, represent certain rational groupings.

The name of a family is that first proposed for the group containing the type genus. Article 4 of the International Rules of Zoological Nomenclature states that "the name of a family is formed by adding the ending idae . . . to the stem of the name of its type-genus." [1] The type-genus is thus automatically designated by tautonomy; and once the type-genus is so established no other genus is valid as such for that group. The fact that the Commission on Nomenclature used the term "type-genus" implies that it recognized such an entity. As the type of a genus is not necessarily its oldest species (in name), so the type of a family is not its oldest genus, but that used in the construction of the name of the group to which it belongs. One of the first authors to divide the species of Linnaeus and Fabricius into groups, many of which are recognized as families to-day, was Latreille in 1809. He, however, did not use the orthodox family endings, but called his groups families and named them after particular genera. Hence we

[1] See also Oberholser's The Nomenclature of Families and Subfamilies in Zoology (Science, n.s., LIII, pp. 142-147, 1920.)

find Tabanii containing the genus *Tabanus;* Bombylarii containing *Bombylius.* Subsequent authors have with few exceptions retained these type-genera as bases of family concepts; but recently there is a tendency to use the oldest genus as the type, thus subjecting the family concept to continual change every time a still older genus is included.

Apropos of the above, I here register my protest against the use of Trupaneidae for TRYPETIDAE, Lauxaniidae for SAPROMYZIDAE, Phyllomyzidae for MILICHIIDAE, Metopidae for SARCOPHAGIDAE, Tetanoceridae for SCIOMYZIDAE. The substitution of Otitidae for Ortalidae cannot very well be avoided on account of the previous use of the name *Ortalis* in Ornithology; but really little or no confusion would result in its retention in Entomology. The above-mentioned changes are recognized in the present manual and are based on the oldest genus scheme, but the author is not consistent in this matter. Why use Opomyzidae when *Anthomyza* and *Geomyza* are both ten years older? *Geomyza* has had the longer use of the two and should be retained as the type-genus. Also, why use Ephydridae instead of Ochtheridae, when *Ochthera* is ten years older than *Ephydra.* I will take this opportunity to call attention to another attempt to change a well-established family name. In the latest, the third edition of Imm's Entomology, Anthomyiidae is substituted for MUSCIDAE. If the Anthomyiidae do not deserve recognition as separable from the Muscidae, their name should give way not only to the older family name but to the older type-genus. I sometimes think the following rules would be good ones to establish: Do not change any name that has been in constant use for ten years, unless absolutely necessary to avoid confusion. A name proposed in a publication having a general normal circulation should have preference over one published in a medium having relatively no circulation or only among a few interested students. A name accompanied by a good description and figure shall have preference over one so poorly described that it is unrecognizable until the type-specimen has been redescribed if the latter exists.

Although the validity of most of the new genera and species, which the author of this manual has unfortunately here pro-

posed, cannot be ignored, the manner in which they have been presented is certainly open to severe criticism and is not befitting an advocate of good descriptions. In one instance I note that a new genus is proposed for a species from the East Indies. Surely a manual of North American Diptera is no place in which to describe East Indian genera.

On the last page of this manual is imprinted "Published, August 25, 1934." I have also received advice from the publisher that over one hundred copies were mailed and expressed on that date. A copy was received by The American Entomological Society on August 27th by parcel post bearing the post office cancellation dated August 25, 1934. The printing is the work of The Ballou Press, owned by the well-known entomologist, Mr. Charles A. Ballou, Jr. The binding is exceptionally practical, done in such a manner that the book will readily stay open at any page. The work may be purchased of John D. Sherman, Jr., Mount Vernon, N. Y., at $7.50, plus postage, per copy.

## Dates on which the Immature or Mature Sexual Phases of Ants have been Observed (Hymen.: Formicoidea).

M. R. Smith, State College, Mississippi.

(Continued from page 251.)

*June 16-30: Ponera trigona* var. *opacior* (Q.) Oxford, (M.) Louisville; *Eciton* (*A.*) *pilosus* (M.) Wiggins; *Leptothorax curvispinosus* (M., Q.) State College, (Q.) Ripley; *L. wheeleri* (M. P., M. Q.) Sturgis; *L.* (*D.*) *pergandei* subsp. *flavus* (M.) Walnut; *Solenopsis xyloni* (Q.) State College, (M.) Lexington, (Q. P.) State College, (M.) Clarksdale, (M.) State College; *Strumigenys louisianae* subsp. *laticephala* (M.) West Point *Aphaenogaster treatae* (Q.) Walnut; *Monomorium minimum* (M.) Oktoc, Starkville, Itta Bena, Lexington; *Pheidole dentata* (M., Q.) West Point, (Q.) Ripley, Walnut; *Ph. vinelandica* (M.) West Point, (Q.) Ripley; *Ph. metallescens* subsp. *splendidula* (M., Q.) Sibley; *Ph. dentigula* (M. P., M.) Louisville; *Dolichoderus mariae* (Q.) Louisville; *Camponotus herculeanus* subsp. *pennsylvanicus* (Q.) Ripley; *Formica pallidefulva* subsp. *schaufussi* (M.) Dossville.

*July 1-15: Solenopsis pergandei* (Q.) Quitman; *Strumigenys louisianae* (Q.) Sibley; *Aphaenogaster lamellidens* var. *nigripes* (M., Q.) Cruger; *A. treatae* (M., Q.) Williamsville; *Crematogaster laeviuscula* (M., Q.) West Point; *Myrmecina graminicola* subsp. *americana* (M.) State College; *Iridomyrmex pruinosus* var. *analis* (Q.) Williamsville; *Dorymyrmex pyramicus* (M.) Williamsville; *D. pyramicus* var. *flavus* (M., Q.) Wiggins; *Pogonomyrmex badius* (M., Q.) Quitman.

*July 16-31: Sysphincta pergandei* (M.) Ripley; *Solenopsis xyloni* (M., Q.) Lexington; *S. molesta* (Q.) Ackerman, Longview, Starkville; *Strumigenys louisianae* subsp. *laticephala* (M.) West Point; *S. membranifera* subsp. *simillima* (Q.) Columbus; *Crematogaster ashmeadi* (M.) Longview; *C. lineolata* (Q.) Ripley; *Pheidole dentata* (Q.) Sessums, (M.) Cedar Bluff, (M. Q.) Longview; *Ph. vinelandica* (Q.) Duck Hill; *Ph. metallescens* subsp. *splendidula* (Q.) Ackerman; *Tetramorium* (*T.*) *striatidens* (Q.) West Point; *Pogonomyrmex badius* (Q.) Columbus; *Myrmecina graminicola* subsp. *americana* (M.) State College; *Brachymyrmex* sp. (Q.) Ripley.

*August 1-15: Ponera trigona* var. *opacior* (Q.) West Point; *Ph. pilifera* (M.) Muldon; *Ph. dentata* (M., Q.) Pickens, (M.) Belzoni; *Pseudomyrma flavidula* (Q.) Fayette; *Brachymyrmex* sp. (M., Q.) Fayette.

*August 16-31: Euponera gilva* (M.) Aberdeen; *Proceratium croceum* (M., Q.) Aberdeen; *Sysphincta pergandei* (M.) Artesia; *Monomorium pharaonis* (M.) West Point; *Camponotus caryae* var. *decipiens* (M.) Columbus; *Lasius niger* var. *americana* (M., Q.) West Point.

*September 1-15: Solenopsis xyloni* (Q.) Osborn, (M. P., M., Q.) Louisville; *Tetramorium guineense* (Q.) Pascagoula; *Pogonomyrmex badius* (Q.) Wiggins; *Stenamma* sp. (Q.) Weir; *Dolichoderus plagiatus pustulatus* var. *beutenmuelleri* (Q. P., Q.), Biloxi.

*September 16-31: Ponera coarctata* subsp. *pennsylvanica* (Q.) Corinth.

*October 1-15: Solenopsis xyloni* (Q.) West Point; *Iridomyrmex pruinosus* var. *analis* (M.) Mendenhall; *Camponotus caryae* (Q.) Jackson; *Lasius niger* var. *americana* (Q.) West Point.

*October 16-31: Leptothorax fortinodis* (M.) State College; *Solenopsis xyloni* (M., Q.) Mendenhall; *Iridomyrmex humilis* (M. P., M.) Aberdeen, (M.) Eupora; *Tapinoma sessile* (M.) Sturgis; *Camponotus caryae* var. *decipiens* (M., Q.) Starkville.

*November 1-15: Ponera opaciceps* (M., Q.) Quitman; *Formica pallide-fulva* subsp. *schaufussi* (M., Q.) Pascagoula.

*November 16-30: Ponera opaciceps* (Q.) Lucedale, (M.) Quitman; *Eciton* (*A.*) *schmitti* (M.) Baton Rouge, Louisiana; *Solenopsis xyloni* (M. P.) New Albany; *Iridomyrmex humilis* (M.) Quitman.

*December 1-15: Ponera opaciceps* (M., Q.) Ocean Springs.

*December 16-31: Camponotus caryae rasilis* var. *pavidus* (Q. P.) Lucedale.

## General Conclusions.

One should be very slow in drawing too definite conclusions from the data presented above. In some instances there are too few records; in others there is so much variation in the dates that nothing very conclusive is offered; again, the species have been taken from such widely remote localities and from such different types of nests that the matter is made even more difficult.

In order, however, to bring out the most outstanding points in connection with the records, it would be best to discuss the subject under the following heads: (a) those ants which produce their sexual forms early in the season, (b) those ants which produce their sexual forms late in the season, and finally (c) those ants in which some of the males and females overwinter in the nest.

Some of the species which produce one or both of their sexual forms early in season are as follows: *Monomorium minimum* Buckley, *Crematogaster laeviuscula* var. *clara* Emery, *C. victima* subsp. *missouriensis* Emery, *Pheidole dentata* Mayr, *P. vinelandica* Mayr, *Pseudomyrma pallida* F. Smith, *Iridomyrmex humilis* Mayr, *I. pruinosus* var. *analis* Andre, *Tapinoma sessile* Say, *Dorymyrmex pyramicus* Roger, *Camponotus* (*Colobopsis*) *mississippiensis* M. R. Smith, *C.* (*C*) *pylartes* var. *fraxinicola* M. R. Smith and others.

Among the species which usually do not produce their sexual phases until late in the season may be mentioned: *Sysphincta pergandei* Emery, *Proceratium croceum* Emery, *Euponera gilva* Roger, and *Lasius niger* var. *neoniger* Emery. This habit seems to be more common in the subfamily *Ponerinae* than in any other subfamily of ants. That in some instances at least the sexual forms of certain species of *Ponerinae* are produced

early is shown by the records of *Ponera trigona* var. *opacior* Forel, which produced queen pupae as early as the latter part of May.

It seems to be a very constant custom among many species of *Formicine* ants for the sexual phases to overwinter in the nest. I have observed this consistently among *Camponotus herculeanus* subsp. *pennsylvanicus* DeGeer, *C. castaneus* subsp. *americanus* Mayr, *C. Caryae* Fitch, *C. caryae* subsp. *rasilis* Wheeler, *C. caryae rasilis* var. *decipiens* Emery, *C. caryae rasilis* var. *enemidatus* Emery. *Prenolepis imparis* Say and its various varieties also have this habit as well as *Paratrechina* (*Nylanderia*) species. I was greatly surprised, however, to learn that some of the *Dolichoderinae* also frequently overwinter as adult males and queens as for example *Dorymyrmex pyramicus* Roger. In rare instances we have found sexed forms of Myrmicine ants over-wintering in the nest, as *Crematogaster ashmeadi* Mayr and *C. opaca depilis* var. *punctulata* Emery. In the southern part of Mississippi winged queens and males of *Ponera opaciceps* Mayr have been taken from the nest during January and February, which are our most severe winter months.

In winter the immature stages are usually represented by larvae.

## Applied Entomology in Public Health.

The Rockefeller Foundation expended for public health work during 1933 the sum of $3,286,063.01. It supported laboratories for yellow fever research in Lagos, Nigeria; Bahia, Brazil; and New York City. It completed, in cooperation with various governments of West Africa, an extensive survey which disclosed the areas in Africa where yellow fever occurs; assisted the governments of Brazil and Bolivia in an extensive program of yellow fever control; conducted experiments and studies on the vaccine and virus of yellow fever and on the mosquito vectors of this disease; aided three states in the United States and seventeen foreign governments in antimalaria work; carried out malaria studies and surveys in various parts of the world and engaged in many other enterprises designed to improve public health.

## A List of Scarabaeidae Collected at Clemson College, South Carolina (Coleoptera).

By O. L. Cartwright, Clemson College, South Carolina.

(Continued from page 240.)

13517 Ph. drakei (Kirby). 9 records. April 21 to July 6.
13519 Pn. barda (Horn). 3 records. March 26, April 19, and May 3.
13520 Ph. marginalis (Lec.) 7 records. April 24 to June 3.
13523 Ph. forsteri (Burm.) Very common. (Feb. 15), April 2 to July 15.
13525 Ph. luctuosa (Horn) One record. April 26.
13532 Ph. hirsuta (Knoch). Common. March 24 to June 11.
13536 Ph. villifrons Lec. One record. April 26. B. F. Driggers*.
13538 Ph. hirticula (Knoch). Common. April 19 to July 14.
13540 Ph. ilicis (Knoch). Common. April 15 to July 25.
13542 Ph. aemula Horn. Rare. One record. June 27.
13544 Ph. crenulata (Froelich). 6 records. April 17 to June 26.
13556 Ph. quercus (Knoch). A late summer species. Common. June 28 to Sept. 15.
13563 Ph. tristis (Fab.). 2 records. April 14 and 19.
19982 Ph. foxii Davis. 4 records. April 24 to 28.
13653 Dichelonyx fuscula Lec. Common on buds of oak. April 12 to 27.
13686 Macrodactylus angustatus (Beauv.). June 25 to July 27.
13695 Hoplia trivialis Harold. Common. March 14 to April 21.
13697 H. modesta Hald. Common on flowers of swamp dogwood, *Cornus stricta,* Lam., May 11 to June 18.
13709 Anomala binotata Gyll. Mch. 3 to May 4.
13715 A. minuta Burm. Rare. One record, Aug. 2
13720 A. flavipennis Burm. 3 records. June 9 to 12 (trap light).
13730 A. undulata Melsh. 11 records. May 28 to July 7.
13731c A. saginatula Casey. 3 records. April 19 to May 4.
13739 Pachystethus marginata (Fab.). 4 records. June 22 to July 30.
13741 P. lucicola (Fab.). One record. June 15.
13742 P. oblivia (Horn). 3 records. June 17 to 21.
13747 Strigoderma arboricola (Fab.) May 28 to July 3.

* Record from: Luginbill, Philip—"The Beetles of the Genus Phyllophaga Inhabiting South Carolina." Ann. Ent. Soc. Am. v. XXI, 1928, p. 89.

13750 STRIGODERMELLA PYGMAEA (Fab.) 2 records. July 30 to Aug. 7.
13757 PELIDNOTA LUTEA (Oliv.) 2 records. July 1 and 12.
13757b. P. LUTEA var. PALLIDIPES Casey. Common. June 3 and July 25.
13769 COTALPA LANIGERA (L.) 8 records. April 8 to May 17.
13787 POLYMOECHUS BREVIPES Lec. 11 records. July 13 to Aug. 17.
13801 OCHROSIDIA IMMACULATA (Oliv.) Common. June 15 to Aug. 12.
13829 DYSCINETUS TRACHYPYGUS (Burm.) 7 records. April 15 to Oct. 2.
13835 EUETHEOLA RUGICEPS (Lec.) Common. Feb. 25 to Nov. 15.
13843 LIGYRUS GIBBOSUS (DeG.) Common. April 13 to Aug. 20.
13868 APHONUS TRIDENTATUS (Say). Not uncommon. July 8 to Sept. 2.
13878 A. CASTANEUS (Melsh.) 2 records. July 2 and 28.
13897 STRATEGUS PINORUM Casey. June 6 to Sept. 27.
13902 XYLORYCTES SATYRUS (Fab.) One record. Sept. 14.
13908 DYNASTES TITYUS (L.) 6 records. June 12 to Aug. 2.
13911 PHILEURUS TRUNCATUS (Beauv.) 17 records, all from within houses. May 8 to Oct. 11.
13918 P. CASTANEUS Hald. 3 records. July 7, Oct. 20 and 30.
13931 COTINIS NITIDA (L.) Common. June 23 to Aug. 12.
13937 EUPHORIA FULGIDA (Fab.) 2 records. April 28 and May 8.
13938 E. HERBACEA (Oliv.) Rare. One record, July 11.
13940 E. INDA (L.) 6 records. March 18 to April 18.
13953 E. SEPULCHRALIS (Fab.) Common. April 6 to Nov. 30.
13955 E. SCOLOPACEA Casey. Common. April 2 to Sept. 28.
13972 CREMASTOCHEILUS HARRISI Kby. 5 records. March 12 to May 7.
13973 C. CANALICULATUS Kby. One record. April 21.
13980 C. VARIOLOSUS Kby. One record. June 9.
14010 OSMODERMA SCABRA (Beauv.) Rare. One record, July 15.
14015 TRIGONOPELTASTES DELTA (Forst.) Common. May 24 to Aug. 15.
14016 TRICHIOTINUS PIGER (Fab.) Common. May 6 to July 13.
14025 T. AFFINIS (G. & P.) One record. May 22.
14027 T. BIBENS (Fab.) 6 records. May 22 to June 22.
14030 VALGUS SETICOLLIS (Beauv.) 5 records, March 19, April 21 (Oct. 14).
14031 V. CANALICULATUS (Fab.) Common. Feb. 26 to June 24.

## New Species of Terapus from North America (Histeridae, Coleoptera).

By Howard E. Hinton, Berkeley, California.

The genus *Terapus* Mars. is typically neotropical. Three species have been described from North America, *T. muniszechi* Mars. (1862) from Mexico, *T. infernalis* (Fall) (1907) from California, and *T. mexicanus* Mann (1926) from Mexico. In this paper two additional species are described from Mexico.

**Terapus balloui,** new species.

Rufo-piceous, shining. Head concave, sparsely, coarsely, irregularly punctate; front concave, with a shallow impressed line extending to base of labrum; clypeus and labrum smooth, anterior margin of labrum truncate, piceous, sparsely pubescent; sides in front of eyes thickly margined, the margins diagonal above and extending to the median impressed line.

Pronotum one-fourth wider than long, sides nearly straight and slightly convergent towards apex; disk moderately densely, finely, evenly and setigerously punctate; anterior margin broadly and deeply emarginate at middle; anterior angles broadly rounded and slightly reflexed, posterior angles obtusely angulate; anterior marginal lobe slightly longer than posterior and both bordering a depressed, flat, triangular area in the middle of which is a small, rounded tubercle bearing a few yellow trichomes.

Elytra broader than long, humeri gibbous, basal margin with several short, shallow impressions; surface coarsely punctate, sparsely pubescent with the pubescence arranged indefinitely in four rows on each elytron.

Propygidium transversely hexagonal, sparsely, moderately finely, evenly, setigerously punctate, base finely tuberculate, opaque and separated from the apical portion by a deeply sinuate line; apex with a low transverse carina divided at middle. Pygidium about as long as broad, sparsely, moderately finely, evenly and setigerously punctate. Ventral surface moderately finely, setigerously punctate; prosternal keel arcuate opposite coxae and slightly broader anteriorly; no dividing line between meso- and metasternum, mesosternum with a finely impressed, interrupted line.

Legs short, stout, slightly more rufous than body; femora stout, concave on ventral edge; tibiae dilated, broadly triangular, concave on ventral edge, with a few short spines on apex; hind femora broad, nearly twice as stout as middle femora and with

a transverse, rounded lobe at base of dorsal border, on the basal half of the outer side is a large, gradually rounded tubercle; hind tibiae with the apical edge straight, not half as long as dorsal edge, ventral longer than dorsal, extending for about half the length of the inner side of the dorsal edge is a narrow, concave area containing golden trichomes, on basal one-fifth of ventral half of outer lobe is a long, prominent tubercle. Length, 2 mm.; breadth, 1.2 mm.

The *type* (No. 3747 Mus. Calif. Acad. Sci.) and seven paratypes were collected by the writer at Real de Arriba, District of Temascaltepec, MEXICO, in July, 1932, at an elevation of 6,300 feet. Two additional paratypes were collected by J. C. Hinton at the same locality and in the same month as above. Five additional paratypes were taken by R. L. Usinger and the writer in July, 1933, at the same locality as above. All specimens were taken in the nests of *Pheidole kingi* Pergande. Paratypes are deposited in the collections of Dr. W. M. Mann and Mr. C. A. Ballou for whom the species is named.

This species is closely related to *T. mexicanus* Mann, but it may be separated by the presence on the outer face of the posterior tibiae of a large, prominent tubercle.

**Terapus nigritus,** new species.

Black, shining. Head concave, very coarsely and very densely punctate. Front concave, with a smooth median line extending to base of labrum; sides in front of eyes thickly margined, margins diagonal above and extending forward as carinae bordering the median impressed line; clypeus and labrum coarsely and densely punctate.

Pronotum one-half wider than long, slightly narrower in front; disk coarsely and densely punctate, anteriorly and at sides more densely punctate; anterior angles truncate, strongly reflexed; anterior marginal lobe longer and wider than posterior; both lobes border a depressed, flat, triangular area in the middle of which is a very large, round tubercle bearing a thick brush of goldern trichomes.

Elytra coarsely and densely punctate, slightly broader than long; humeri gibbous, with a prominent carina extending on the sides of the elytra to the apex which is truncate; in the middle of the elytra next to the suture is a small, smooth, glabrous, highly polished area.

Propygidium transversely hexagonal, coarsely, very densely punctate; transverse carina near apex thickened and divided at

middle forming two approximate tubercles. Pygidium slightly broader than long, coarsely and densely punctate. Ventral surface coarsely, densely punctate and sparsely pubescent; prosternal keel very coarsely punctate, arcuate opposite the coxae and strongly broadened anteriorly; no dividing line between meso- and metasternum, meso-metasternum with an impressed and interrupted, longitudinal line; meso-metasternum and middle of abdominal segments more sparsely and finely punctate.

Femora stout, concave on ventral edge; tibiae dilated, broadly triangular, ventral edge grooved for entire length; hind femora twice as stout as middle femora, outer-side strongly convex, with a transverse lobe at basal border; ventral edge of hind tibia half as long again as dorsal edge and twice as long as apical edge. Length, 2.5 mm.; breadth, 1.8 mm.

The *type* (No. 3746 Mus. Calif. Acad. Sci.) and one paratype were collected by R. L. Usinger and the writer at Real de Arriba, District of Temascaltepec, MEXICO, on July 9, 1933, at an elevation of 6,300 feet. Both specimens were taken in the nests of *Pheidole kingi* Pergande.

*Terapus nigritus* has the proportionally short legs of *T. mexicanus* Mann and *T. balloui* Hntn., but the robust body and dense, coarse punctation would place it close to *T. mniszechi* Mars. and *T. infernalis* (Fall), from both of which it differs in its black instead of rufo-piceous color. The following table will serve to separate the species:

*A Key to the Species of Terapus North of South America.*

1. Hind tibia with a very prominent tubercle on the outer face ..... *T. balloui* Hntn.
   Hind tibia without a prominent tubercle on the outer face ..... 2.
2. Inner face of hind tibia only slightly concave; outer face only slightly convex; pronotum finely and sparsely punctate ..... *T. mexicanus* Mann
   Inner face of hind tibia rather strongly concave; outer face strongly convex; pronotum at least moderately densely punctate ..... 3.
3. Basal portion of hind tibia not strongly dilated for about one-fourth the length of the tibiae ... *T. infernalis* Fall
   Hind tibia dilated from near the base..... 4.
4. Rufo-piceous; upper surface moderately densely pubescent with long hairs ..... *T. mniszechi* Mars.
   Black; upper surface pubescent only with very fine, short hairs ..... *T. nigritus* Hntn.

## The Status of the Genus Rhinopsis, with Description of a New Species from Texas (Hymen.: Ampulicidae).

By J. Chester Bradley, Cornell University, Ithaca, New York.

*Rhinopsis* was founded by Westwood for his species *abbottii* which is a synonym of *canaliculata*. Authors have usually looked upon its sole distinguishing character as being the absence of the first transverse cubital vein, and since this vein is not constantly present in some species of *Ampulex*, and also since some of the forms that lack it do not seem to be closely related in other respects to others, there has been a tendency to consider *Rhinopsis* an unnatural group, which should not be recognized even as a subgenus.

Authors seem to have overlooked a character which the type of *Rhinopsis* shares with all of the known new world species that possess only two submarginal cells, namely that the first section of the subdiscoidal vein (m of the Comstock-Needham terminology) is continuous with the second recurrent, there being no trace of a second section of the subdiscoidal (longitudinal $M_2$ of Comstock and Needham). The continuous subdiscoidal and second recurrent veins enclose an elongate third discoidal cell which is gradually narrowed toward the apex and there more suddenly terminated by the upcurving second recurrent.

This character I have observed in *canaliculata* Say, in *ferruginea*, n. sp., in *trigonopsis* Smith, and it is shown by the figure of *maculicornis* Cameron in the Biologia Centrali Americani to obtain in that species. There are no other new world species known to have only two submarginal cells.

In all of the other *Ampulex* that I have seen, new or old world species with three submarginal cells, or old world species with two, including the European *fasciata* Jurine, the second section of the subdiscoidal vein is present, the first meets the second recurrent at an angle, and the third discoidal cell is not gradually narrowed but terminated by the more or less rectangular second discoidal vein.

It therefore seems that our American species allied to *canaliculata* form a natural group which may be properly accorded at least subgeneric rank.

KEY TO SUBGENERA OF AMPULEX.

Subdiscoidal and second recurrent veins of fore wing continuous, not meeting at an angle, the apical section of the former vein wanting. First transverse cubital vein wanting. Color black or ferruginous, never strongly metallic. Neotropical and Nearctic Regions, *Rhinopsis* Westwood.

Subdiscoidal and second recurrent veins not continuous, the latter inserted at an angle on the former, which it divides into a basal section and an apical section. Two or three submarginal cells. Colors usually, but not always strongly metallic. Old and new worlds. . . . .*Ampulex* Jurine.

Specimens of the only known nearctic species of *Ampulex* are looked upon as such rarities that the discovery of a second form is of considerable interest. The form hereunder described is very closely related to *A. canaliculatus* Say, and differs chiefly in being, except for the abdomen, entirely yellowish ferruginous, instead of black. Structurally it differs from a specimen of *A. canaliculata* before me but slightly, chiefly in the sculpture of the mesopleura, in two pits on the vertex, and in the fact that the petiole appears a little longer. Whether these are individual or persistent distinctions, it will take additional specimens to decide. If not a morphologically distinct species, it doubtless represents a geographical color form.

**Ampulex (Rhinopsis) ferruginea** n. sp.

♂. Entirely ferruginous except the abdomen beyond the petiole, which is piceous and polished, and the petiole which is testaceous. Wings hyaline, a fuscous area abruptly delineated basally across the wing beneath the stigma, but gradually disappearing before the apex; a small cloud also at the apex of the submedian cell. Length 8 mm.

Head roundly but strongly contracted behind the eyes, the occiput not distinctly margined, but inferiorly with a weak tubercle or suggestion of the termination of a carina (*canaliculata* has these and the bordering carina of the occiput a little stronger); inner margins of the eyes very slightly divergent toward clypeus; clypeus strongly convex medially, depressed beneath each antenna, a trace of a median carina visible on its crest only at extreme apex, where it becomes a short apical mucronate tooth, the apical border otherwise rounded; surface of clypeus minutely pubescent, and with some longer hairs apically, the median convex part crossed by a faint transverse impression (strong in *canaliculata*); mandibles slender, attached normally beneath the eyes, with a very short malar space; dis-

tance from foramen magnum to buccal orifice two-thirds the length of the third antennal segment; distance between ocelli one-half of the minimum distance between them and compound eyes; minimum width between eyes four-fifths the length of segment 3 of antenna; this about six times longer than the pedicel, two and one-half times longer than the scape; segments 4 and 5 about equal to each other and to the scape, the two together about one-eighth shorter than segment three; front with a round lobe overlying the base of each antenna, leading above into a very short and weak frontal carina; no median carina; front and vertex opaque, with evenly scattered fine punctures; a pit behind each posterior ocellus (absent in *canaliculata*).

Pronotum longer than wide, the anterior half divided by a median sulcus into a right and left rounded ridge, the dorsal surface with weakly indicated suggestion of fine rugosity, anteriorly this is only on the summits of the ridges, but covers the entire dorsal surface posteriorly; lateral surfaces smooth and impunctate. Mesonotum with sharply defined parallel parapsidal furrows, extending from anterior to posterior margins, with weakly defined lateral furrows on the posterior half, and with two short furrows between the parapsidals on the anterior margin; surface smooth, and chiefly between the parapsidal furrows with minute ill-defined punctulation, regularly but not closely distributed, just discernible at x35 magnification; a pit-like depression near the postero-lateral angles, which are in turn somewhat elevated, slightly hood-like. Scutellum with deep lateral foveae, its disc sculptured like the middle section of the mesonotum; postscutellum impunctate; mesopleura obsoletely rugulose, in places somewhat reticulate, but without distinct rows of punctures as in *canaliculata*. Epicnemial carina sharp; pleura separated from the mesosternum by a poorly defined depressed line, scarcely a definite sulcus. Mesosternum smooth; at x35 scattered setigerous punctulation is evident, and a background of minute shagreening. In this species and in *canaliculata* the mesosternum between the middle coxae is convexly rounded, not flattened and not forming a strong ridge or median line; posteriorly the ordinary furcula is replaced by a downward projecting U-shaped translucent lamina, which connects one hind coxa with the other. Postero-lateral area of propodeum with a small erect tooth; dorsal surface of propodeum horizontal, at right angles to the vertical posterior face; dorsal surface with a weak median carina, and four lateral carinae on each side, the fourth bounding the top of the lateral face; the first lateral pair, distant at the base from the median, approach it and finally disappear before uniting

with it apically, setting off between them a triangular area which is darker in color than the rest of the body; the next two pairs of lateral carinae closer to each other than to the first pair, and the second and third a little closer than the third to the fourth; the median triangle radially striated at base, transversely at apex, the interval between carinae 1 and 2 transversely striated, that between 2 and 3 as likewise 3 and 4 transversely striate but the striae sufficiently short and separated to form rectangular meshes; the lateral faces obsoletely rugulose, contrasting with the smooth metapleura below them; the posterior face slightly rounded, with a very weak vertical median carina, and obsoletely transversely wrinkled, but not above.

The forewings have entirely lost all trace of the first transverse cubital vein. The united first and second submarginal cells extend about half way from the tip of the median cell to the wing apex. The marginal cell is long and pointed, its extreme tip slightly removed from the margin, forming a very small appendiculate cell. The second transverse cubitus is transverse. The first and second sections of the radius are of about equal length, longer than the third, which is about equal to the second transverse cubital vein. The third transverse cubitus curves obliquely outward to the cubital vein. The third discoidal cell is elongate gradually and evenly narrowed until just before the apex the terminating curve becomes pronounced; this by reason of the unusual fact that the first section of the subdiscoidal vein (m of Comstock-Needham system) is entirely continuous with the second recurrent, there being no trace whatsoever of the second section of the subdiscoidal (longitudinal $M_2$ of the Comstock-Needham system). This arrangement *ferruginea* has in common with *A. canaliculata*. The hind wing does not differ materially from Kohl's figure of *A. compressa*, except that the apical part of the anal vein, the part beyond the submedian cell, is wanting. Femors slender, thickest at the basal third and evenly tapered to the apex; metatarsus .55 of length of tibiae; tarsal segments in proportion of: 9:4:1.5:1:2.2; ultimate segment, as usual, inserted near base of penultimate; claw with an oblique median tooth on the inner margin.

Petiole (measured from apex of hinging nodules at base to where it suddenly enlarges at base of first tergite) as long as the second tarsal segment. Abdomen impunctate, polished and shining, the second tergite little wider than the apex of the first, the third tergite about one-third the length of the second, the apical ones narrowly exposed.

Texas: Liberty, 1 ♂, March 18, 1908 (E. G. Tucker). *Holotype* in the United States National Museum.

## A New Genus of Cobboldiini and a New Genus of Chrysomyine Flies (Dipt.: Oestridae, Muscoidea).

By Charles H. T. Townsend, Itaquaquecetuba, Brazil.

The two African stomach and intestinal botflies of the elephant differ markedly by their metallic coloration from the Indian stomach botfly of the related host. One of the African species was made the genotype of *Rodhainomyia* in 1920, while the other was left in *Cobboldia*, whose genotype is the Indian species. The second African species is accorded generic recognition below, being strikingly distinct from the Indian *Cobboldia*.

**PLATYCOBBOLDIA** gen. nov.

Genotype, *Cobboldia loxodontis* Brauer. Differs from both *Cobboldia* and *Rodhainomyia* by the strongly flattened male and female head and thorax and female abdomen, also by the metallic blue male and female mesoscutum and male abdomen. Both fly and maggot characters are given in detail by Rodhain & Bequaert in Bull. Biol. France et Belg. LII, 412 (1919).

**PYCNOSOMOPS** gen. nov.

*Genotype*, *Musca putoria* Wd., Africa.

Differs from *Achoetandrus* (genotype, *Musca albiceps* Wd.) mainly by possessing a strong mesopleurospiracular bristle, inferior proximal process of remigium bare, squamae dark-haired on disk.

*Lucilia rufifacies* Mq. is congeneric with *putoria*, differing at once from latter by lacking the black hind margins of intermediate abdominal segments. It belongs to the Australian fauna.

## A New Name for Aphodium smithi Brown (Coleoptera, Scarabaeidae).

*Aphodius browni* Hinton, new name for *Aphodius smithi* Brown, Canad. Ent. Vol. LXII, p. 2, 1930.

As the name *A. smithi* Brown is preoccupied by *A. smithi* Shipp (Smith, Through Unkn. Afr., Coleopt. App. p. 451, 1897) the species is here renamed *A. browni* as a slight tribute to Mr. W. J. Brown.

*Aphodius browni* Hntn. is extremely closely related to *A. socialis* Brown, and, indeed, at one time the writer doubted the validity of *A. browni*. *Aphodius browni* is, however, slightly larger and more strongly punctate, and is found in the nests of *Microtus* whereas *A. socialis* is found in the nests of *Thomomys*. According to Mr. Brown, the types of *A. browni* are males and not females as stated by him in the original description.—Howard E. Hinton, Berkeley, California.

## Some Observations on Notonecta undulata Say (Hemiptera: Notonectidae) and other Aquatic Insects in Winter.

*By John W. Stutzman, Reading Public Museum, Reading, Pennsylvania.

It seems to have been taken for granted by hemipterists generally that the various species of the family Notonectidae hibernate during the colder months in the mud and vegetation at the bottom of the ponds they inhabit. Several writers did mention seeing backswimmers active on warm sunny days beneath the ice. No one has reported on how they overwinter except to suggest that they hibernate. On a series of field trips during the month of December, 1933, in the vicinity of Reading, Pa., the writer has found that these insects and those of other aquatic orders were active in frozen ponds even during very cold periods. During one very cold spell, when the air temperature was 18° C. (0° F.), aquatic insects were captured in numbers while actively swimming beneath the ice. Of course the temperature of the air affects these insects only indirectly, while the temperature of the water is of greatest importance. But it stirs the imagination to think that while most insects are imprisoned motionless by cold, there are others placidly swimming beneath the ice of our ponds.

The temperature of water in which these notonectids remain active is surprisingly low. According to Metcalf and Flint the minimum effective temperature for most insects is 6° C. (42° F.). It was not unusual to find notonectids active in water at 2° C and in one instance I have observed a number of *Notonecta undulata* Say swimming at 1° C.

During the trips in the field, the ice was usually so thick and cloudy that it was necessary to cut out blocks of ice with a saw and watch the insects through these windows. The temperature of the water was taken in the following way. A thermos bottle was lowered into the water to the desired depth and the cork pulled out. The bottle was then raised out of

* The encouragement of Mr. Herman Hornig, of the Reading Public Museum in this work is gratefully acknowledged.

the water in a vertical position. The thermometer was then placed in the thermos bottle for several minutes and the reading taken while the thermometer was immersed. In this way, the inaccuracies resulting from the cooling of the thermometer by air, etc., were reduced to a reasonable degree. The following table shows the insects collected which were active beneath the ice and the temperature of the water in which they were found.

INSECTS COLLECTED ACTIVE BENEATH ICE.

| Species taken Dec. 10 to Jan. 3 | | Centigrade Water Temp. | Taken at Flashlight |
|---|---|---|---|
| Hemiptera | *Notonectidae* | | |
| | Notonecta undulata Say | 2° to 5° | + |
| | Buenoa margaritacea T.-B. | 4°, + 3° | + |
| | *Corixidae* | | |
| | Arctocorixa interrupta (Say) | 3° to 5° | + |
| | *Nepidae* | | |
| | *Ranatra fusca P. de Beauv. | 6° | + |
| Coleoptera | *Gyrinidae* | | |
| | Dineutes americanus Say (assimilis Kby.) | 3° to 7° | + |
| | *Dytiscidae* | | |
| | *Rhantus binotatus Harr. | 4° to 6° | |
| | Agabus disintegratus Cr. | 4° to 6° | |
| | *Haliplidae* | | |
| | Peltodytes muticus Lec. | 2° to 7° | |
| Diptera | *Culicidae* | | |
| | Corethra sp. ? (larvae) | 2° to 7° | |
| Odonata | | | |
| Species of Zygoptera | | 2° to 7° | |
| Species of Anisoptera | | 2° to 7° | |

Several field trips were made at night. On all of these trips it was noted that *Notonecta undulata* Say and other aquatic insects seemed positively phototropic. On one occasion a hole about two feet square was cut into the ice. The flashlight revealed only about two *Notonecta undulata* Say resting on the bottom. In the next fifteen minutes 33 specimens of the same came into the lighted area and were captured with the water net. A few individuals came to the surface and would swim

* Two specimens only.

swiftly in circles suggesting the erratic flight of moths about a light. Others would drift into the field of light and then drift slowly out as if totally unaffected. The majority, however, came into the lighted spot and then swam slowly to the illuminated bottom, anchored by a leg to the vegetation.

On one trip the cap to a thermos bottle was filled with water and specimens of *Notonecta undulata* Say were captured and placed in it. The night was very cold and the water in the cap began to freeze immediately, but the insects swam actively for about half an hour and were still active when removed. The temperature of this water was 1° C. On another trip several dragonfly larvae were fished out of the pond and thrown aside on the ice. Several hours later that evening, the larvae were found, still able to wiggle. As soon as they were placed in the water they swam to the bottom.

A complete answer as to how the aquatic insects remain alive and active under such vigorous conditions can only be answered by much physiological and ecological study of these highly specialized forms. Wesenberg-Lund (Int. Rev. ges. Hydrobiol, III: 460-86) has made a fine beginning. He shows how the insects obtain their oxygen under the ice, from the oxygen output of aquatic plant photosynthesis. He also states that when the oxygen supply becomes low, hibernation is induced.

Food supply as well as oxygen supply must differ somewhat in character from that of the summer months. *Buenoa margaritacea* is said to live especially on entomostraca. Daphnia, therefore, which was observed frequently on these field trips, should furnish nourishment for *Buenoa*. As to what food there is for other insects we can only conjecture.

It is plausible from the above observations that notonectids are much more active during the winter than we had supposed. They are able to move freely at a temperature four degrees C. or more below that point (6° C.) at which most insects are quiescent. What physiological peculiarities enable them to do this would be most interesting to discover. In fact the whole aquatic field must contain many unusual phases the investigation of which will add much to our biological knowledge.

# Entomological Literature

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

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

(*) Papers containing new forms or names not so stated in titles, have an * within parentheses thus (*) following the pagination of reference to paper.

(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.** Titles of papers containing new forms or new names will be indicated by an asterisk within parentheses at end of reference, (*).

*Papers published in the Entomological News are not listed.*

**GENERAL.—Anon.**—Consider the ant. [68] 80: 404. **Brown, A. W. A.**—A contribution to the insect fauna of Lake Timagami. [4] 66: 206-211. **Carr, F. S.**—Obituary. By H. A. M. [4] 66: 211-212. **Feyer, E.**—Nachklänge zu "Bilder aus meinen sammelreisen." [17] 51: 205-209, cont. **Fuller, M. E.**—The insect inhabitants of carrion: a study in animal ecology. [Bul. Counc. Sc. & Indust. Res. Australia] No. 82: 62 pp., ill. **Galapagos** Islands, Norwegian Zoological Exped. to; Scorpiones, by W. Meise; Orthoptera, by M. Hebard; Hemiptera-Heteroptera, by H. G. Barber; Neuropterous insects, by P. Esben-Peterson. [Med. Zool. Mus. Oslo] 74. 25-43; 279-280; 281-289; 291-294. **Kennedy & Landis.**—On writing articles for the Annals of the Entomological Society of America. [7] 27: 357-371. **Linsley & Usinger.**—Insect collecting in California. [55] 10: 102-106. **Neave, F.**—(See under Smaller Orders.) **Osborn, H.**—An entomological forecast. [7] 27: 480. **Titschack, E.**—Die Entomologische Abteilung des Zoologischen Staatsinstituts und Zoologischen Museums in Hamburg. 1932-1933. 64 pp., ill.

**ANATOMY, PHYSIOLOGY, ETC.—Auten, M.**—The early embryological development of Phormia regina (Calliphoridae). [7] 27: 481-506, ill. **Blackwelder, R E.**—The prostheca or mandibular appendage. [55] 10: 111-113, ill. **Castle, G. B.**—The experimental determination of caste differentiation in termites. [68] 80: 314. **Cole, A. C.**—A

brief account of aestivation and overwintering of the occident ant, Pogonomyrmex occidentalis in Idaho. [4] 66: 193-198. **DeLong, D. M.**—Insecticidally induced immunity in plants to sucking insects. [08] 80: 320-321. **Hendee, E. C.**—The role of fungi in the diet of termites. [08] 80: 310. **Hering, M.**—Hysteroteile bei einer puppe von Carpocapsa saltitans. [97] 54: 329-331, ill. **Koltzoff, N.**—The structure of the chromosomes in the salivary glands of Drosophila. [08] 80: 312-313, ill. **Ludwig, D.**—Studies on the metamorphosis of the japanese beetle (Popillia japonica). [7] 27: 429-434. **Mansour & Mansour-Bek.** The digestion of wood by insects and the supposed role of micro-organisms. [Biol. Rev. Cambr. Phil. Soc.] 9: 363-382. **Martin & Cotner.**—Serological studies of moth proteins with special reference to their phylogenetic significance. [7] 27: 372-383. **Mellanby, K.**—The site of loss of water from insects [Proc. R. Soc. Lond.] B. 116: 130-149. **Melvin, R.**—Incubation period of eggs of certain muscoid flies at different constant temperatures. [7] 27: 406-410. **Nagel, R. H.**—Metathetely in larvae of the confused flour beetle (Tribolium confusum). [7] 27: 425-428, ill. **Poll, M.**—Le système malpighien de Hylecoetus dermestoides. [33] 74: 192-194. **Roubaud, E.**—Au sujet des differentiations raciales chez le moustique commun Culex pipiens. [54] 12: 337-339. **Roubaud et Mezger.**—La nourriture larvaire n'influe pas sur le developement de l'autogenese chez les races de Culex pipiens specifiquement anautogenes. [54] 12: 340-342. **Speicher, K. G.**—Impaternate females in Habrobracon [92] 67: 277-293. **Strasburger, E. H.**—Ueber die zellbewegungen bei der eifurchung der fliege Calliphora erythrocephala [94] 145: 625-641, ill. **Thienemann, A.**—Chironomiden-Metamorphosen. [59] B. 7: 29-46. **Voukassovitch, H. et P.**—Variations dans la duree du developement du papillon Ephestia kuehniella. [77] 117: 33-36. **Weber, H.**—Zur kenntnis der doppelaugen der Aleurodinen. [34] 108: 49-58, ill.

**ARACHNIDA AND MYRIOPODA.—Chamberlin, J. C.**—On two species of false scorpions collected by birds in Montana, with notes on the genus Dinocheirus (Chelonethida). [55] 10: 125-132, ill. (*). **Jacot, A. P.**—Two species of lichen-mining mossmites [7] 27: 462-467, ill. (*). **Meise, W.**—Scorpiones [of Galapagos Isl.]. [Med. Zool. Mus. Oslo] 74, 25-43, ill. (*). **Milzer, A.**—On the great abundance of the black widow spider. [08] 80: 403. **Verhoeff, K. W.**—Bronns Klassen u. Ordningen des Tierreichs. Bd. 5, Abt. 2, p. 121-200. Symphyla u. Pauropoda.

THE SMALLER ORDERS OF INSECTS.—Esben-Peterson, P.—Neuropterous insects from Galapagos Isl. [Med. Zool. Mus. Oslo] 74: 291-294, ill. (*). Lloyd, L. C.—Two species of Mecoptera from Alaska. [55] 10: 119-120, ill. (*). Mickel, C. E.—The significance of the dragonfly name "Odonata". [7] 27: 411-414. Navas, R. P. L.—Insectos de Méjico. [Bol. Soc. Ent. España] 16: 68-75. (*). Neave, F. A.—A contribution to the aquatic insect fauna of Lake Winnipeg. [Intern. Rev. Gesam. Hydrob. u. Hydrog.] 31: 157-170, ill. (*). Smith, R. C.—Notes on the Neuroptera and Mecoptera of Kansas, with keys for the identification of species. [103] 7: 129-145, ill. Ward, J. W.—Boopinae Mallophaga collected from Oklahoma City dogs. [Proc. Okla. Ac. Sci.] 1933: 22-23, ill.

ORTHOPTERA.—Ander, K.—Ueber die gattung Cylindracheta und ihre systematische stellung (saltatoria). [83] 26A, No. 21: 1-16, ill. Hebard, M.—Orthoptera of the Galapagos Islands. [Med. Zool. Mus. Oslo] 74: 279-289.

HEMIPTERA.—Barber, H. G.—Hemiptera-Heteroptera of the Galapagos Islands. [Med. Zool. Mus. Oslo] 74: 281-289. (*). Bruner, S. C.—Notas sobre Cripto-tenmatidos Cubanos. [Mem. Soc. Cuba Hist. Nat.] 8: 209-212, ill. (*). China & Meyers.—Critical notes on some neotropical species of Tomaspis (Cercopidae). [75] 14: 448-466. (*). Oman, P. W.—The Agallian leafhoppers of the Biologia material. [7] 27: 445-461, ill. de la Torre-Bueno, J. R.—A note on Nova Scotia Heteroptera. [4] 66: 201-202.

LEPIDOPTERA.—Clark, A. H.—Observations on the butterflies of Apple Orchard Mountain, Bedford County, Virginia. [Pro. Biol. Soc. Wash.] 47: 177-179. Fenton, F. A.—Tingitoidea affecting cotton. [4] 66: 198-199. Hemming, F.—Supplementary note on the dates of the plates of the Papiliones in Jacob Hübner's Sammlung Europäischer Schmetterlinge. [9] 67: 226-227. Higgins, L. G.—A note on the dates of Hübner's plates. [9] 67: 224-226. Hoffmann, F.—Beiträge zur naturgeschichte brasilianischer schmetterlinge. [45] 27: 22-29. McDunnough, J.—On Forbes' grouping of Agrotine genera. [4] 66: 202-203. Sheldon, W. G.—The genus Prepona. [9] 67: 228-230. Warnecke, G.—Einige schmetterlinge mit unsymmetrischen flugelhälften. [14] 48: 97-98, ill.

DIPTERA.—Edwards, F. W.—On the genus Comptosia and its allies. (Bombyliidae). [59] B, 7: 81-112. Hendel, F.—Uebersicht ueber die gattungen der Pyrgotiden, nebst beschreibung neuer gattungen u. arten. [59] B, 7: 141-156, ill. (No new Amer.) James, M. T.—Hoplitimyia, a new genus of Stratiomyidae. [7] 27: 443-444. Parent, O.—

Especes nouvelles de Dipteres Dolichopodides. [59] B, 7: 113-140, ill. (S). **Townsend, C. H. T.**—Manual of Myiology. Part 1. Development and structure. 275 pp., ill. **Wade, J. S.**—An annotated bibliography of the hessian fly Phytophaga destructor. [U. S. D. A., Mis. Pub.] 198: 100 pp.

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**SPECIAL NOTICES.—The Macrolepidoptera** of the World. Fauna palaearctica Supplement. Parts 51-52. Vol. 3, pp. 121-160, pl. 13. Noctuiidae, by M. Draudt. These pages treat of the genus, Neoborelia of the Hadeninae, those of the Cucullianae, and Pyrois to Oligia of the Amphipyrinae. Publisher, Alfred Kernen Verlag, Stuttgart.

## OBITUARY.

Dr. FRANCIS METCALF ROOT, associate professor of medical entomology in the School of Hygiene and Public Health, The Johns Hopkins University, Baltimore, Maryland, died in the Hospital of the University, October 21, 1934. His death was attributed to heart disease. He was born at Oberlin, Ohio, September 24, 1889, and attended Oberlin College, where he received the A.B. in 1911 and the A.M. in 1912. Johns Hopkins gave him the Ph.D. in 1917, and here he continued as teaching fellow in the School of Hygiene, 1919-20, and associate, 1920-26, and was appointed associate professor in the last-named year. Early in his connection with this school, he began his work on the anopheline and other mosquitoes for which he is best known. In his spare time he turned his attention to the Odonata and contributed two papers on them to the NEWS: *Notes on Zygoptera from Maryland, with a description of Enallagma pallidum n. sp.* (Vol. xxxiv, pp. 200-204, July, 1923) and *Notes on Dragonflies from Lee County, Georgia, with a Description of Enallagma dubium, new species* (Vol. xxxv, pp. 317-324, Nov., 1924). Previously he had published an annotated list of *Dragon Flies Collected at Point Pelee and Pelee Island, Ontario, in the Summers of 1910 and 1911* (Canad. Ent. 44: 208-209, 1912), including notes on swarms of these insects in August of those two years.

He was the author of the section on Arthropods of Medical Importance in the well-known textbook, *Outlines of Medical Zoology* (New York, Macmillan, 1923), by Profs. R. W. Hegner, W. W. Cort and himself, all of Johns Hopkins, and of the section Medical Entomology in the larger *Animal Parasitology* (New York, the Century Co., 1929) by Prof. Hegner, himself and Prof. D. L. Augustine of Harvard.

Among his publications on the mosquitoes are:

1922. Larvae of American Anopheles. 2:379-393.
1922. Mosquitoes and other Blood-sucking Flies from Porto Rico. 2:394-405.
1923. Male genitalia of some American Anopheles. 3:265-279.
1923. Preferential Feeding Experiments with Anopheles. 3:354-355.

1924. Mosquitoes of Lee County, Georgia. 4:449-455.
1924. Further notes on the male genitalia of American Anopheles. 4:456-465.
1924. The larval pilotaxy of Anopheles quadrimaculatus and Anopheles punctipennis. 4:710-724.
1926-7. Studies on Brazilian mosquitoes. I. The Anophelines of the Nyssorhynchus group. 6:684-717. II. Chagasia fajardoi. 7:470-480. III. The genus Culex. 7:574-598. IV. Notes on some Brazilian species of Anopheles. 7:599-605.
1927. Note on the mosquito fauna of the Republic of Haiti. 7:463-469.
1932. The pleural hairs of American Anopheline larvae. 15:777-784.

All of the preceding publications are in the American Journal of Hygiene, in the volumes indicated.

1924. American Anopheline mosquitoes, Classification and Relation to Transmission of Malaria. Proc. Intern. Conf. Health Probs. Trop. Amer. 5:149-156. United Fruit Company, Boston.

The studies on Brazilian mosquitoes present results obtained during a trip to Brazil, extending from January 15 to July 8, 1925, undertaken upon the invitation and at the expense of the International Health Board of the Rockefeller Foundation.

He was also the author of *Experiments on the carriage of Intestinal Protozoa of man by flies* (Amer. J. Hyg. 1: 131-153, 1921) and of *Larval characters in the genus Sarcophaga* (Jour. Parasit. 9: 227-229, 1923).

A former student says of him: He was a quiet, scholarly gentleman, always considerate of his students and associates; his lectures were masterpieces, illustrated with beautiful drawings.

P. P. CALVERT.

Announcement of the death of Dr. FREDERIC W. GODING on May 5, 1933, was made in the NEWS for July of that year, page 196. A brief biographical sketch of him by Chris E. Olsen appears in the Journal of the New York Entomological Society for December, 1934 (issued two weeks earlier than its date). Mr. Olsen has added a bibliography of Dr. Goding's entomological papers. The following is omitted from his list: Synonymical Notes on Membracidae, ENT. NEWS xliv: 185-187, July, 1933.

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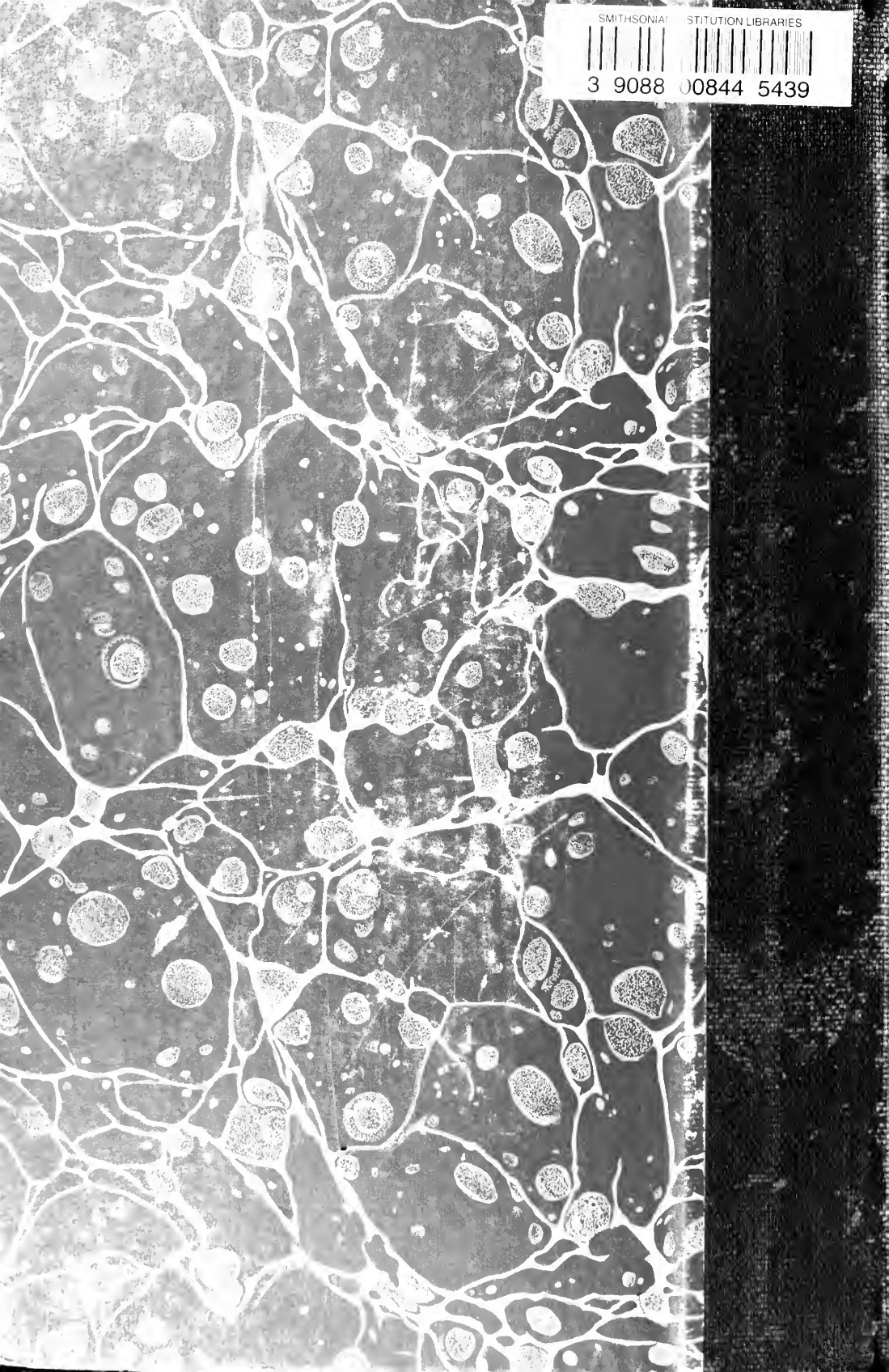
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