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JOHN MERTON ALDRICH;
1866-1934.

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ENTOMOLOGICAL NEWS

JANUARY, 1935

Vol. XLVI

No. 1



JOHN MERTON ALDRICH;
1866-1934.

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*Yours sincerely
J. Williamson.*

ENTOMOLOGICAL NEWS

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JANUARY, 1935

No. 1

Edward Bruce Williamson.

(Portrait, Plate I.)

Edward Bruce Williamson, diligent and thoughtful as collector, student and author in advancing our knowledge of the Odonata, died at Ann Arbor, Michigan, on February 28, 1933, as announced in the NEWS for March of that year. He was a frequent and welcome contributor to our pages during a period of thirty-four years; of his 103 papers and notes on insects, 57 were published here. Prof. Frederick M. Gaige, Director of the Museum of Zoology, University of Michigan, writes that the NEWS was the journal Williamson most enjoyed. It is, therefore, appropriate that a somewhat extended biographical notice should appear in our columns. That which follows avoids, as far as possible, repetition of the accounts of his life which Prof. Gaige and Prof. J. J. Davis have respectively published in the Annual Report of the Director of that Museum for 1932-33 and in the Proceedings of the Indiana Academy of Science, volume 43, each accompanied by the same portrait but different from that in our present number.

His father, Lent A. Williamson, was born in Fairfield County, Ohio, December 8, 1845. His mother, Dorothea Kellerman, a native of an adjoining county (Pickaway), of the same state, was born at Ashville, January 24, 1849. The parents went to Indiana and at Marion, in Grant County, their first child, Edward Bruce Williamson, was born July 10, 1877. In 1879, the family moved to Bluffton, thirty miles to the north-east, and here their life was centered for fifty years. The father engaged in the hardware business with his brother, George T. Williamson, and later became president of the Wells County Bank in that town until his death, on December 21,

1914, in California.* Of him, Bruce wrote, January 2, 1915: "We both loved collecting [dragonflies] and he took a sincere interest in my work." A maternal uncle, William Ashbrook Kellerman (1850-1908), was Professor of Botany at the Ohio State University, at Columbus, from 1891 to 1908. Bruce's mother died at Bluffton, October 8, 1928.

Bruce attended the Bluffton Public Grade and High Schools and in 1894 entered the Ohio State University. In a supplementary certificate, applying for a position as Assistant Biologist, which he filled out in November, 1900, under United States Civil Service Commission rules, he wrote of himself:

"I was a student at Ohio State University, Columbus, Ohio, for four years, receiving the degree of Bachelor of Science, June 16, 1898. For graduation usual college courses in zoology, botany, geology, mineralogy, chemistry, physics and astronomy, as well as courses in English, political economy, logic and one modern language were required. Four years of Latin was one of the requirements for entrance to this course. In my senior year I took beginning Greek. As elective work I took advanced courses in invertebrate palaeontology, petrography, systematic botany (grasses and sedges), food analysis in chemistry, human histology, vertebrate anatomy, invertebrate anatomy, vertebrate embryology and vertebrate neurology. All of these were laboratory courses, running through the college year, and six or ten hours per week were given to each subject. During my college course I was at different times secretary of the Biological Club and president of the Wheaton Ornithological Club. My thesis, with Mr. [later Professor] R. C. Osburn, was a descriptive list of the fishes of Franklin County, Ohio, together with secondary lists of the Astacidae, Amphibia and Reptilia."

Prof. David Simons Kellicott (1842-1898), was Professor of Zoology and Entomology at Columbus from 1888 to 1898 and, at the time of his death, shortly before Williamson's graduation there, general secretary of the American Association for

* An extended obituary notice of Lent A. Williamson is in *The Evening News*, of Bluffton, for December 26, 1914. Other issues of the same newspaper contain accounts of E. B. Williamson's expedition to Barbadoes, Guiana and Trinidad (March 21, 1912), Panama and Colombia (March 15, 1917) and Venezuela (May 15, 1920), with many personal details.

the Advancement of Science. His field studies on the Odonata of Ohio, published in the Journal of the Cincinnati Society of Natural History (1895-1897) and by the Ohio Academy of Science in 1899, doubtless contributed to Williamson's interest in these insects if they did not originate it. In September, 1898, Williamson wrote to me: "For the past three summers I have been collecting dragonflies whenever time permitted, about my home in northern Indiana. Sixty-one or sixty-two species have been taken." This fixes the beginning of his odonatological activity as not later than 1896.

The year of his graduation from Ohio State, 1898, was also the year of his first appearance as an author, as may be seen from the bibliography accompanying Prof. Gaige's biography. Alone, or in association with R. C. Osburn, he published on fishes, crayfish, birds and dragonflies.

About the end of July, or the beginning of August, 1898, he entered the Carnegie Museum, at Pittsburgh, Pennsylvania, as assistant curator of insects.

Returning to Philadelphia on August 29, 1898, from a brief collecting trip into New Jersey, bringing with me specimens recognized as an undescribed species of *Ischnura*, I found Williamson's first entomological paper awaiting me—three pages on "September Dragonflies of Round and Shiner Lakes Whitley County, Indiana," from the Report of the State Geologist of Indiana for 1897. It contained a footnote by Prof. Kellcott briefly describing a single female referred to "Enallagma sp (?)". The description seemed to correspond to some of my *Ischnurac* from New Jersey. I wrote to Williamson about it, in the first week in September. He replied on September 9, 1898. The rest of the story may be found in the News for November, 1898.

So began a correspondence, for me the most extensive carried on with any one person and only terminated when my reply of February 20, 1933, to his of February 6 arrived too late to find him conscious. There are 527 of his letters lying before me, 57 of them six or more pages in length, chiefly concerned with the Odonata, but here and there touching on other

phases of his very active life. To no one in this field of entomology do I owe more than, or as much as, to these letters of Williamson. Both of us had a great interest in the tropical American Odonate fauna and each turned to the other for advice, suggestions and sympathy. We met but once, when I stayed at his home in Bluffton from December 28 to 30, 1912. We were thus compelled to rely upon letters and publications for the comparison of our ideas. Looking backward, one can appreciate the amount of time which our mutual correspondence alone involved, and must realize that the survivor feels a very great loss in his world. Williamson was younger than I and in the natural course of events he might have been expected to perform this present office for me, rather than that I should be commemorating his deeds after his passing.

From July 16 to August 15, 1899, Williamson was one of a party led by Dr. W. J. Holland, Director of the Carnegie Museum, which collected chiefly vertebrates in Wyoming. In a letter written the day after his return to Pittsburgh he says:

"I have been thinking a great deal about going to the U[niversity] of P[ennsylvania] to take a course in medicine," and again on September 29: "I was arranging my affairs to spend this winter at Philadelphia in the medical department of the U. of P., but after my resignation at the Museum I was offered the position of teacher of science in the high school here [Salem, Ohio], so I have taken the position for the year. Next year I hope to be able to enter the U. of P. and complete the medical course in three years." On January 24, 1900, he wrote: "In spite of plans and wishes, which have never availed anything, I guess, it will be impossible for me to take a course in medicine at U. of P. I am rapidly losing my hearing, due to a catarrhal affection of the middle ear." . . . "about my hearing—I am afraid nothing can be done. The trouble is I think congenital and it has been aggravated by exposure."

In the first days of July, 1900, he had a week's collecting at Ohio Pyle, on the Youghiogheny River, in Fayette County, Pennsylvania "and caught enough *Calopteryx angustipennis* to supply the world—have 132 good specimens besides some damaged ones." No other male of this species was then known to

exist than that in the British Museum, sent by John Abbot, from Georgia, a century previously. Doubtless the world of his correspondents received them, for he was always most generous in sharing his material with others. His letters of this year refer to much correspondence with the late James S. Hine at Columbus, and with Charles C. Adams. His first mention of C. H. Kennedy, now Professor at Columbus, is in connection with a trip to Winona Lake, Indiana, in July, 1900, and about the same time he appears to have begun correspondence with Prof. James G. Needham.

In the summer of 1901 he was at the Winona Lake Laboratory of Indiana University and again at Salem, Ohio, in the Fall until the Christmas holidays.

Many of his letters of 1902 are on paper bearing the printed letter heads of the Wells County Bank at Bluffton, with his father's name as President, and he probably began to work there in January of this year, but his name does not appear in the list of officers thereof until a letter of March, 1903, when he is given as Assistant Cashier.

On April 16, 1902, he married Miss Anna Tribolet. She and three adopted daughters survive him.

On October 19, 1904, he wrote:

"I suppose there would be no chance at M[useum] C[omparative] Z[oology] for a permanent curatorship? I am pretty well situated now as far as leisure time goes but I am always on the lookout for anything which will give me greater opportunity to work on dragonflies."

In his letter of September 20, 1904 (15 pages) he discussed questions of nomenclature at length, concluding:

"I am in favor of giving a binomial name (and a binomial only) to every form which can be defined to cover a considerable number of individuals, which individuals or similar ones it is to be expected other students may in time collect and study." This position he maintained to the end of his life.

On December 31, 1904, Mrs. Williamson, he and four others, left Bluffton on a collecting trip to Guatemala for Odonata and returned March 8, 1905. He published an Itinerary of this

expedition in the NEWS for November, 1905. Two days after his return, he wrote:

"I think my dragonflies will enable you to formulate some such law as this: The species occurring at any locality during the dry season are those species of widest distribution. Or, in other words, local species are to be found at the height of the season. . . . From February 10 to 24, inclusive, I was practically shelved as a result of an attack of tropical fever contracted at San José on the Pacific."

He made a second expedition to Guatemala in May and June, 1909,* and it is probably to this trip that a passage in a letter of July 13, 1910, refers:

"I never made any pretensions at care of my health in Guatemala after the first few days down there. I was especially careless about food and drink and I never found the native cooking palatable."

On his return from Guatemala in 1905 he was offered the cashiership of the bank at Bluffton.

"To refuse it seems to me to invite business ruin and loss of associates' respect. To accept means still less energy and time for Odonata, but possibly opportunities for greater leisure in future years. I have worked at business and at dragonflies, hoping someday to be in a position to have independent income sufficient to enable me to take some position in a museum at a small salary but with large leisure for pure science work along lines I might select." (March 10, 1905.)

He accepted and the aim thus set was actually realized, although banking failed to afford him the means which, in 1905, he was justified in expecting.

His letter of May 15, 1906, says:

"Recently put the bird egg collection belonging to brother and myself in City Library. City furnished a light and dust proof case which makes the eggs accessible, however, even to little tots. We found we had 93 species and about 1200 eggs, nearly all local. Of red-shouldered hawks, 13 sets, 33 eggs, all collected by myself—hawks are rare with us."

* Collecting records of this expedition are cited in Ris's *Libellulinen*, *Cat. Coll. Zool. Selys*, and in Williamson's own papers, *Occas. Papers No. 130* and *Misc. Publ. No. 9*, both of the Univ. Mich., *Mus. Zool.*, 1923.

His interest in birds' eggs, both before and after this gift is evidenced by some passages in his letters:

"The evening before my marriage I climbed 70 feet in one of the biggest oaks in an hundred acre woods for a set of 3 of red-shouldered hawks eggs and two days after my marriage I took another set of 2 of the same species." (April 28, 1902.)

"An M.D. diagnosed my liver trouble as pleurisy. He said calomel was alright if I had been doctoring the right organ. He prescribed salicylate of soda and quiet. I took the medicine alright (90 grains a day for a week) and climbed 80 feet up a big sycamore for a hawk's nest, since which my recovery has been rapid and complete." (April 28, 1908.)

In April, 1916, he had a corneal ulcer of which he wrote:

"I carried my eye in a sling 10 days though and had to climb for a set of great horned owls with the eye bandaged and with a strip of ice and snow a foot wide up the tree from the ground to above the nest which was 55 feet high."

Another interest had developed:

"I have a nice lot of iris blooming in my garden and I have been spending some time since my return cross-pollinating. If weevils don't destroy all the seed, I ought to have a pretty thorough mix-up. Next to orchids which are undoubtedly the finest flowers, fad or no fad, I prefer Iris." (June 11, 1907.)

In 1910 he hoped that the American Museum of Natural History could be interested in purchasing the René Martin Collection of Odonata.

"If I could get in such an institution with Martin's Collection and my own as a foundation to build on and work with, I might eventually evolve to a point where I could be of some real assistance in this dragonfly work. I am 33 years old (last Sunday, when I worked 21 hours) and I come of long-lived stock. In the next 30 years I could do lots of work if I had a chance."

He raised the question as to the American Museum again in a letter of July 11, 1914.

In December 1910 he wrote that he had ordered a motorcycle "and next summer I'm going after the local stuff as I never did before." In the following July he reported

"Four weeks ago I tumbled for the fifth time from my motor-cycle . . . and damaged one arm, both legs and made a climax by breaking a rib. So I didn't ride any more till July 2."

"During the warmer months, I spend all my Sundays and holidays (3 or 4) in the woods or fields, always collecting or bluffing at it. I might stay at home and work material these days, but I am so confined during the week, I naturally break for the woods with my lunch in my pocket Sunday. On these days I want to be absolutely alone, or with some one who doesn't talk at all. The only religious sense I have is a feeling of absolute oneness with the visible world—whatever of mortality or immortality, of chance or design belong to the woodland swamp, to the blue iris and to the red-winged blackbirds and to the fox squirrels belong to me to an identical degree. So I want one day of the week to think it uninterruptedly. And collecting (the way I collect on Sundays) doesn't interfere." (June 14, 1912.)

"I enjoy collecting better than anything else and everything else in the world. If my objective mind stops business for a minute, the subjective jumps right in with palm forests, blue, hazy, verdure-covered mountains, little gravelly brooks, muddy lagoons—and me and a bug net. So why worry about unworked material." (March 23, 1919.)

But even in summer other thoughts arose:

"This summer I am going to write a scathing letter to the Editor of *Science* relative to the scientific (natural [science]) men of this country who annually flock to the seashore (where biological conditions are practically eternal) or to the largest freshwater lakes they can reach (where biological conditions in permanence compare favorably with 'the eternal hills') while all over this country unique biological conditions are being destroyed never to be replaced or duplicated. I have in mind just now Vanneman's swamp. (Above is half joke and half dead earnest. Really when I see that swamp going I can almost cry.)" (July 29, 1913.)

A hope which he never realized but which he entertained until the day of his death was a monograph of the genus *Argia*.

"It really 'grinds' me that my life is slipping away and I can get so little done myself. I have things in such good shape if I had only more leisure." (Oct. 8, 1913.)

"It is more and more evident that if I am to get any dragon-fly work done, I shall have to get out of the bank; but I do not see the way. And I have things in good shape to work, too, if I could only find a little more time and strength. The little I have done has been only by the most rigorous application and self-denial in every other line." (Jan. 2, 1915.)

In 1915 he wrote to Ris to learn if Menger, the artist at the Brussels Museum, could make drawings of *Argia*.

"I want to get material together so . . . can do an *Argia* paper some day. I don't know but I believe I have at least 2000 unstudied specimens here." Menger did make the drawings and they are at Ann Arbor.

"And some day some student of *Argia* will rise up and call me blessed! . . . And I may fool the doctors and live to study my *Argias* myself. Anyway I had the joys of several existences in catching them." (May 1, 1919.)

His health fluctuated greatly in 1915 and 1916.

"My hilarious and ungrateful amoebae, not satisfied with free board and lodging, set up some rectal trouble for which I am taking treatment here [Grand Rapids, Mich.]" (Nov. 19, 1915.) He returned to Bluffton the first week of December. "I came away from Grand Rapids feeling fine." "Have been out of the bank about half the time the last week or ten days—sick with some obscure intestinal trouble." (Jan. 13, 1916.)

"The doctor here thinks I have an ulcer or ulcers in the duodenum. At times the attacks are very severe, fairly taking all the nerve I have and leaving me feeling weak and bruised for a day or two afterwards. Monday and Tuesday were bad days, finally requiring opiates and hot external treatment—it got me to where I was whimpering. (Jan. 15, 1916.)

"My health is perfect." (Jan. 29, 1916.)

"My gizzard turned me on my head last Thursday. It had been good for several weeks. . . . However, for about 45 minutes I heard the choir invisible. It's great sport." (March 4, 1916.)

"I feel better this spring than I have for several years and I think my amoebae are dead and my intestines healing at last." (April 11, 1916.)

In late November, 1916, he started for Colombia where he and his cousin Jesse H. Williamson collected until March 12th.

On the return trip down the Magdalena he wrote: "We have 150 species of dragonflies and 8543 specimens in papers." Among the localities visited in Colombia was

"Cristalina the best collecting spot I ever saw in my life—it was (or is) simply wonderful. It would make a beetle man dissatisfied with heaven. In fact I much prefer Cristalina myself, from various reports I've heard."

This expedition was in part financed by the Museum of Zoology of the University of Michigan and so began the connection which later resulted in Williamson's becoming Research Associate there.

In November, 1917, he underwent an operation, and four and a half weeks later had an attack of pneumonia which

"kept me flat for four weeks. . . . Now that I'm up and about again I'm about the gentlest and tamest unconverted bug hunter in captivity." (Jan. 15, 1918.)

"I was looking again to-day at the little Fundacion freak [*Agriogomphus hamatus* Wllms.] . . . I think I'd better get it out and prepare a little paper and some drawings. When I thought I was going to die, when I had pneumonia, the thoughts of it and a fine lot of *Macrothemis* we got in Colombia more than anything else made dying distasteful." (Jan. 21, 1918.)

In 1918 he was elected President and a director of the Wells County Bank at Bluffton, of which he had been cashier since 1905. In 1918 also he was President of the Indiana Academy of Science.

There is a gap in his letters between March 18, 1925, and February 27, 1926, on which latter date he writes:

"I am just beginning to perk up a bit after having lost one year. . . . I am most anxious to get 3 started papers completed and then get at *Gomphoides* as I have borrowed material of that genus."

His cousin, Jesse H. Williamson, son of George T. Williamson, his father's brother, wrote on July 9, 1927:

"Bruce is in better physical condition than at any time during the past three years. He resumed active duty in the bank just a year ago and has been on the job there practically every day since. Bank duties and problems have been particularly

difficult and trying for the past two years in our little community, as the largest bank here was in a failing condition and finally closed its doors a few months ago. While its closing did not put an end to all problems by any means, it did relieve the suspense which is very trying to the nerves of a thyroid patient. Business conditions have added greatly to Bruce's burdens and required much time that in former years would have been devoted to Odonata. The iris culture has developed from a back-yard proposition to a real business requiring lots of time, energy and correspondence particularly for several months each spring. Bruce has not the strength and endurance required to carry on banking, iris business and scientific work simultaneously, as in days gone by and hence the last has had to be neglected . . . his failure to answer welcome letters has been due to the fact that he feels that *all* his energy should be devoted to his business connections in place of using even a part in riding his hobby. If he had his former strength he would still be burning the mid-night oil in the "bug room" long after a full day's work at the bank had been done. We hope that conditions will change so that he can again spend time working on Odonata without feeling that he is thereby depriving his business associates of any energy that should be devoted to business matters."

In 1928, his bank at Bluffton closed.

On November 8, 1928, E. B. wrote:

"All my dragonfly work this past season has consisted of every Sunday trips to points in northern Indiana, data (insignificant) turned over to [B. E.] Montgomery to whom I willed the Ind[iana] dr[agon] fl[ies]. For several years it has seemed to me that the northern Ind. Aeshma fauna was not what it used to be and I spent Sundays and some other days looking diligently in many localities for them. And they 'ain't' here. Saw 2 spp.—one a pair Montgomery caught—and a few *Ae. umbrosa*—and nothing else. And we visited dozens of lakes, completely encircling several, marshes, back-ups, cut-offs and every kind of habitat we would find."

On June 22, 1929, in answer to an inquiry he replied:

"Yes, I still have my dragonflies, library and iris and the last largely explains my delinquencies as a letter writer. For I've been very busy therewith and have never felt better in my life. . . . We have all of us been working with the iris and we've been busy too. Lots of visitors from all over, endless

correspondence, more field work than we can do, and unfilled orders always staring us in the face. . . . I have no definite future plans. If it is at all possible I hope to spend the rest of my life working with dragonflies and iris and nothing else. If I have to come to one thing it will be dragonflies, as I find they can pull me away from the iris—a thing I believe nothing else could do. . . . The iris business is making a little but not quite a living.”

The realization of his hopes was expressed in his letter of August 16, 1929:

“Dr. Gaige . . . came to tell me they have made a position of research student of Odonata there [Museum of Zoology, University of Michigan] for me. The only thing is that I must be in residence 3-4 months a year—otherwise I select my own problems, my own methods and do pretty much as I please, with no students unless I want them—which I do—I need about 4 right now. I shall store my collection at Ann Arbor. They have given me two of the large offices in the new building with all the additional storage space I need. It is just simply an ideal layout.”

“I am moving my collection and library to Ann Arbor.” (Oct. 8, 1929.)

“The past two weeks have been very busy ones but about the happiest I’ve ever known. I have every facility and all the room one could wish for.” (Dec. 21, 1929.)

“I’ve had a delightful winter here and got done about $\frac{1}{4}$ what I thought I could if I were free to do as I pleased as I have been here.” (Mar. 31, 1930.)

Many another extract from his correspondence, of interest to the student of the Odonata, must be omitted, but we shall at least quote from his last letter to me—that of February 6, 1933—

“Thanks for your note on *Cal[opteryx] dimidiata* and *apicalis*, which as I interpret it, is an apology for following Hagen, who led you astray in your callow youth into positions which you now recognize as untenable. Signs of age grow on me; one of the most deplorable is my lack of ability to come back at you with a hot retort for your ‘Great Williamson’ slam. ‘Plumed Leader’ is hardly the term I need, so in my senility, you escape a rejoinder you so richly deserve.”

Of the 102 papers on Odonata listed in Prof. Gaige's bibliography of Williamson, 11 deal with the Odonata of Indiana, 6 with those of Pennsylvania, 36 with those of other parts of the United States or are monographs of genera (*Stylurus* 1901, *Macromia* 1909, *Celithemis* 1922), restricted to United States species, 6 are concerned with those of Canada, 28 with those of the neotropical fauna and 3 with those of other parts of the world (Formosa, Burma and Siam). The remainder describe habits or give directions for collecting and preserving dragonflies and one (1913) is purely morphological. In number of pages his publications on the neotropical fauna exceed those of any of the other groups enumerated, and include monographs of the genera *Protoncra* (1915), *Nconcra* (1917), *Heteragrion* (1919), *Triacanthagyna* and *Gynacantha* (1923) *Erythemis* (1923) and *Perilestes* (1924), as well as descriptions of new genera and species. A list of all the new genera (14) and species (92) which Williamson described accompanies Prof. Gaige's biography. Four of his papers propose rearrangements of larger taxonomic units, the Oriental Calopteryginae (1904) and Gomphinae (1907) and the Cordulinae (1908) and Gomphinae (1920) in general. Among his observations on habits of the Odonata, the most remarkable was his discovery of the exact positions assumed by the abdominal appendages of the males in relation to the females at copulation (1899, 1906), correcting previous statements on this subject.

That which especially distinguished E. B. Williamson, it seems to me, was the combination of indefatigability as a collector, and minuteness of observation and of discrimination as a student and author. This resulted in his knowing the Odonata, both in the field and in the laboratory, with probably a greater thoroughness than any of his predecessors or contemporaries. These qualities are especially displayed in his *Notes on American Species of Triacanthagyna and Gynacantha* of 1923, which I am inclined to regard as his greatest work, though the *Notes on species of the genus Heteragrion Sclys* (1919) stands not far behind. "Great Williamson" was not a mere playful jest in correspondence, but indicates the position he won in his field of entomology. P. P. CALVERT.

The photograph from which Plate I was made was taken about 1922, the autograph is from a letter of July 1, 1929.

An Analysis of the *Cicindela purpurea* Group (Coleop.: Cicindelidae).

By E. GRAYWOOD SMYTH, Entomologist, W. R. Grace & Co.
Sugar Estates, Trujillo, Peru.

In all the great variation and world wide distribution of this remarkable genus of tiger beetles, *Cicindela*, embracing over 700 named species and varieties, are no others which rival in exotic beauty the varieties of the *purpurea* group. And it is noteworthy that these varieties, in common with those of the *scutellaris*, *sexguttata* and *formosa* groups, reach their highest color development and greatest diversity of pattern in certain mid-western states, notably Kansas and Colorado. Coleopterists residing in those states, and enjoying thereby the advantage of first hand acquaintance with these divergent and highly developed geographic races, are in a most favorable position to adequately appraise and evaluate them, and to render fair judgment on their proper classification.

I have characterized this (8, p. 197) as the most difficult group in the genus *Cicindela* in America, and the proof of my statement lies in the fact that our two foremost authorities on the Cicindelidae, Charles W. Leng and Walther Horn, can exactly agree on the status of only six out of seventeen recognized species and varieties in the group. A recent synopsis (5), purporting to clear up the matter of their classification, has left the group in no less a state of confusion than it was. The writer disagrees, in several cases, with all of the above authorities, and bases his conclusions upon a knowledge of the living insects and their habits, and of their phylogeny and ontogeny.

There will, no doubt, always be this cleavage of opinion between—(a) those systematists who depend wholly upon the literature and upon dried museum specimens, and (b) those who, knowing by necessity the literature and collections available, believe in checking against the knowledge thus obtained the broader facts of habit, ecology, environmental factors, and all obtainable data gleaned from personal contact with the living insect. The writer has lived among, actually camped beside, the tiger beetles at every opportunity for the past thirty-odd years, from Atlantic to Pacific, from the Yellowstone to Cen-

tral America, has spent long hours over large series of many species, and has chased them with net, or studied the habits of their larvae, more days than he has eaten apples in his lifetime. He feels, therefore, that he almost knows the genus *Cicindela* in America, and is in position to take issue with such as, very patently, base their conclusions upon faulty and inadequate premises. As one who believes in following a middle path between extremes, and with sincere desire to aid those students who, like himself, have been intrigued by the high merits of these handsome beetles, he offers this contribution in a hope of clarifying the still prevalent confusion in the classification of the *purpurea* group.

In his recent answer to the writer's criticism of the Nicolay and Weiss Synopsis of the Cicindelidae (*Purpurea* Group) (5) Mr. Nicolay has made plain (4, p. 154) what most Cicindelists, lacking opportunity to verify, have long believed or suspected, namely, that the two stem forms *purpurea* Oliv. and *limbalis* Klug may be properly treated as distinct species. Not, indeed, from any notable dissimilarity of structure does he conclude this, but from their very different habitat, and from the fact that, even when occurring in the same locality, they show no tendency to intermingle or interbreed. This knowledge is a definite step forward, and makes very logical the writer's recently expressed opinion (8, p. 203) that all varieties (or so-called species and subspecies) in the group, with exception of *decemnotata* Say and *pugetana* Casey, may be correctly classified as varieties of either *purpurea* or *limbalis*. There are two decided reasons for this point of view, which have been too often overlooked or not considered. First, there are no stable morphological characters yet known that can be depended upon to separate one variety from another, all dependence being placed upon pilosity (which is very unstable), surface lustre, color and maculation. Secondly, the varieties (geographic races) in either species blend very gradually one into another wherever the distributional boundaries separating them overlap. This applies to every one of the varieties thus far described except *propinqua* Knaus, and in this case the morphological characters at once identify it as closely related to *denverensis* Casey, the lack of intermediate forms being due solely to our failure to have thus far discovered them.

How, may we ask, can two morphologically identical varieties of exactly similar habits, differing only in color and markings, even though separated from one another in distributional limits by a considerable distance, be possibly considered distinct species when every grade of intermediate or transition form can be found between them in the intervening terrain? To pronounce them separate species (viz., *limbalis* Klug and *splendida* Hentz), and to associate the intermediate forms (*transversa* Leng; *cyanoccephala* Varas) with either the one or the other, as the notion strikes one, is neither logical nor rational. It is contrary to the facts in the case.

The fallacy of this conception is proven by the following anomaly. Mr. Leng considers *transversa* to be a variety of *splendida*, and *cyanoccephala* a variety of *limbalis*. The authors of the Synopsis reverse this, and consider *transversa* as a variety of *limbalis*, and *cyanoccephala* a variety of *splendida*. Whom should we follow as our authority? Have the two varieties *transversa* and *cyanoccephala* shifted their colors, or changed their allegiance, between the dates on which the two opinions were published? Plainly something is wrong, yet the answer is very simple: for *splendida* is not a valid species, but merely a variety of *limbalis*, in common with *transversa* and *cyanoccephala*. How simple it all is, after all. And we can only marvel at the convenience of a philosophy that considers transition forms in eastern Kansas between *transversa* and *splendida*, and between *limbalis* and *cyanoccephala*, as "hybrids," and cites as evidence the existence of hybrids in fish (+, p. 131).

Of the seventeen species and varieties which the writer considers as belonging to the two stem species, the following may be classified as varieties (geographic races) of *purpurca* Oliv.: (1) *auduboni* Lec. 1845 (= *graminea* Schp. ex parte); (2) *nigerrima* Leng (= *auduboni* Lec. 1854); (3) *auguralis* Casey; (4) *cimarrona* Lec.; (5) *lauta* Casey; (6) *mirabilis* Casey.

The following may be considered varieties of *limbalis* Klug: (1) *spretta* Lec. 1848; (2) *transversa* Leng; (3) *cyanoccephala* Varas; (4) *splendida* Hentz; (5) *ludoviciana* Leng; (6) *denverensis* Casey; (7) *plattensis* Smyth (= *conquisita* Casey fide Nicolay); (8) *propinqua* Knaus; (9) *scdalia* Smyth.

In either of these groups, intermediates (transition forms)

may be found between any two nearest related varieties (except in *propinqua*), definitely proving their relationships. But there is no reason whatever to confuse the varieties of the two species, even though anatomically similar, for their habits and habitat are very distinct, as the writer has previously emphasized (8, p. 203). Contrarily, our reasons for considering *decemnotata* and *pugetana* as distinct from all the others are that, not only are they quite unique and easily separable from all the others anatomically, but there occur no intermediate forms between either of them and any of the others named above. Intermediate forms between the two, however, may yet be found, as they seem fairly closely related.

In defending his position in the placement of certain varieties, Mr. Nicolay states (4, p. 128) that the Synopsis of the Cicindelidae has been "almost entirely a task of collecting and consolidating the views and conclusions of our predecessors. There is very little that we have changed. . . ." By predecessors we presume that he refers to Mr. Leng and Doctor Horn. Let us examine, specifically, just how faithfully the Synopsis adheres to this principle, which, if logically carried out, might indeed be justifiable.

(1) *C. purpurca* Oliv. All agree on this as *the* stem species.

(2) *C. auduboni* Lec. Nicolay and Weiss agree with Mr. Leng (3, p. 40) in placing it as a variety of *purpurca*, but Doctor Horn (2, p. 80) does not even honor it with that distinction, calling it a mere color phase of *purpurca*.

(3) *C. nigerrima* Leng. Like the preceding, Horn considers this a mere color phase of *purpurca*, though the others, we believe rightly, call it a variety. It is, apparently, merely a melanic form, yet its genetic divergence from *auduboni* has been noted (7, p. 428) on the western prairie, where the two occurred together and it chose isolated spots of darker soil.

(4) *C. auguralis* Casey. Although Leng considers this a synonym of *auduboni* (which is a variety of *purpurca*), and Horn calls it a "larger race" of *purpurca*, and although Casey described it as a variety of *purpurca*, Nicolay, by an anamorphosis all his own, insists that it is a variety of *limbalis*. He bases this conclusion on the appearance of the type specimen, which to him looks like *limbalis* because it has "the middle band

touching the sides and of course at right angles to them" (4, p. 130). It might profit him, we believe, to examine the large series of mountain forms in some of our western collections, showing every intermediate stage (transition form) between *auguralis* and *auduboni* on the one hand, and between *auguralis* and *cimarrona* on the other, the matter depending largely upon the altitude from which the specimen was secured (8, p. 199). As a matter of fact, *auguralis* may itself be well considered a transition form between *auduboni* (and *nigerrima*) of the plains and *cimarrona* of the highest plateaus. If one were to strictly follow Mr. Nicolay's principle of not "recognizing the intermediates between species and varieties" (5, p. 343), as he interprets that phrase, there would seem little reason to continue use of the name *auguralis*. Certainly it is very risky to form judgments from the superficial appearance of type specimens (as also proven by his first judgment on *mirabilis*) (4, p. 153).

(5) *C. cimarrona* Lec. This is considered a valid species by Leng, and by Doctor Horn a "larger race" of *purpurca*. What distinction the latter makes between a "larger race" and a variety we are not in position to say, but the difference must be small, since nearly all our "varieties" in *Cicindela* are, in fact, geographic races. It is very understandable why Mr. Leng considered *cimarrona* as worthy of specific standing, since he had not at hand the intermediate forms to show him that such was not the case. But that hardly justifies present day revisionists in subscribing to the error (4, p. 129).

(6) *C. lauta* Casey. Mr. Leng gave this variety the standing of a species (as with the preceding, he lacked intermediate forms connecting it with *auduboni*), but Doctor Horn was more accurate, considering it a "larger race" of *purpurca*. Regarding this variety Horn says (1, p. 24): "Under the name *graminea* the unlucky Schaupp had thrown together under one name two very different races,—the flat, often large bellied form of the Pacific coast—*lauta* of Casey, and the parallel, more arched form from Colorado." Yet the authors of the Synopsis differ from both of these authorities, and sink the name *lauta* to synonymy. Were they in possession of some of the large,

blue-green forms from the Northwest, they might feel otherwise.

(7) *C. mirabilis* Casey. Leng places this as a variety of *lauta*, while Horn calls it a synonym of *lauta*. Nicolay and Weiss sank the name (5, p. 346) as a synonym of *auduboni*. It is, however, an easily distinguished and well established Californian variety of *purpurca*, and it is gratifying that Mr. Nicolay is now willing (4, p. 154) to restore it to its legitimate standing as such.

(8) *C. limbalis* Klug. Most of us prefer to consider this the other stem species of the group, on an equal footing with *purpurca*. Mr. Leng considers it a valid species, though Walther Horn lists it among the "larger races" of *purpurca*, on a par with *cimarrona* and *lauta*, with neither of which it has any but remote relationship. (It is this confused notion of comparative values among the races of *purpurca* and *limbalis*, shared by our best authorities, that has hampered proper arrangement of the beetles of this group for years.) Mr. Nicolay has fortunately settled the matter (4, p. 154) by describing the exact relationship of these two stem species (*purpurca* and *limbalis*) in the East, where they most approach each other morphologically and ecologically, yet are distinct in habit and do not intermingle.

(9) *C. sprcta* Lec. The former confusion about this variety may be best explained by Dr. Horn's statement (1, p. 37): "*C. sprcta* Lec. has been twice and certainly not harmoniously described by LeConte (once as dirty dark green and once as black)." Horn gives the name no standing, placing it as a synonym of *purpurca* (which ignores its different habits and type of maculation), but Leng correctly places it as a variety of *limbalis*. Nicolay and Weiss follow Leng in this conclusion, which they justify (5, p. 349) in order "to separate that form occurring only in the northeast which has the usual cupreous color more or less suffused with green." This makes improper the inclusion under this name of certain greenish aberrations from Colorado that have been heretofore wrongly determined as *sprcta*, and are, in reality, *auguralis* (a variety of *purpurca*).

(To be continued)

Biological Races of Insects and their Bearing on Host Plant Resistance.

By W. M. P. HAYES, University of Illinois.¹

The invasion of chinch bugs in the corn fields of the mid-west during the summer of 1933 has created new interest in the matter of finding host plants that are resistant to insect attack. During the coming season, plant breeders, entomologists, and growers will more thoroughly test the strains of corn that are being recommended in certain states as chinch bug resistant. Similarly, workers are looking for strains of corn resistant to European corn borer and strains of wheat resistant to Hessian fly. Such investigations may reveal lines of attack useful to the farmer whose acreage of field crops is so extensive that the application of physical or chemical control measures is precluded because of impracticability.

Plants growing in the wild state are usually less injured by insects that attack them than are cultivated plants which seem to have acquired a greater degree of susceptibility. The characters which produce resistance in wild plants have through time been bred out of the cultivated crops (Imms, *Recent Advances in Entomology*, p. 240, 1931). However, we often find certain strains or individual plants that appear resistant to the injury of a particular pest. This absence of injury does not necessarily mean that a plant is resistant to attack, because the matter of host avoidance or host selection or preference enters strongly into consideration. The attacking insect may have avoided the particular uninjured plant due to its preference for others more to its liking.

Resistance usually implies a low degree of susceptibility. Very few plants are completely resistant to insect damage, so that we are usually compelled to recognize lesser degrees of resistance which we regard as either apparent resistance or partial resistance. Consequently, among those crops which exhibit partial resistance we have come to recognize what is now regarded as tolerance to insect injury. For the grower, a plant that can produce a good yield in spite of insect damage is almost

¹Contribution from the Entomological Laboratories of the University of Illinois, No. 164.

as valuable as an immune or resistant one. The measure of resistance in a host plant is its degree of immunity or lack of susceptibility to insect damage, while tolerance is computed on the basis of infestation and yield. In other words, a plant strain with high infestation and high yield exhibits greater tolerance than a strain with low infestation and the same high yield. It is therefore apparent that low infestation and high yield are the desired factors in a resistant strain.

Unfortunately, most strains that have been bred by plant geneticists which show a high degree of resistance are low in yield and further breeding is necessary to develop the yield factor. As a result, some plant geneticists and entomologists engaged on this problem have come to regard insect tolerance in a plant as a more desirable factor than resistance and one more easily obtainable. Wardle (*Problems of Applied Entomology*, 1929, p. 17) states that tolerance is "due possibly to strong and vigorous growth or to a reaction of the host tissues that tends to lessen the injury." If this is true, tolerant strains are more apt to be the resultant of environmental factors such as soil conditions, climate, crop nutrition, or some physiological factor, such as vigor, or physico-chemical factors such as density of cell-sap, sugar content, hydrogen ion concentration, osmotic pressure or electrical conductivity.

Geneticists are of the opinion that resistance, and perhaps tolerance as well, is due to the presence of some heritable factor or factors. Most work to date on this problem has been done by plant geneticists breeding for factors in plants resistant to insects. Practically, no attention has been devoted to the genetics of the attacking insect. It has been asserted by some workers that biological races or physiological varieties of insects are the products of mutant genes. It is known that among insects such as aphids and certain coccids, that alternation of host plants has led to the development of biological races. In America, the European corn borer (*Pyrausta nubilalis* Hbn.) has two such races which differ considerably in their feeding habits. The eastern strain is decidedly polyphagous. At least 200 larval food plants are known. It differs also in the production of two generations a year. The western race is decidedly limited in the number of food plants, less than a dozen

are of any importance, and there is but one generation a year.

Williston (Amer. Nat. 42:184, 1908) points out that ascendant phyla are more plastic than stabilized older phyla, which would indicate that the one-brooded, limited-host-plant, race of the European corn borer in the western area is more primitive than the eastern race. Wardle and Buckle (Principles of Insect Control, p. 2) assert that the polyphagous habit in insects is the more primitive. Such being the case the eastern race would be the older. Regardless of these divergent viewpoints it is clearly apparent from the two examples cited that it is the plasticity of a given insect race that must be taken into account in studying host-resistance or tolerance.

If as stated above, plants growing in the wild state are usually less injured and cultivated plants have acquired a greater degree of susceptibility, our search among plant strains for desired factors should lead us to the older and more resistant kinds.

Painter, Salmon and Parker (1931) have shown the Hessian fly (*Phytophaga destructor* Say) to have two biological races. Their studies seem to show that "these biological or physiological strains are genetically distinct. The evidence available also indicates that the population of fly in any one locality consists of a mixture of two or more strains which differ in their ability to infest the several varieties of wheat."

Up to the present time, most breeding work has been done on the assumption that the attacking species will react in the same manner under all conditions. If, as we maintain, resistance is inherited, is it not reasonable to think that various degrees of ability to injure or attack may likewise be inherited? Whether this ability is a genetic character of the species or is brought about by ecological conditions, it remains pertinent that a so-called resistant host plant will not exhibit resistance under all conditions. A strain of corn that may be resistant to the European corn borer in the western area of infestation, where the variety of host plants is limited, would scarcely be expected to show as marked resistance in the eastern area of infestation where it is subject to attack by a biological race of a different nature, whose food habits exhibit greater plasticity,

and which produces more generations per year. It would seem that the problem of the corn-breeder in producing a resistant strain for the one-brooded, limited host-plant race may be more capable of solution than the task of producing plants resistant to the two-brooded, polyphagous eastern race.

The situation, as just described, is more complicated in those areas of infestation where the two biological races of insects overlap. This condition occurs in the case of the Hessian fly described by Painter, Salmon, and Parker (*l.c.*) in which a given population of the insect in any one locality consists of a mixture of races with varying degrees of ability to inflict damage on the host. In this insect we have a species that differs from the European corn borer in being restricted to fewer food plants, which, theoretically, should make breeding for resistance a simpler task. In other words, were it not for the differences occurring in our biological races of the attacking species, it would be a far simpler problem to breed resistant hosts.

Genetic studies on insects have shown the vast number of varieties that may be bred in the laboratory. Such variations must also exist in nature and it seems imperative to know more of the genetics of our injurious species in order to assist us in breeding plants that are resistant to them. It is highly probable that we shall never be able to breed hosts that are entirely resistant against all biological races of a given species, which, at the same time, will have desirable agronomic characteristics. Each biological race must be considered as a distinct unit. It would seem, also, that the subject of host tolerance is one that must be given deeper study. Tolerant plants may be developed by the selection and breeding of those which show some degree of resistance, tolerance, or greater recuperative power. Tolerance in plants may also be enhanced by giving more attention to such matters as crop nutrition, better soil conditions, time of planting, and better seed, all of which can be more or less controlled by the grower. Even then, particularly with insects that prefer a wide choice of food plants, our developed resistance or tolerance may not be permanent because the attacking insects may be able to adapt themselves to our produced strains and accept them as new hosts.

Laboulbenia formicarum Thaxter, a Fungus Infesting some Idaho Ants, and a List of its Known North American Hosts (Hym.: Formicidae).

By A. C. COLE, JR., East Lansing, Michigan.

Workers of *Formica sanguinea* subsp. *puberula* Emery, *F. sanguinea* subsp. *subnuda* Emery and *F. subpolita* var. *camponoticeps* Whlr., collected by the writer in the Snake River Plains section of Idaho, were rather prominently infested with the ant fungus, *Laboulbenia formicarum* Thaxter. The infested colonies of *F. sanguinea subnuda* were found beneath rocks in a subalpine meadow, while colonies of the other species nested in the open sagebrush semidesert areas. Where one occupant of a colony was affected many others of the same nest were likewise diseased. Thus the spread occurred apparently within the nests. It is rather surprising that this fungus was found, inasmuch as summer temperatures of the region are so high and the relative humidity so low.

The ants now known to bear the fungus are as follows:

1. FORMICA PALLIDE-FULVA subsp. SCHAUFUSSI Mayr. Forest Hills, Massachusetts (J. Bequaert).
2. F. PALLIDE-FULVA SCHAUFUSSI var. INCERTA Emery. Sioux City, Iowa (C. N. Ainslie); Urbana, Illinois (M. R. Smith).
3. F. NEOGAGATES Emery. Cambridge, Massachusetts (Thaxter); Urbana, Illinois (M. R. Smith).
4. F. FUSCA Linn. Sioux City, Iowa (C. N. Ainslie).
5. F. FUSCA var. ARGENTEA Whlr. Urbana, Illinois (M. R. Smith).
6. F. SUBPOLITA var. CAMPONOTICEPS Whlr. Hollister and Twin Falls, Idaho (Cole).
7. F. SANGUINEA subsp. SUBNUDA Emery. Rogerson and Twin Falls, Idaho (Cole).
8. F. SANGUINEA subsp. PUBERULA Emery. Nampa, Idaho (Cole).
9. LASIUS NIGER var. AMERICANUS Emery. Cambridge, Massachusetts (Thaxter); Columbus, Ohio (M. R. Smith); Raleigh, North Carolina (Z. P. Metcalf).
10. L. NIGER var. NEONIGER Emery. Urbana, Illinois (M. R. Smith); Ellenville, Massachusetts (W. M. Wheeler).

The Duties of the Queen Wasp, *Polistes pallipes* (Hym.: Vespidae).

By PHIL RAU, Kirkwood, Missouri.

In reading accounts of the life history of *Polistes* wasps, one is led to believe that the founding queen, who when alone does all of the work of nest building and nest provisioning, ceases work when the first generation of workers appears and thereafter becomes a mere egg-laying machine. I was anxious to know just what the queen's duties are after the workers appear so I spent six hours, on July 14, 1929, on a step-ladder watching a queen and eight workers.

Sometime before the emergence of the workers, this queen was marked with a drop of paint; there is no outward differentiation between the queen and workers of this species so that a distinction by marking had to be made before the workers were born to set her apart.

Even though this queen had eight workers on the nest, she flew off at 10 a. m., remained in the field for three minutes and returned empty handed. At 10:35 a. m. she again ventured out for three minutes, returned with a mouthful of paper pulp, and then spent five minutes applying it to an unfinished cell.

She then spent some time poking her head into one or another of the cells, touching the larvae with her antennae, and sometimes kept it there for several minutes. This phenomenon of course is one of the little tricks practiced by wasps to get larva to spit up saliva which the adults drink. The workers practice it and so do the queens when alone on the nest. This little observation shows that the queens, or at least this queen, has not lost the desire to practice it even if the nest abounds with workers who are supposed to do all the nursing.

The workers brought in caterpillar meat from time to time and fed it direct to the larvae but sometimes they turned it over to one of the workers on the nest who in turn, after chewing it for a while, would apportion it to the larvae. One worker (marked with a white dot) shared half of a ball of yellow caterpillar meat with the queen. The latter chewed it for a

short while, then gave one half of it to one of the workers and the other half she fed direct to a larva; often during the day incoming workers with balls of wet paper pulp would divide it with the queen who would apply it to an unfinished portion of the cell.

The third time the queen left the nest that day was 2:47 p. m.; then she remained out for half an hour and returned empty handed. The observations show that one queen, at least, even though she had an abundance of workers to carry on the nesting activities, did not degenerate into a mere egg-laying machine, but took an active interest in the business affairs of the colony, actually doing the same kind of work as the workers. Queens show a great deal of individuality in behavior, and I wonder if another queen under similar circumstances would behave in precisely the same way. In another nest observed later, a marked queen often relieved an incoming worker of its load of pulp and applied it herself to an unfinished cell; and another observation during the same year showed that a certain queen *pallipes* spent an enormous amount of time away from the nest, and this even though she had a large number of workers. In still another nest the queen went out foraging with her previous regularity, even though she had a force of five workers.

One cannot spend six hours watching a colony of wasps without noting other items of behavior that one has not especially sought. I was fortunate in seeing a newly adult worker bite its way out of its cell early in the morning and remain in hiding on top of the nest nearly all day. She was shy and seemed to be afraid of the queen, since she would only venture to the active part of the nest during the queen's absence and would rush back to her hiding place the moment the queen returned. One of the workers (marked in blue) that was especially active in bringing in loads of caterpillar flesh, singled out this shy young one, and to my amusement gave the juvenile its first lesson in nursing. "Blue Dot" came in with a big load of flesh, flew immediately to the roof, pushed the shy one out from its hiding place, thrust the entire meat market into its

front legs and then flew from the nest. This shy one had a lesson to learn and she had to do it without further instruction, and this is how she handled this big mass of meat. She evidently did not know what to do with it, and for more than an hour turned it round and round in her forelegs, much as a squirrel would manipulate a nut, and at short intervals she would imbed her jaws into the flesh and swallow the juices until the great mass was reduced to half its original size. Then the portion that was left was separated into two parts, one going to feed a larva in one of the cells, and the other was again manipulated with the jaws until it gradually became smaller and smaller and finally the last vestige disappeared down her own gullet. The disposal of the last portion demonstrated that not only do the adults use caterpillar juice for food but also that they devour the flesh as well. The moment the food was gone this youngster made a careful toilet for several minutes, and then beat a hasty retreat to the hiding place on top of the nest. Late in the afternoon the shy one ventured among the crowd at the open face of the nest, often poking her head into the cells with larvae, and was learning so rapidly that before I left I saw her take several loads of meat from the incoming foragers and feed them to the larvae in the approved fashion.

To summarize then, the founding queens of *P. pallipes* do not devolve into egg-laying machines the moment the workers appear, but continue to take an active interest in building, foraging and nursing; also the newly emerged worker remains on the nest for the first day and, in an awkward fashion, possibly through imitation, learns to play nurse to the larvae.

Longevity and the Moulting of the Myriapod, *Spirobolus marginatus* Say.*

A myriapod fully five inches long and about one-fourth inch in diameter was brought to me on June 8, 1930. The animal lived quite contentedly among the rotten wood in a glass fish globe until its death on January 20, 1932. This made the length of life in captivity almost a year and eight months. It

* Kindly identified by C. V. Chamberlin.

ate of the rotten wood, letting the frass accumulate in the jar. It also ate raw potato, but would readily leave the potato for the leaves of cabbage.

The rotted wood was occasionally sprinkled with water, and remained the myriapod's main supply of food; it remained surprisingly free of fungus, although the cabbage was densely covered with a webby growth soon after being placed in the jar. The myriapod itself as well as the large amount of frass in the jar was immune from fungus attacks. This immunity of both the animal and its excrement was undoubtedly due to the influence of the creature's musky secretions. Sinclair (Camb. Nat. Hist., Peripatus, Myriapods & Insects, p. 36, 1895) says that the millepeds rely for protection on the fluid secreted by the stigmata repugnatoria. This fluid has been shown to contain prussic acid, and has a very unpleasant odor.

The jar at one time was nearly full of woody pellets of excrement, and on July 18, 1931, I noticed that the myriapod had made its way through this mass and rested in a coiled position at the bottom of the jar. A week later when I dug down to the bottom I noticed that a brownish secretion oozed from its body at the joints of several segments. A month later, when it still remained at the bottom, I again dug down, and then found large pieces of shedding skin adhering to the body. This showed that a complete moult had occurred during the month. I replaced the frass, and on September 1st, the myriapod came to the top of its own volition, and resumed feeding on the rotten wood, and so continued until death.—PHIL RAU, Kirkwood, Missouri.

Plecoptera as Food for Bank Swallows.

Apropos of the recent discussion by Hamilton (The Auk, 49, No. 3, 1932, and 50, No. 3, 1933), by McAtee (Smithsonian Misc. Col. 85, No. 7, 1932) and Knappen (The Auk, 51, No. 1, 1934) it may be pertinent to record the presence of Plecoptera in the stomach contents of a Bank Swallow (*Riparia r. riparia*).

In the examination of more than 60 stomachs of Bank Swallows, both adults and young, collected in the Oneida Lake, New York region, I encountered remains of these insects in but a single bird. This swallow was an adult male taken from a burrow on the south bank of Fish Creek about eight miles northeast of Oneida Lake on May 15, 1931.

The stomach of this bird was full. An examination of the content showed that the bulk of it (70 per cent) consisted of two-winged flies (Diptera) principally Muscidae, although

crane-flies (Tipulidae) also were represented. Beetles (Coleoptera), consisting principally of small dung beetles (Aphodiini: Scarabaeidae), amounted to 28 per cent. Traces of Orthoptera (Gryllidae), Heteroptera and Homoptera (Fulgoridae) were present while several small hymenopterous forms (Braconidae and possibly others) amounted to 1 per cent. In addition, this stomach contained two small adult stoneflies (Perlidae: Plecoptera) comprising 1 per cent of the food eaten. These delicate insects had been little mangled in the act of deglutition and one of the specimens was sent to Dr. P. W. Claassen of the Department of Entomology, New York State College of Agriculture, who determined it as *Alloperla mediana* Banks.

During the course of several seasons spent in investigating the Bank Swallow and other birds in the Oneida Lake region, I have often observed adult stoneflies clinging to the vertical sandy banks along Fish Creek where thousands of Bank Swallows nest. Excellent breeding places for these insects are afforded in the waters of Fish Creek and at least some of its tributaries. The comparative abundance of stoneflies can not be denied. It seems strange, therefore, that these weak-flying, soft-bodied insects do not form a greater part of the diet of Bank Swallows in this territory than is indicated by our findings.

Mr. W. L. McAtee informs me that the U. S. Biological Survey has no record of the presence of stoneflies in the stomachs of Bank Swallows and, so far as I have been able to determine, this constitutes the first published record of such occurrence.—DAYTON STONER, New York State Museum, Albany, New York.

The Sixth International Congress of Entomology.

At the meeting of the Entomological Society of America, at Pittsburgh, Pennsylvania, December 27-29, 1934, it was announced that Prof. O. A. Johannsen, of Cornell University, member of the Permanent Executive Committee of the International Congresses of Entomology, had received a message from Prof. I. Bolivar y Urrutia, President of the Sixth International Congress, that the Congress will meet at Madrid, in the first half of September, 1935. Particulars will be furnished later.

The Compte Rendu of the Fifth Congress (Paris, 1932) states that invitations for holding the Sixth Congress were received from Egypt, Spain and Germany. The Congress voted to accept the invitation of Spain for 1935 and that the Seventh Congress be held in Germany (page 59).

Orthoptera New to Colorado

Since the publication of Mr. Hebard's "Orthoptera of Colorado" (Proc. Acad. Nat. Sci. Phila. LXXI: 303-425, 1929), the writer has collected two species of Tettigoniidae and one of Acrididae not then recorded from the state. No one of these may be considered accidental, each species being represented by several specimens.

Scudderia texensis Saussure & Pictet is represented in the University of Colorado collection by a male taken at Boulder, Colorado, September 20, 1923, by S. Miller. Prof. F. B. Isely took the following specimens in 1931: one male near Roggen, Colorado, August 6; two males at Boulder, Colorado, August 14. On August 29, 1933, I took a female of this species in a vacant lot in Boulder. It is evidently established at Boulder, at least, but is comparatively rare.

Cyphoderris monstrosa Uhler has already been recorded from Colorado, its southeastern limit, by Mr. Hebard in his recent revision of the genus (Tran. Amer. Ent. Soc. LIX: 363-375, 1934). In addition to the specimen there recorded, two other males were collected at the same time and place. All were located, while stridulating, at about 9 P. M., August 17, 1932. They were in pine forest in the mountains of the Park Range, west of Crowley, Colorado, and at an elevation of about 8,800 feet above sea-level.

On September 8, 1932, I collected in the sand hills near Roggen, Colorado, a female of a species of *Eremiacris*. Mr. Rehn, who examined the specimen, suggested an attempt to get additional ones. Consequently, a trip to the same area was made on September 9, 1933, and an intensive search of several hours, chiefly in grasses of several species of *Andropogon*, yielded twenty-two specimens,—nine males and thirteen females. Several specimens were sent to Messrs. Rehn and Hebard, who determined them as *Eremiacris pallida* (Bruner), a species rather widely distributed west of the southern Rocky Mountains but not previously found so far to the northeast. The Roggen specimens, however, are shorter than the dimensions given by Rehn and Hebard in their 1909 key (Proc. Acad. Nat. Sci. Phila. LXI: 133-134) to *Paropomala* Scudder (*Eremiacris* Hebard, in part). The species cannot be confused with *Eremiacris virgata* (Scudder), which has been taken in southeastern Colorado.—GORDON ALEXANDER, Department of Biology, University of Colorado, Boulder, Colorado.

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

1. Transactions of The American Entomological Society. Philadelphia
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annals of the Carnegie Museum. Pittsburgh, Pa.
4. Canadian Entomologist. London, Canada.
5. Psyche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. 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'Agricoltura 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. Bollettino 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 Janeiro. 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 chilena 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 öserr. 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 hebdom. 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, Czechoslovakia.
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 Entwicklungsmechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
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 Científica Argentina, Buenos Aires.
107. Stylops: a Journal of Taxonomic Entomology, London.
108. Revista. Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten ueber morphologische und taxonomische entomologie aus Berlin-Dahlem.
110. Arbeiten ueber physiologische und angewandte entomologie aus Berlin-Dahlem.
111. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.

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.—Fall, H. C.—A choice of words. [4] 66: 233-234. Felt, E. P.—Classifying symbols for insects. [6] 42: 373-392. Goding, F. W.—Obituary. By C. E. Olsen. [6] 42: 443-449.

ANATOMY, PHYSIOLOGY, ETC.—André, M.—L'épistome et l'appareil buccal des Caeculus (Acariens prostigmatiques). [58] 9: 93-96, ill. Ball, E. D.—The number of generations of the beet leafhopper under natural conditions. [12] 27: 945-959, ill. Bodenheimer, F. S.—Ueber die temperaturabhangigkeiten der insekten. [89] 66: 113-151, ill. da Costa Lima, A.—Aplicaço de uma technica de para a montagem da terminalia dos mosquitos. [105] 4: 499-501, ill. Eckert, J. E.—A gynandromorph honeybee. [12] 27: 1079-1082, ill. Hambleton, J. I.—Bee behavior. [76] 1934: 544-546, ill. Hasebrock, K.—Industrie-und grosstadt als ursache des neuzeitlichen vererbbaeren melanismus des schmetterlinge in England und Deutschland. [Forsch. u. Forsch. Berlin] 10: 307-398, ill. Herms & Ellsworth.—Field tests of the efficacy of colored light in trapping insect pests. [12] 27: 1055-1067, ill. Herriot, A. D.—The renewal and replacement of the stylets of sucking insects during each stadium and the method of penetration. [Can. Jour. Res.] 11: 602-612, ill. Holdaway & Mulhearn.—Sheep sweat a factor in blowfly attack of sheep. [31] 134: 813-814. Hoskins & Craig.—The olfactory responses of flies in a new type of insect olfactometer. [12]

27: 1029-1036, ill. **Lebedev, A. G.**—Ueber den gesetzmässigen zusammenhang zwischen bienen und pflanzen. [56] 13: 160-170. **Mayer, K.**—Beitrag zur sinnesphysiologie der schlupfwespe *Nemeritis canescens* (Ichneumonidae). [110] 1: 245-248. **Moore, W. G.**—The production of sterility in *Drosophila melanogaster* by x-ray treatment. [90] 68: 508-515. **Norris, M. J.**—Contributions towards the study of insect fertility. Adult nutrition, fecundity and longevity in the genus *Ephestia*. [93] 1934: 333-360. **Pictet, A.**—Instincts et survivance. [Lambillionea] 1934: 209-219. **Sen, S. K.**—The sucking apparatus of ticks. [31] 134: 664. **Stickney, F. S.**—The external anatomy of the parlatoria date scale, *Parlatoria blanchardi*, with studies of the head skeleton and associated parts. [U. S. D. A. Tech. Bul.] 421: 66 pp., ill. **Tirelli, M.**—Spostamento del pigmento nelle cellule della sierosa durante lo sviluppo embrionale nel *Bombyx mori*. [Bol. Z. Union Zol. Ital.] 5: 163-172, ill. **Vansell, G. H.**—Relation between the nectar concentration in fruit blossoms and the visits of honeybees. [12] 27: 943-945. **Warren, E.**—On the male genital system and spermatozoa of certain millipedes. [An. Natal. Mus.] 7: 351-402, ill. **Zacwilichowski, J.**—Ueber die innervierung und die sinnesorgane der flugel von schabe *Phyllodromia germanica*. [Bul. Acad. Polonaise Sci. et. Let.] 1034, B. 2: 89-104, ill.

ARACHNIDA AND MYRIOPODA.—**Davis, N. W.**—A revision of the gen. *Leiobunum* (Opiliones) of the U. S. [Am. Midl. Nat.] 15: 662-705, ill. (*). **Exline & Hatch.**—Note on the food of the black widow spider. [6] 42: 449-450. **Mello-Leitao.**—Pequenas notas arachnologicas. Notas sobre os opiliones do Brasil. Ensaio sobre as Myrmarachninas do Brasil. [Bol. Mus. Nac. R. de Jan.] 8: 67-75; 9 (1): 99-114; 9 (2): 39-101, ill. (*). **Schroeder, C. R.**—The snake mite (*Ophiomyssus serpentium*). [12] 27: 1004-1014, ill. **Verhoeff, K. W.**—Beiträge zur systematik und geographie der Chilopoden. [89] 66: 1-112, ill. **Werner, F.**—Scorpiones, Pedipalpi. Bronns Klass. Ordnung. Tierreichs. V, (4) pp. 161-316, ill.

THE SMALLER ORDERS OF INSECTS.—**Cowley, J.**—The types of some genera of Odonata. [9] 67: 249-253. **Friederichs, K.**—Das gemeinschaftsleben der Embiiden und naheres zur kenntnis der arten. [52] 3: 405-444, ill. **Pyecraft, W. P.**—Feather eaters [Mallophaga]. [Ill. London News] 95: 806, ill. **Tinkham, E. R.**—The dragonfly fauna

of Presidio and Jeff Davis Counties of the Big Bend region of Trans-Pecos, Texas. [4] 66: 213-218.

ORTHOPTERA.—**Hebard, M.**—The Dermaptera and Orthoptera of Illinois. [Bull. Ill. Nat. Hist. Surv.] 20: 125-279, ill. (*).

HEMIPTERA.—**Brown, W. F.**—The genus *Chlorotettix* in America, north of Mexico. [Univ. Kans. Sc. Bul] 21: 235-256, ill. (*). **de Carlo, J. A.**—Familia Belostomidae. Descripciones de especies nuevas procedentes del Brasil. [Bol. Mus. Nac. R. d. Jan.] 9 (1): 93-98, ill. **Cummings, C.**—The giant water bugs. (Belostomatidae). [Univ. Kans. Sc. Bull.] 21: 197-220, ill. (*). **Dow, R.**—The periodical cicada on Martha's Vineyard. [Bull. Boston Soc. Nat. Hist.] 1934: 3-5, ill. **Drake & Bondar.**—Concerning Brazilian Tingitidae. [Bol. Mus. Nac. R. d. Jan.] 8: 87-96, ill. (*). **Drake & Hambleton.**—Brazilian Tingitidae. [105] 4: 435-451. (*). **Hungerford, H. B.**—The genus *Notonecta* of the World. [Univ. Kans. Sci. Bul.] 21: 5-196, ill. **Johnston, H. G.**—*Lygus lucorum* re-discovered in North America (Miridae). [4] 61: 231-232, ill. **Shaw, J. G.**—A study of the Genus *Brachymetra* (Gerridae). [Univ. Kans. Sc. Bul.] 21: 221-234, ill. (*).

LEPIDOPTERA.—**d'Almeida, R.**—Studien ueber die gattung *Terias*. [14] 48: 115-118, ill. (S*). **Bell, E. L.**—Studies in the Pyrrhopyginae. [6] 42: 393-440, ill. **Crumb, S. E.**—A classification of some noctuid larvae of the subfamily Hypeninae. [70] 14: 133-196, ill. **Fernandez, A.**—Nuevas formas de lepidopteros exóticos (S). [Bol. Soc. Espana. H. N.] 32: 453-454, ill. **May, E.**—*Prepona meander* castorina. [Bol. Mus. Nac. R. de Jan.] 8: 64-65. (S*). **Wille, J.**—Der "Perforador de la bellota", *Mescinia peruellea*, ein wichtiger schädling der baumwolle in Perú. (Pyralidae). [105] 4: 455-485, ill. (*).

DIPTERA.—**da Costa Lima, A.**—Chave para a determinação dos Flebotomos americanos. [105] 4: 427-429. **da Costa Lima, A.**—Moscas de frutas so gen. *Anastrepha*. [Mem. Ins. O. Cruz] 28: 487-576, ill. (S*). **Curran, H. C.**—New American Asilidae, III. [40] 752: 18 pp. **Reinhard, H. J.**—Revision of the American two-winged flies belonging to the genus *Cuphocera*. [50] 83: 45-70. (*). **Scott, H.**—The puparium of *Nycteribia* (*Listropodia*) *pedicularia* with general remarks on this stage in *Nycteribiidae*. [8] 70: 255-259, ill. **Shaw, F. R.**—A new species of *Sciara*. [4] 66: 233, ill. **Townsend, C. H. T.**—Mosquitoes of the Rio Tapajós. [105] 4: 486-499.

COLEOPTERA.—**Bernhauer, M.**—Neue Staphyliniden aus Argentinien. [105] 4: 501-517. **Blaisdell, F. E.**—Rare North American Coleoptera. [1] 60: 317-326, ill. (*). **Borgmeier, T.**—Uma nova tribu da subfamilia Aleocharinae (Staph.). [105] 4: 451-455. **Hinton, H. E.**—Notes on Aphodius in the cadaverinus group with a description of a new species. (Scarabacidae). [4] 66: 218-220. (cont.). **Maydell, G. G.**—New species of North American Meloidae. [1] 60: 327-336. **Nagel, P.**—Zur systematik und biologie von *Sclerostomus ruficollis*, nebst beschreibung der larve. (Lucanidae). [105] 4: 429-435, ill.

HYMENOPTERA.—**Compere & Flanders.**—*Anarhopus sydneyensis*, an encyrtid parasite of *Pseudococcus longispinus* recently introduced into California from Australia. [12] 27: 966-973, ill. **Molitor, A.**—Beiträge zur oekologie und ethologie der Hymenopteren. [Bol. Lab. di Ent. R. Ist. Sup. Agr. Bologna] 6: 151-163.

OBITUARY

The daily press announced the death of DR. THEOBALD SMITH, on December 10, 1934, at New York. While he was in charge of investigation of infectious animal diseases in the Bureau of Animal Industry, U. S. Department of Agriculture (1884-95), he and Kilborne showed that Texas fever was spread from infested to healthy cattle by the tick, *Margaropus* (or *Boophilus*) *annulatus*, said to be the first demonstration that arthropods transmit pathogenic organisms. He was born at Albany, New York, July 31, 1859, received the degree of Ph. B. from Cornell in 1881, and of M. D. from Albany Medical College, Union University, in 1883. While connected with the U. S. Department of Agriculture, he was also professor of bacteriology at George Washington University. From 1896 to 1915, he was professor of comparative pathology at Harvard University, and from 1916 to 1929, director of the department of animal pathology of the Rockefeller Institute at Princeton, New Jersey. He was the recipient of many honorary degrees from universities in the United States and Europe, and member or fellow of such bodies as the Royal Society of London, and the Academies of Science of Paris, Denmark and the United States.

The number of ENTOMOLOGICAL NEWS for December, 1934, was mailed at the Philadelphia Post Office on December 20, 1934.

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.

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 Hesperidae. 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.

Wanted—Names and addresses of those desiring Cocoons of Actias luna and Automeris io. Exchange considered. Eggs in season. Virginia Weaver, 822 S. College Ave., Tulsa, Okla.

Literature Wanted—Barnes & McDunnough's "Contributions," Henry Edward's "Pacific Coast Lepidoptera" and other publications relative to North American Lepidoptera. C. F. dos Passos, Mendham, New Jersey.

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COLEOPTERA

- 989.—Blaisdell (F. E.).—Studies in the genus *Auchmobius*.
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DIPTERA

- 987.—Huckett (H. C.).—A revision of the North American
species belonging to the genus *Coenosia* (Muscidae).
II. The subgenus *Limosia*. (Trans., 60, 133-198, 6
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- 988.—Cresson (E. T.).—Descriptions of new genera and species
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199-222, 1934)50

LEPIDOPTERA

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FEBRUARY, 1935

Vol. XLVI

No. 2



JOHN MERTON ALDRICH;
1866-1934.

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No. 2

Notes on the Nesting Habits of the Red-bellied Bee, *Andrena rythrogaster* Ash.* (Hymen.: Andrenidae).

By PHIL RAC, Kirkwood, Missouri.

In April of each year for the past six years, these solitary but gregarious bees have been nesting in my garden. They dig their burrows in the hard-packed soil of the foot path as well as in the grassy plots nearby. Their nests are easily found because a conspicuous ant-hill-like mound of fine dirt covers each tunnel. These mounds are as readily seen on the grassy plots as on the barren foot path.

The insects have been given the manuscript name of "Red-bellied bees" because of the large bright red abdomen of the female. This is in decided contrast to the small-sized and somber-colored male. Both males and females emerge from the ground within a period of two or three days, and then the mothers use the same nesting site from which they have emerged to do their own nesting. This of course makes this solitary bee a gregarious species, not so much because it is psychologically neighborly, but because it is far easier to nest where it happens to be born than to seek distant sites. There is an advantage too in keeping close to home in that impregnation is more easily accomplished. This is an advantage to insects that have short adult lives. The males fly about the nests, often rest in the grass for long periods near a mound and have occasionally been seen to enter a burrow; and often too, they have been glad to make a hasty escape, when put to rout by a busy mother.

The duration of adult life of this bee is short; at the most it is only from three to four weeks. Then the adults die off and are not seen again until the new generation appears next spring.

* Identified by Dr. Grace Sandhouse.

I said that the bees make "ant-hill-like" mounds on top of their burrows. These are conical and roughly about one and one-half inch to two inches in diameter with an opening at the side or top. The bees themselves are seldom seen when they are making these mounds. During digging operations the soil is pushed up from below with the abdomen while the bee walks backward towards the top.

The suddenness with which these mounds appear makes one suspect that the bee actually uses and enlarges the tunnel in which she has spent the winter as an immature insect. This theory is also strengthened by the fact that one seldom sees the mother bee beginning a new excavation. Of course some bees must occasionally dig new nests or the colony would not have been started in my garden.

The adult length of life which is entirely devoted by the mother to nesting is, as I have said, of about three to four weeks' duration, but coming as it does in April, the month of showers, their activities are much interrupted and curtailed. Sometimes when the rains are prolonged or severe the mortality is great, for often the soil of the mound is washed into the burrows and occasions much labor for the few mothers who are able to extricate themselves and often they are drowned when the rains enter the nests. It is surprising that in the face of short life and much hardship the species is able to maintain itself sufficiently to give forth a colony of offspring year after year.

The following table shows the dates when the bees first appeared and the approximate date when the nesting activities terminated.

Year	First seen	Activities terminated	No. of nests in colony	No. of mounds counted later
1925	April 18	May 10	April 18, 20.	.....
1926	April 19	.....	April 19, 9.	April 21, 25
1928	April 4	April 30	April 4, 3.	April 8, 50
1930	April 9	May 5	April 11, 48.	.....
1931	April 12	.....	April 12, 25.	April 15, 110
1932	April 14	May 8	April 14, 6.	April 18, 75

Thus we see that the bees made their appearance each year between April 4th and 19th, during a period of six years when the records were kept, and lived for a period of from three to

four weeks; that the number of nests reached a total of from twenty in 1925 the first year of observation to the maximum of one hundred ten in 1931.

Since the bees have little difficulty in getting food for themselves or offspring, and since no enemies in the way of parasites were seen about the nests, the fluctuation in population numbers must be wholly due to the weather conditions at the time of nesting. The biggest factor influencing population is the amount of rainfall in April. For the benefit of future compilers of the relation of insects to rain, I here append the following from my note book on the havoc played by this element.

There was much rain from April 8th to 14th, 1928, and all activity about the nests had stopped; in fact the mounds above the burrows had been beaten flat and entirely covered the openings; four days after the rain ceased (April 18th) only three mothers (out of fifty) were able to extricate themselves and were again at work. Heavy rains again occurred on April 20, 21, and 22, and these three nests were covered solid with mud, and out of these three nests one mother survived and was able to continue her nesting work on April 23rd.

Cool days are also a hindrance to nest building. There are often several cool dreary days in April and then *Andrena* remain comfortably indoors, but they are ambitious in propitious weather and often at 6 a. m. the mothers can be seen pushing up the soil in their burrows; they, however, do not become active among the flowers (gathering pollen) until the sun becomes warm, which, in April, is usually about 9 a. m.

Acridian Researches within Northeastern Texas (Orthoptera).

By F. B. ISELY, Trinity University, Waxahachie, Texas.

INTRODUCTION.

During the past four years, 1931-34, the writer has been carrying on field and experimental studies concerning the *ecology of orthopterous insects*. Year-around field study trips one hundred twenty-four to date in northeastern Texas—have

thoroughly investigated in Anderson, Marion, Smith and Van-Zandt counties: only a partial check has been possible of the grand prairie short-horned grasshoppers as found in Bosque, western Denton, Hill, Johnson, and Tarrant counties; while only a beginning has been made on the field work of the west cross timbers.

However, enough data have been brought together for significant comparisons of the acridians of these several areas. Altogether twenty northeastern Texas counties have contributed to the total of the species studied, but it is well to note that the center from which the field work has radiated has been Ellis county. With a few exceptions, all of the data herein presented are based on my personal field investigations.

Historically speaking this area is of considerable interest to entomologists. Dallas County was the center of the entomological studies of Jacob Boll² for the period of twelve years (1869-81), while Gustaf W. Belfrage,³ who prodigiously collected Texas insects for fifteen years (1867-82), worked especially in Bosque county. While neither of these "pioneer naturalists" published the results of their collecting, it is well known that both were all around entomologists. A number of type species of Orthoptera described by Scudder, Saussure, Stål and others were based on specimens and species first collected and studied by Boll or Belfrage, while many of the large museums and collections, both in Europe and America, have extensive series of orthopteran species sent in by them from Texas.

Dr. S. W. Geiser has pointed out, however, that as far as specific localities are concerned, Boll's *Dallas* and Belfrage's *Bosque County*, as credited and cited by entomological writers, are not always specific for these localities, as both made collecting forays into the "Piney Woods" of east Texas and other excursions west and southwest (San Antonio) from their home

¹ Carter, W. T., *The Soils of Texas*, Bull. 431, Tex. Agri. Exp. Sta. (1931).

² Geiser, S. W., *The American Midland Naturalist*, XI, pp. 435-452, (1929).

³ Geiser, S. W., *Southwest Review*, XIV, pp. 381-98, (1929), and *ENTOMOLOGICAL NEWS*, XLIV, pp. 127-132, (1933).

stations respectively. Acridian literature abounds with scattered references from Texas, chiefly due to the work of Boll and Belfrage. Unfortunately most of these fragmentary references are more or less inaccessible to the average worker. Recent papers by Hebard,⁴ to ⁷ Morse,⁸ Rehn,⁹ Little¹⁰ and Isely¹¹ are helpful and suggestive, but do not apply directly to northeastern Texas.

The writer is deeply indebted to Mr. Morgan Hebard, Research Associate of the Department of Entomology of the Academy of Natural Sciences of Philadelphia, for helpful suggestions and difficult determinations.

On most of my study trips from one to three assistant collectors have aided me in making more complete records than would otherwise have been possible. This generous assistance was given the writer by members of his immediate family, Trinity University students and friends. My wife, Mary N. Isely, not only assisted in field work but has aided me as preparator of materials for study. In the case of a few species specific acknowledgment is given elsewhere in this paper for records obtained by other workers.

DATA CONCERNING SPECIES.

Some of the salient facts that have been gathered through one hundred and twenty-four year-around study trips and the rechecking of notes concerning 6287 individual specimens from my field records, representing eighty-seven species, are summarized below.

¹ Hebard, Morgan, Orthoptera of Kansas, Proc. Acad. of Nat. Sc. of Philadelphia, pp. 119-227, (1931).

² Hebard, Morgan, The Dermaptera and Orthoptera of Illinois, Div. Ent. Nat. Hist. Surv., Bull., XX, pp. 125-269, (1934).

³ Hebard, Morgan, Dermaptera and Orthoptera in the Kansas State College Collection, Jour. Kansas Ent. Soc., VII, pp. 25-36, (1934).

⁴ Hebard, Morgan, Notes on Orthoptera from Northwestern Minnesota, ENT. NEWS, XLV, pp. 103-106, (1934).

⁵ Morse, A. P., Further Researches of North American Acrididae, Pub. No. 68, Carnegie Inst. of Washington, (1907).

⁶ Rehn, J. A. G., A Study of the Orthopterous Genus *Mermiria* Stal. Proc. Acad. of Nat. Sc. of Philadelphia, 1919, pp. 55-120, (1919).

⁷ Little, V. A., Notes of the Acrididae of Brazos County, Texas, ENT. NEWS, XXXVII, pp. 316-19, (1926).

⁸ Isely, F. B., Field Notes on Texas Orthoptera, ENT. NEWS, XLV, pp. 5-8, (1934).

In stating the relative numbers of individuals, I am employing terms much used by field biologists in census and population studies; in an ascending order the series here used is as follows: rare, infrequent, occasional, frequent, common, abundant, very abundant, swarming. These should serve to give other interested workers comparative information at least as far as they apply to the present study.

Seasonal range is indicated either in Roman notation I-XII, (January to December) or by naming the months. For the most part the active peak period of the annual cycle of a species is emphasized but in many cases the entire known seasonal range is given. In the case of the more populous and characteristic species "peak seasonal records," as shown by my field data, are given.

Local regional distribution is indicated by naming the counties where species have actually been taken as checked by my own field records. To a limited extent general faunal areas are indicated and in the case of a number of well-known ubiquitous species the listing of counties has been omitted.

LIST OF SPECIES STUDIED.

ACRYDIINAE.

NOMOTETTIX CRISTATUS DENTICULATUS Morse. Bisbee, Tarrant County, III, 31, '33, 2 ♀; Carter Lake, Marion Co., III, 31, '34, 4 ♂, 1 ♀.

PARATETTIX CUCULLATUS CUCULLATUS (Burm.). Common to abundant in favorable habitats—stream, pond, and lake margins—throughout the year. 107 specimens checked from Ellis, Anderson, Dallas, Harrison, Marion, Smith, Henderson, Somervell, Tarrant, and Van Zandt Counties.

TETTIGIDEA LATERALIS LATERALIS (Say). Common, I-XII, Ellis, Anderson, Harrison, Hill, Smith, Tarrant, and Van Zandt Counties.

T. ACUTA Morse.⁸ Elkhart, IX, 1, '33, 1 ♀; Carter Lake, IV, 1, '34, 2 ♂, 2 ♀.

ACRIDINAE.

TRYXALIS BREVICORNIS (Johann). Edom, Van Zandt County, VIII, 1, '33, 1 ♂; Tyler, Smith Co., VIII, 2, '33, 7 ♂, 3 juv. ♀; Elkhart, Anderson County, IX, 1, '33, 13 ♂, 5 ♀. All records from east Texas timbers.

MERMIRIA PICTA (Walker). Ben Wheeler, Van Zandt Co., VIII, 2, '33, Im, 6 juvs.; same locality (Jean Wilson) VIII, 20, '33, 7 ♂, 7 ♀; Elkhart, IX, 1, '33, 9 ♂, 4 ♀. East Texas timbers.

M. NEOMEXICANA (Thos.). Locally frequent to abundant in Ellis, Dallas, Parker, and Tarrant during August and September. Earliest record, Camp Wisdom, Dallas County, VII, 16, '33, 4 ♂; latest record, Bell Branch, Ellis County, XI, 11, '31, 1 ♂, 1 ♀.

M. BIVITTATA (Serville). With the aid of Rehn's key⁹ the males are easily separated from *M.m. maculipennis* with which species *M. bivittata* was always closely associated wherever it was found. Thus far this species has not been secured in my field studies in the grand prairies or in the west cross timbers; VI-VIII; Ellis, Dallas, Johnson Counties.

M. MACULIPENNIS MACULIPENNIS Bruner. This species is the outstanding virgin prairie acridian during July and August in both the black prairies and the grand prairies. While very abundant in the sandy *Andropogon* sp. stretches of the east cross timbers, I did not take *maculipennis* in four days field work in southeastern Van Zandt, Smith, and Anderson Counties. 313 specimens have been checked in my field studies. Earliest adult record is VI, 16, peak of abundance through July, swarming in optimum localities; VI-X; Ellis, Hill, Dallas, Johnson, Palo Pinto, Parker, Tarrant Counties.

MESOCHLOA ABORTIVA Bruner. An active fall and winter species, common on warm days X-V, Ellis, Bosque, Dallas and Tarrant Counties. Third instar juveniles taken in Palo Pinto and Parker Counties, VIII, 1-2, '34.

ACROLOPHITUS VARIEGATUS (Thos.). Common in optimum localities in late May and June, only occasional specimens during July; Ellis, Dallas, Johnson, Denton, Tarrant and Wise Counties.

SYRBULA ADMIRABILIS Uhler. Reaches peak of abundance in late August, although many juveniles may be taken in September. While never swarming in the numbers observed for *M. maculipennis* and certain of the Melanopli, *S. admirabilis* is by far the most populous and widely distributed Acridian in this area from middle August into October. Taken in every locality where collecting has been done during these months and frequently outnumbering in individuals all other species of the Acrididae combined. Field notes: "McWhorter's ranch, May Pearl, Ellis County, IX, 16, '32, in upland, Houston stony clay, weedy pasture (chiefly broom weeds, *Amphichyris*).

Four collectors working for one hour in late afternoon, found 34 species of Orthoptera among 131 specimens; 90 individuals of this lot represented 19 species of the Acrididae; of the 90, 49, or over half, were *S. admirabilis*, 19 ♂, 25 ♀, 5 juvs.; other leading associates in this habitat at this date were *M. m. mexicanus*, 8 ♂, 4 ♀; *M. m. scudderi*, 6 ♂, 5 ♀; *C. o. olivaceae*, 2 ♂, 5 ♀." Taken in Ellis, Anderson, Bosque, Dallas, Denton (Dr. B. B. Harris), Henderson, Hill, Johnson, Freestone, Kaufman, Palo Pinto, Parker, Tarrant and Van Zandt Counties.

S. FUSCOVITTATA (Thos.). This species has been rare with the exception of one station, Camp Wisdom, Dallas County, IX, 18, '31, 15 ♂, 15 ♀; also taken in Ellis, Bosque and Parker Counties.

OPEIA OBSCURA (Thos.). An occasional to frequent mid-summer and fall species among short mesquite grasses; Ellis, Johnson, Palo Pinto, Parker and Tarrant Counties.

AMPHITORNUS COLORADUS (Thos.). Only 8 ♂, 17 ♀, 1 juv., and these chiefly from the grand prairie stations; VI-VIII; Ellis, Dallas, Palo Pinto, Parker, Tarrant and Wise Counties.

AMBLYTROPIDA OCCIDENTALIS (Sauss.). A late fall and winter species. Locally occasional to common in east cross timber and east timber open woods; X-V; Anderson, Harrison, Johnson, Marion and Tarrant Counties; peak collection at Mansfield, Tarrant County, IV, 21, '34, 6 ♂, 14 ♀.

ERITETTIX SIMPLEX (Sc.). This comparatively infrequent species proved to be common in an old pasture with a heavy growth of dead prairie grass (*Andropogon* sp.), White Rock Lake area, Dallas County. Field notes: "Four collectors working over an hour secured IV, 28, '34, 18 ♂, 34 ♀." Infrequent juveniles have been taken in March, June and November; Ellis, Dallas and Tarrant Counties.

PHLIBOSTROMA QUADRIMACULATUM (Thos.). Infrequent to occasional at grand prairie stations; VI-VIII; Ellis, Johnson, Palo Pinto, Parker and Tarrant Counties.

ORPHULELLA PELIDNA (Burm.). Locally common in open, sandy, oak woods; VI-IX; Anderson, Dallas, Freestone, Johnson, Kaufman, Tarrant and Van Zandt Counties.

ORPHULELLA SPECIOSA (Sc.). An abundant late summer and fall acridian found especially in short bermuda grass pastures. Taken at prairies as well as at east cross timber and east timber stations; V-XII; Ellis, Dallas, Freestone, Navarro, Smith, Tarrant and Van Zandt Counties.

(To be continued.)

An Analysis of the *Cicindela purpurea* Group (Coleop.: Cicindelidae).

By E. GRAYWOOD SMYTH, Entomologist, W. R. Grace & Co.
Sugar Estates, Trujillo, Peru.

(Continued from page 19.)

(10) *C. transversa* Leng. Mr. Leng lists this as a variety of *splendida*, while Dr. Horn considers it a "minor form" (whatever that may be in American terminology) of *splendida*. Nicolay and Weiss place it, correctly, among the varieties of *limbalis*. All of this confusion arises, plainly, from the mistaken attitude in considering *splendida* as a valid species, when in fact it is a geographic race of *limbalis*, the varieties *transversa* and *cyanocéphala* connecting the two, the one in color, the other in maculation. This statement should not be taken as contradictory to the writer's recent quotation (8, p. 202) from an earlier writing, where he spoke of the interbreeding of this variety with *splendida* as "thus establishing *splendida* as a variety of *transversa*, and so of *purpurea*." At the time that was written, in 1907, *limbalis* and its varieties were considered as all belonging to the species *purpurea*.

(11) *C. cyanocéphala* Varas. (= *C. amocna* Lec. of Leng). Here again we have complete confusion, from the same cause mentioned above (i.e., considering *splendida* as a species). Leng correctly considers this a variety of *limbalis*; Horn, a "larger race" of *purpurea*; and the authors of the Synopsis, a variety of *splendida*.

(12) *C. splendida* Hentz. Leng in his catalogue, and Nicolay and Weiss in their Synopsis, consider this a valid species. Western collectors who know its phylogeny and habitat cannot figure this out. Horn places it as a "larger race" of *purpurea*, on the mistaken assumption, it would appear, that *limbalis* and *purpurea* are one species. The writer cannot consider *splendida* as other than a variety (geographic race) of *limbalis*, and has no fear that Cicindelists of the Middle West will not uphold him in this view.

(13) *C. ludoviciana* Leng. Leng, Horn, and Nicolay and Weiss, all agree in calling this a variety (or "lesser form"—Horn) of *splendida*. In the writer's eyes it is a local variety, or race, of *limbalis*.

(14) *C. denverensis* Casey. All place this as a variety, or form, of *splendida*; which makes it of course, a variety of *limbalis*. Distance of separation from the stem species has no bearing on the situation, so long as there are connecting links. And there are (in *splendida* and *transversa*).

(15) *C. plattensis* Smyth (= *C. conquisita* Casey fide Nicolay). All authorities place *conquisita* as a synonym of *denverensis*, preferring not to consider as a distinctive character the differences of maculation. This essentially ignores Casey's description of the maculation of *denverensis*. And in the Nicolay and Weiss "key" to the group, this variety would run down to *pugetana* or *decemnotata*, with neither of which it bears any close relationship. If, in proposing the name *plattensis* (8, p. 202), the writer has without intention made a synonym, as Mr. Nicolay asserts (+, p. 15+), it has at least accomplished the result desired, namely, the recognition by name of a western, fully maculate, all-green (or blue and green) geographic race of *limbalis* paralleling the maculation of *limbalis* and *cyanocephalus*. Such specimens have heretofore rested in all collections without name, or improperly under *denverensis*. Since Colonel Casey, as pointed out by Dr. Horn (2, p. 74), had the custom of describing "localities" and "individuals," and in many cases sports and Mendelian forms, without immediate access to his types for purposes of comparison it was not possible to assign a name to this variety in other manner.

(16) *C. propinqua* Knaus. Horn wrongly interpreted this as a variety of *tranquebarica* Herb., but Leng and Mutchler in their Supplement to the Leng Catalogue of Coleoptera, 1927, assign it a number as a variety of *splendida*. Nicolay and Weiss so consider it also. This makes of it, logically, a geographic race of *limbalis*.

(17) *C. decemnotata* Say. Mr. Leng gives this, quite correctly, specific standing, as do also Nicolay and Weiss. Doctor Horn considers it a "larger race" of *purpurca*, on a par with *lauta*, *splendida*, *cyanoccephala*, etc. He makes no discrimination in the comparative values or inter-relationships of these.

(18) *C. pugetana* Casey. Considered by Leng a variety of *purpurca*, and by Horn a "larger race" of *purpurca*. Nicolay and Weiss differ with both, placing it as a variety of *splendida*, to which, in our opinion, it bears no close relationship. This and the preceding species may be readily distinguished from all varieties of *purpurca* and *limbalis* by the more polished surface texture, and by other anatomical differences.

To summarize: of the above 18 species and varieties, the authors of the Synopsis agree with our two outstanding authorities, Charles W. Leng and Walther Horn, in only four cases (*purpurca*, *ludoviciana*, *denverensis*, *conquisita*): agree with only one of them (Leng) in eight cases (*auduboni*, *nigerima*, *cimarrona*, *limbalis*, *spretta*, *splendida*, *propinqua*, *decemnotata*): and disagree with both of them in six cases (*auguralis*, *lauta*, *mirabilis*, *transversa*, *cyanoccephala*, *pugetana*). Plainly, where the two older authorities are not themselves in agreement, the authors of the Synopsis could not well agree with both of them. But it is conspicuous that they disagree with both oftener than they agree with both. This, naturally, does not convince us that there is very little that they have changed.

Before closing, the writer would call attention to a few discrepancies in Mr. Nicolay's "answer" to his criticisms of the Synopsis.

1. The writer made no comparison of the *purpurca* group with the Megacephalini, as stated by Nicolay (4, p. 128), but characterized it as "the most difficult group in the genus *Cicindela*" (8, p. 197). He has not changed in that opinion.

2. Neither did he take issue with the authors of the Synopsis in their use of color and maculation in a key to separate varieties, for he knows as well as they that "it cannot be done" on the basis of structure, unless perhaps by the genitalia. What

he objected to, and so stated clearly, was the exclusive use of color and maculation in a key to determine "species" (viz., *splendida*; *cimarrona*), and to the hopeless mixing up of the species and varieties in a key, using color as sole criterion, instead of arranging them according to their genetic relationships, which would vastly simplify the matter.

3. He made no objection to their "recognizing only species and varieties;" he would certainly do the same. What he took exception to was the "elevating subspecies to specific rank," because, the term subspecies the authors use themselves as equivalent to Doctor Horn's term "larger races," and there can be no doubt that these races, by American usage, are varieties (in all cases except *limbalis* and *deccunotata*).

4. When the writer stated that "those acquainted with the *purpurea* group have decided years ago that *cimarrona* is not entitled to specific standing" he referred very naturally to those who have collected and know intimately the habits of the western varieties, or who have first hand information from others who had collected them. He needs make no apology to Mr. Leng on this score. How can one who knows only museum specimens pass fair judgment on the inter-relationship of varieties? To use Mr. Nicolay's expression: "It cannot be done."

5. The writer, in quoting Doctor Lantz (8, p. 200) on the varieties of *purpurea*, did so to bring out only one point: that Lantz, who had also collected *cimarrona*, considered it a variety of *purpurea*. The writer made no mention of, and places no importance whatever upon, the size, shape, or degree of inclination of the median band in *Cicindela*, except, in rare cases, in so far as those features are relatively constant (as in *deccunotata* Say and *curcka* Fall). So this is not "one of the few things that we agree on" (4, p. 131). In *cimarrona* and *auguralis* the length and inclination of the median band is anything but constant; and Nicolay himself states that (4, p. 130) in the paratype specimens of *auguralis* the median band is "slightly more oblique than in typical *limbalis*." One who has not material at hand might consult Shelford (6, pl. 25, figs. a to d) for some idea of the variability in the markings of

cimarrona and *auguralis* (which Shelford miscalled *spretta*). Shelford plainly marks these "level ground inhabitants," which proves that they are *not* varieties of *limbalis*, but rather, of *purpurca*.

6. Mr. Nicolay speaks of "this so-called species *scdalia*," which is very carelessly (if not intentionally) misquoting (4, p. 130). The writer distinctly named it as a variety of *limbalis* (8, p. 200), and mentioned no "connection between this form and *cimarrona*." Nor is there indeed any connection, except that both occur in Colorado and both belong to the *purpurca* group, their habits being entirely different. Nor is it significant that Doctor Horn has not assigned a name to the variety. If Mr. Nicolay can fit "specimens from Colorado in the Horn collection . . . nicely in either *limbalis*, *splendida* or variety *cyanocéphala*, and *cimarrona*," he may consider it clever. But who said that any such specimens were *scdalia*? The variety *scdalia* is at once distinguishable from all other varieties of *limbalis* by broad markings, dilated marginally and often confluent on the margin as in *lutesignata* Lec. (no other variety of *limbalis* develops a marginal band), by usually entire humeral and apical lunules that are quite persistent and seldom broken into dots (other varieties of *limbalis* seldom if ever develop entire humeral lunule, and never in a whole series of specimens), and color, usually red, suggestive of the more eastern forms, that does not occur at lower altitudes on the adjoining plains, except as a rare mutation. That transition forms occur between *scdalia* and the neighboring named varieties of *limbalis* there is abundant evidence; but as much may be said of any other named variety of *limbalis* that has been recognized in our catalogues. Like *Indoviciana*, *scdalia* is a very local and somewhat sporadic race, but none the less well defined in its divergence from other known varieties.

7. One who owns the extensive Casey literature, who has lived some years in Washington and spent hours over the National Collection of beetles in company with our late, kindly and erudite Doctor Schwarz, and who was there when Mr. Buchanan unboxed the Casey types and transferred them to

cabinet, can perhaps afford to pass over a critic's suggestion that he evidently "never looked in a Casey box."

8. Mr. Nicolay has the right to pride himself on his familiarity with certain eastern collections which he enumerates, but should not consider that he monopolizes a knowledge of those collections, for that can be challenged. If he will examine again the *Cicindela* collection of the American Museum of Natural History in his own Manhattan, he will find there a nice series of *Cicindela mirabilis* Casey, properly labeled, all with cupreous head and thorax, from Dutch Flat, Placer County, California (March)—specimens identical with those that he claims to have discovered, tardily (4, p. 153), in the collection of Mr. Wood. We believe he mistakes also in presuming that temporary residence in Peru, "several thousand miles away from collections and literature," predisposes to senility.

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New Histeridae from the Nests of Ants of the Genus *Atta* in Mexico (Coleoptera).

By HOWARD E. HINTON, Cambridge, England.

While determining a collection of Histeridae taken from the nests of *Atta serdens* L. and *A. fervens* Say by the writer and others in Mexico at various times during the past few years, four new species have come to light. The Histerids described below were not taken in the actual nests of the leaf-cutting ants, but they were taken in accumulations of waste material which are deposited by the ants near the openings of the nests. Through the kindness of Dr. W. M. Mann, the *Atta* from the District of Temascaltepec was determined as *A. serdens* L. The writer determined the *Atta* from Cuernavaca as *A. fervens* Say.

Saprinus pusio, new species.

Broadly oval, rather convex, black with a slight aeneous lustre, shining; antennae, mouth-parts and legs rufo-piceous.

Head without impressed lines, finely, transversely strigose anteriorly, extremely finely, sparsely punctate basally.

Prothorax twice as wide as long, apical margin very finely but densely ciliate, apical and lateral marginal lines fine; sides arcuate, converging moderately to apex; base evenly arcuate; surface finely, evenly, moderately sparsely punctate, extreme base with moderately coarse, closely placed punctures.

Elytra twice as long as prothorax, base nearly impunctate, posteriorly finely punctate, punctures becoming gradually denser apically and being moderately dense in apical one-third, extreme apex impunctate; striae somewhat feebly, crenately punctate and extending only to about basal one-tenth and slightly unequally to apical one-third, two joined in a broad arch to sutural which gradually converges nearly to suture near apex; humeral at base scarcely visible, short, diagonal, more longitudinal and distinctly impressed for a short distance in apical one-half; scutellum minute, triangular. Propygidium nearly impunctate basally, moderately finely and densely punctate apically; pygidium moderately finely, densely punctate, with the punctures becoming finer and sparser on disk.

Prosternal striae sinuately diverging anteriorly to end in a deep pit before which they are contingent with carinae above antennal cavities; mesosternum broadly, feebly emarginate in front, moderately densely, coarsely punctate, marginal line

feebly, broadly sinuate; metasternum coarsely, sparsely punctate. Length, 1.6 mm.; breadth, 1 mm.

Type: Deposited in the collection of the writer. Collected at Tejupilco, District of Temascaltepec, MEXICO, alt. 3960 ft., in July, 1933 (H. E. Hinton, R. L. Usinger).

It was taken from the deposits of *Atta sexdens* L. It is difficult to relate *Saprinus pusio* to any of the known species, for it is quite distinct. It is the smallest species recorded from this region. Its small size, head without impressed lines, pronotum finely and evenly punctate except at extreme base, coarsely, moderately densely punctate mesosternum, and coarsely, moderately sparsely punctate metasternum should make this species an easily recognizable one.

Saprinus formicus new species.

Broadly oval, convex, black, strongly shining; antennal club fuscous, mouth-parts and legs piceous.

Head with distinct supra-orbital striae extending to base of clypeus, very finely, moderately densely punctate, anteriorly slightly strigose; scape of antennae with a few long, erect, testaceous hairs.

Prothorax one-half wider than long, feebly ciliate along apex, apical marginal line fine, lateral fine apically, more coarse basally; sides converging feebly to apex, nearly straight, strongly rounding near apex; surface finely, moderately densely punctate basally, elsewhere extremely finely, sparsely punctate.

Elytra finely, sparsely punctate basally, with the punctures becoming coarser and denser apically, apical two-thirds coarsely, moderately densely punctate; striae fine, finely, not closely punctate, outer humeral well impressed and extending from basal one-fourth to apical one-fourth, humeral scarcely impressed, short, diagonal; striae five to two slightly curved at base, fifth extending to apical one-third, fourth to second progressively shorter, second extending only to apical one-half and joined in an arch at base to sutural which extends to apical one-fifth and does not converge but is parallel to suture; scutellum small, equilateral; Pygidium coarsely, moderately densely, evenly punctate.

Prosternal striae parallel, slightly sinuate at middle, extending nearly to apex and not ending in fovea; prosternum slightly convex between striae; carinae above antennal cavities straight

and parallel with prosternal striae; mesosternum very coarsely, densely punctate; metasternum finely, sparsely punctate except caudally where it is coarsely, densely punctate with shallow, oblong-oval punctures; extreme base of first ventral segment punctate as adjacent area of metasternum, apex with a row of fine, closely placed punctures. Length, 3.8 mm.; breadth, 2.5 mm.

Type: Deposited in the collection of the writer. Collected at Tejupilco, District of Temascaltepec, MEXICO, alt. 3960 ft., June, 1933 (H. E. Hinton, R. L. Usinger).

Paratypes: Three. Same data as above.

All specimens were collected in the deposits of *Atta sexdens* L. This is a very distinct species, and it can not be closely related to any of the previously described species of *Saprinus* from North America. Its most distinctive character is found in the punctation of the pronotum which is anteriorly and at sides only extremely finely and sparsely punctate without coarser punctures. In the few species of *Saprinus* in which the pronotum is, except at extreme base, extremely finely and sparsely punctate, there are nearly always a few coarser punctures apically near the sides.

***Epierus pubifrons* new species.**

♂: Oblong oval, convex, dark rufo-piceous, strongly shining; antennae, mouth-parts and legs paler, antennal club somewhat testaceous.

Head without raised or impressed lines; front slightly concave, clypeus anteriorly with a semicircular area which is densely clothed with short, stiff, testaceous hairs; surface very finely, moderately densely punctate, with the punctures somewhat sparser basally.

Prothorax one-third wider than long, apical and lateral marginal lines moderately fine; sides arcuate, converging moderately to apex; base arcuate, more strongly arcuate at middle; surface moderately finely, densely, evenly punctate and also with extremely fine punctures sparsely intermixed, base with a row of coarser, closely placed punctures and an oval impression in front of scutellum.

Elytra more than twice as long as prothorax, finely, moderately sparsely punctate throughout; striae moderate, finer nearer suture, moderately closely, crenately punctate, all ex-

tending from near base to near apex with exception of sutural which does not extend so near to base; humeral (seventh) absent but humerus with a feeble, diagonal impression extending only in basal one-fourth; scutellum small, equilateral. Propygidium one-third as long as pygidium, moderately densely punctate with moderately fine and extremely fine punctures intermixed; pygidium moderately finely, moderately densely punctate and also with a few microscopical punctures sparsely intermixed.

Prosternal striae moderately widely separated, diverging slightly caudally, parallel anteriorly, not attaining lobe; mesosternum microscopically punctate, marginal striae in front present only at sides of emargination; metasternum moderately densely, extremely finely punctate, much more coarsely punctate caudally; first ventral segment finely, moderately densely punctate, more coarsely punctate at sides. Length, 2 mm.; breadth, 1.1 mm.

♀: Front not concave; clypeus anteriorly without hairs; slightly more coarsely punctate throughout.

Type: Male in the collection of Mr. C. A. Ballou, Jr. Collected at Cuernavaca, Estado de Morelos, MEXICO, June, 1934. (H. E. Hinton.)

Paratypes: One female with same data as above. Three males and three females collected at Tejupilco, District of Temascaltepec, Mexico, alt. 3960 ft., June, 1933 (H. E. Hinton, R. L. Usinger).

The male may readily be separated from all other North American species of the genus by the pubescence on the anterior portion of the clypeus. The female resembles *Epierus intermedius* Mars., but is about one-third smaller, the head and pronotum are more densely and more coarsely punctate, and the sutural and second striae are not abbreviated. Specimens from Cuernavaca and Tejupilco were collected in the deposits of *A. scydens* and *A. fervens* respectively.

***Epierus singulistrius* new species.**

Oblong oval, convex, dark rufo-piceous, strongly shining; antennal club testaceous; antennae, mouth-parts, pronotum, pygidia, and legs paler rufo-piceous.

Head with supra-orbital striae curved anteriorly and extending a very short distance across front; surface extremely finely, moderately sparsely punctate.

Prothorax nearly twice as wide as long, apical and lateral marginal lines moderately fine; sides nearly straight, converging to apex; base evenly arcuate; surface very finely moderately sparsely punctate, with a few coarser punctures near sides, base with a row of closely placed punctures on middle one-third and with an oblong impression in front of scutellum.

Elytra half again as long as prothorax, extremely finely, moderately sparsely punctate throughout; striae moderate, feebly but closely, crenately punctate and with exception of second all extending from near base to near apex, second present only in apical one-half, sutural diverging from suture towards base and shortly curved outwardly near base; humeral absent, humerus with a short, diagonal, feeble impression in apical one-third, outer humeral well impressed, present in apical two-thirds; scutellum nearly equilateral. Propygidium two-thirds as long as pygidium, moderately coarsely and sparsely punctate, with extremely fine punctures intermixed; pygidium very finely, moderately densely punctate and with a few coarser punctures basally.

Prosternum between striae narrow, convex; striae diverging caudally, parallel anteriorly, not quite attaining lobe; carinae in front of anterior coxal cavities short, nearly parallel with prosternal striae; mesosternum slightly elevated above metasternum and limited posteriorly by a strongly sinuate line, anteriorly feebly, very broadly, arcuately emarginate, marginal stria complete, feebly sinuate in front, surface extremely finely, moderately sparsely punctate. Length, 2 mm.; breadth, 1.2 mm.

Type: Female in the collection of Mr. C. A. Ballou, Jr. Collected at Tejupilco, District of Temascaltepec, MEXICO, June, 1933, alt. 3960 ft., (H. E. Hinton, R. L. Usinger).

Paratypes: Two females and five males. Same data as above.

All specimens were collected in the deposits of *Atta serdens* L. This species may be separated from all others by the complete sutural striae and very short second striae. The males have the meso-metasternum concave and more strongly punctate. The mesosternum is often in the males not so distinctly elevated above the metasternum, as it is in the females, but this last character is very variable.

ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., FEBRUARY, 1935.

ENTOMOLOGY AT THE CONVOCATION WEEK MEETINGS,
DECEMBER 27, 1934, TO JANUARY 2, 1935.

Our annual summary of the entomological items of the programs of the American Association for the Advancement of Science and Associated Societies, held at Pittsburgh, Pennsylvania, follows:

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

*Entomological Society of America (including a joint session with the Ecological Society of America)	52
American Association of Economic Entomologists	127
American Society of Zoologists	21
American Society of Parasitologists	6
*American Phytopathological Society	4
Genetics Society of America	20
*Potato Association of America	2
Wilson Ornithological Club	1
American Society of Naturalists	1
Committee on Hydrobiology and Aquiculture, National Research Council	2
Section N, Medical Sciences, A. A. A. S.	2
American Nature Study Society	1
Total	239

These papers were distributed in subject as follows:

i	Behavior	1
General Entomology	*Geographical Distribution	6
*Collecting and Rearing Methods	Genetics	12
Entomological Instruction	*Evolution	4
Entomological Museums	*Taxonomy	6
*Cytology	Parasites and Diseases of Insects	8
*Embryology and Life History	*General Economic Entomology	19
Anatomy and Morphology	Insecticides	28
*Physiology	Apiculture	12
*Ecology	*Insects Affecting Man	12

* do. Other Animals	6	Thysanoptera	1
do. Cereals and Field Crops	16	Neuroptera	1
do. Truck Crops	13	Coleoptera (excluding Japanese Beetle)	18
* do. Ornamental & Greenhouse Plants	6	* Japanese Beetle	2
do. Fruits and Fruit Trees	14	Hymenoptera (excluding Honey Bee and <i>Habrobracon</i>)	11
do. Forest and Shade Trees	9	Honey Bee	9
		<i>Habrobracon</i>	5
	ii	* Lepidoptera (excluding Codling Moth, Oriental Fruit Moth and Corn Borers)	19
* Acarina	4	* Codling Moth	13
Orthoptera	16	Oriental Fruit Moth	2
Dermoptera	1	Corn Borers	1
Isoptera	1	* Diptera (excluding <i>Drosophila</i>)	26
Ephemera	1	<i>Drosophila</i>	13
Odonata	1		
Homoptera	16		
* Heteroptera	5		

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, at Boston and Cambridge, 1933, 227. Increases in numbers of papers over the corresponding figures for 1933 are starred (*).

Both entomological societies met December 27 to 29, in different rooms, mostly on the same floor, of the William Penn Hotel. This contributed to frequent visiting from one society to the other. Meetings of the other societies in the above list were held mostly in or near the University of Pittsburgh, at such a distance as to prevent the easy attendance of entomologists chiefly interested in their own associations.

The Entomological Society of America was presided over by Prof. C. L. Metcalf, University of Illinois, and Prof. H. B. Hungerford, University of Kansas, continued his ministrations as secretary. The annual symposium, on Improved Technique in the Study of Insects, participated in by fifteen speakers, brought out many useful suggestions on collecting equipment and field methods, museum technique, modern taxonomic methods, rearing insects of various habitats, ecological, behavioristic, physiological, toxicological and morphological studies and those of insect-borne diseases. It is to be hoped that all these will be published and thus rendered available to all interested persons.

Dr. E. F. Phillips, Cornell University, and Mr. A. I. Bourne, Massachusetts State College, were president and secretary, respectively, of the American Association of Economic Entomologists. The President's address dealt with the Increasing Complexities of Economic Entomology. Instead of the usual Entomologists' dinner, a smoker was held on Friday evening, December 28, immediately following the annual public address of the Entomological Society. This address, by Dr. C. H. Kennedy, Ohio State University, was a keen analysis of the Family and the Society, both human and insectan. In the afternoon of the same day, Dr. Kennedy was elected president of the Entomological Society for 1935, a honor which he has well earned by his editorial conduct of the *Annals*.

The Courtship and Mating of the Wasp, *Monobia quadridens* (Hymen.: Vespidae).

The wasp, *Monobia quadridens* makes mud partitions in the old burrows of the carpenter bee, *Xylocopa virginica*, and uses the rooms for her own progeny provisioning them with caterpillars. The adult wasps make their appearance in this region about the middle of May of each year and live until about the middle of September. The males appear at the same time with the female and, unlike certain other Aculeate Hymenoptera, do not die shortly after they are born.

The males go through certain courtship or sun dances in front of the boards containing the nesting females. The details of this behavior is as follows: Every morning for about a week, beginning May 17th, 1932, a dozen or more male wasps were flying with fantastic motion about these boards. This started with a few individuals about 7 a. m. and by 9 o'clock the number in this flight would increase to about 18, and by noon it would be reduced to a very few individuals, and by 2 o'clock the flight had completely ceased. This same behavior went on for about three weeks but mating did not occur. Sometimes a male would follow a caterpillar-laden mother into the burrow but was usually driven out; sometimes when repulsed he would quietly wait in the doorway and when an opportunity offered, would again attempt to mate. In this case a rough and tumble battle followed, with the interlocked pair dropping to the ground.

By June 12th, only a few were to be seen daily in the dance, and by June 15th, (a month after the commencement of this behavior) the dance was completely over, although occasionally after this date a pouncing male was seen attempting to mate with an industrious mother.

In spite of the daily courtship dances, actual mating escaped

my notice, if it occurred at all. However, later in the season, long after the dances had stopped (week of August 10th) several pairs were seen in actual copula. In every case the female was at rest on the board containing the borrows or on the vegetation nearby, while the male hung free in the air head downward while attached to the female. In one case the female made short flights from bush to bush with the male dangling free in the air beneath her. The maximum time in which any of the half dozen pairs observed remained in copula was about thirty minutes.

PHIL RAU, Kirkwood, Missouri.

Ovoviviparity in *Colias*? (Lepid.: Pieridae).

Recently when making a preparation of the genitalia of a female *Colias hecla* Lefebvre from Fort Churchill, Manitoba, I was greatly surprised to find a well-developed, apparently first instar larva in the oviduct. There was no trace of a chorion accompanying the larva, nor could any such structures be seen further up the oviduct.

Kusnezov (Horae Ent. Soc. Russ. 39: 634-651, 1909-10) recorded the same phenomenon as occurring in occasional specimens of a large number of species of Palaearctic *Colias* and *Euchloini*. He was likewise unable to find a trace of chorion in any of the numerous specimens containing larvae that he examined.

Such data are of course far from constituting proof of the occurrence of ovoviviparity in these butterflies, but are highly suggestive. The phenomenon is known to occur in the Microlepidoptera (*Tinea vivipara* of New South Wales) but has not been recorded from the higher moths or the butterflies. If it should occur in these higher forms it might well be expected in *Colias* or in similar Arctic-inhabiting groups which, handicapped by the very short growing season of the far North or of Alpine regions, would be benefited greatly. The habit would probably occur at first in only a small percentage of the specimens of a species and, if definitely beneficial, become more and more common. Moreover it would thus be more likely to be retained in the more northern or Alpine parts of a species' range, where very few specimens are collected.

Collectors of Arctic butterflies should therefore keep this possibility in mind when in the field. Females seen fluttering around known or potential specimens of a food plant should not be collected immediately but observed with care; any eggs or larvae deposited should then be collected immediately and preserved. Moreover the preservation of some *fresh*, not dried, females for cytological examination, using a fixative such as Bouin's Fluid, would be extremely useful.

ALEXANDER B. KLOTS, College of the City of New York.

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.

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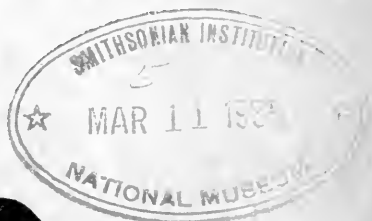
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MARCH, 1935

Vol. XLVI

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The Prothoracic Pleurites of Coleoptera.

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

A search of both morphological and purely systematic literature indicates that neither morphologists nor systematists have developed any precise understanding of the homologies of the prothoracic pleurites of the Coleoptera. The systematic workers make use of traditional descriptive phrases which have no clear morphological meaning or are even morphologically untrue. The morphologists disagree sharply among themselves as to the interpretation of the various parts. It is evident that a new approach to the problem is desirable.

As the guide for such an approach there is here adopted the concept of the origin and nature of the thoracic pleurites which has been so clearly elucidated by Snodgrass.¹ This concept regards these parts as vestiges of a primitive sub-coxal segment of the leg, which has become incorporated in the body wall with a consequent reduction and modification of its parts. These parts—however great the degree of modification and reduction—must bear some relation to a definite, common plan of organization that is dependent upon this morphological origin. If morphological reasoning has any validity it may be assumed that some feature or features will persist, throughout all the changes that have taken place, to such a degree as to afford a basis for homologizing the conditions found in widely differing forms, especially if these features be sought for in a series of types leading from one extreme to another. Such is the basis for all morphological reasoning, but this fundamental doctrine appears not to have been consistently applied in connection with the structures here under consideration.

It will be well to review the persistent characters or landmarks that may be available in the present study, such availability being determined by the experience of other morphol-

¹ Snodgrass, R. E. Morphology and mechanism of the insect thorax. Smithsonian Miscellaneous Collections, 80 (1), 1-108; figs. (1927).

ogists and from conclusions derived in the course of the study itself.

In whatever manner the primitive sub-coxal segment of the legs may have been articulated to the body, it is clear that its articulation to the next succeeding segment was by a joint moving upon two condyles, for these condyles generally remain, although probably not in their primitive positions. It may be assumed that the articulation with the body was of such a nature as to permit of a maximum of rotatory movement, but with the incorporation of the sub-coxa into the body wall this freedom would have been lost if not maintained by compensatory changes in the next articulation. These changes have been accomplished in various ways. One condyle may be completely suppressed, and this appears in some cases to have happened, although this is not the most favored solution. The two condyles may remain as points upon a single sclerite which is reduced in size and surrounded by membranous areas such as to allow of considerable flexibility. Or the condyles may be placed upon separate pieces, one of which is reduced in size leaving the other as the major point of suspension and producing what is in effect a mono-condylar joint. Or the sub-coxa as a whole may be greatly reduced in size and the coxa retracted into a pit the walls of which function as a socket the result being virtually a ball-and-socket joint.

The separation of the two condyles upon distinct pieces is a common phenomenon. The smaller piece thus produced, bearing what is generally the minor condyle, is the trochantin. The larger piece forms the area to which the term "pleurum" is generally applied. This area is frequently composed of two minor areas, separated by a more or less distinct furrow into an anterior piece, the "episternum," and a posterior piece, the "epimeron." This furrow is hardly a suture, in the sense that it is the meeting of two areas of sclerotization, it is more in the nature of a stiffening fold the internal aspect of which is a ridge that functions as a support for the major coxal condyle which is set at its apex. At some point along its length there is commonly a more or less tubular invagination which may extend far into the body. This is the pleural process, or, as it occurs in the prothorax, the "prothoracic pleural apophysis."

Of the various elements making up this primitive sub-coxal segment, four—the two condyles, the pleural fold and the apophysis—are of such a persistent nature that they may serve as the landmarks for morphological orientation in an investigation of the prothoracic structures. Any one—or occasionally even all—of them may be suppressed or so altered as to be unrecognizable but the evidence which they present in a series of forms is so clear that in the Coleoptera a consistent and logical interpretation of the pleural structures is possible with their aid.

It is desirable, as a first step in this study, to find some form in which the situation is uncomplicated by secondary developments, or if none such appears to find one that comes reasonably close to such a condition. It is a matter of dispute as to which of the groups of the Coleoptera is the most generalized. There has been a common tendency to regard some of the Adephaga as being so, but Crampton² has maintained that this distinction belongs to the Cantharoidea. For our purposes the question is somewhat beside the point. We need merely to find a form in which the situation in regard to the particular features in which we are interested is clear. It so happens, however, that the most suitable forms observed do occur in the Cantharoidea and we may begin with a representative of this group, although there are others—Staphylinids for example—which would do almost equally well.

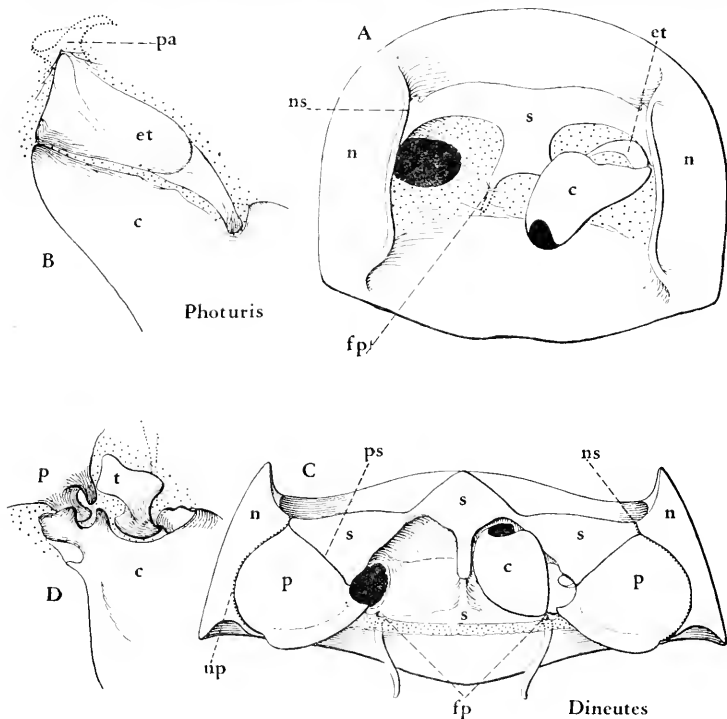
THE PROTHORACIC PLEURITES OF A LAMPYRID.

Determined specimens of *Photuris pennsylvanica* (DeGeer) being available, this species has been employed. Crampton has used a species of *Lampyrus* which seems to agree closely.

In the ventral aspect of the prothorax (Fig. I, A) the following structures may be noted: on each side a broad zone (*n*) apparently formed by the inflexed margins of the notum; a central, broadly T-shaped plate (*s*), the lateral arms of which meet the lateral zones along a short suture (*ns*), this plate being the sternum as is evidenced by those most stable of landmarks, the furcal pits (*fp*); the large coxae (*c*), set in a quite

² Crampton, G. C. A comparison of the neck and prothoracic sclerites through the orders of insects from the standpoint of phylogeny. Transactions American Entomological Society 52: 199-248; pls. x-xvii. (1926).

extensive membranous area and showing clearly at the base a somewhat crescent-shaped piece (*ct*). Dissecting off a coxa and accompanying the dissection with a manipulation of the parts, we find that this basal piece (Fig. 1, B) articulates with the coxa at two points. There is no condylar articulation with the lateral thoracic margin which slightly overlaps this basal piece, there being merely a very narrow membranous connec-



Text Fig. 1—*Photuris pennsylvanica* (DeGeer). A, ventral aspect of prothorax, one coxa removed; B, base of coxa. *Dineutes discolor* Aube. C, ventral aspect of prothorax, one coxa removed; D, base of coxa.

tion between the two parts. Upon this basal piece there is a fold or pit, leading into a short invaginated apophysis (*pa*).

The interpretation of these structures, in the light of our earlier discussion of landmarks, seems clear. There seems no escape from the conclusion that the basal piece, which bears three of the four pleural landmarks—two condyles and an

apophysis—is the pleurum. The pleural "suture" and pleural ridge alone are lacking to make the picture complete. The pleurum, therefore, in this case includes the trochantin, the resulting piece being what Crampton (ref. cited) has called the "eutrochantin." The lateral zones, which appear as part of the notum, are, indeed, merely the inflexed margins of this part. The situation seems perfectly clear.

This is the interpretation arrived at by Crampton, although on somewhat different grounds. It is in sharp contrast to the view commonly held and more or less clearly expressed in various texts—but which seems to have been arrived at by no definite chain of morphological reasoning—that the lateral zones are composed of the fused notum and pleurum and that the basal coxal piece is merely the trochantin.

THE PROTHORACIC PLEURITES OF A GYRINID.

The greater part of all published statements concerning the prothoracic structures of Coleoptera has been based upon representatives of the Carabidae or at least of Adephaga. Species of *Harpalus* have been especially favored by American authors (Comstock, MacGillivray). Specimens of all the families of Adephaga represented in North America have been examined in this study and out of them a Gyrinid, *Dinocutes discolor* Aubé, has been selected as being the least complicated by secondary developments, the coxae not being so deeply retracted into their acetabula as in the Carabids and Cicindelids.

Here, examining the ventral aspect of the prothorax, we find a situation very different from that in *Photuris*. There is on each side a narrow lateral zone (Fig. I, C n) which is evidently the inflexed edge of the notum; there is a large median area, in which the acetabula of the coxae are impressed and which is accepted by all as the sternum, its landmarks, the furcae (*fp*) being widely separated. Forming a broad wedge between the sternum and the lateral notal zone is a large piece (*p*) which is accepted by all authors except Crampton as the pleurum. It is divided—in this form rather indistinctly—into two pieces, one of which forms a narrow caudal border and has been interpreted as the epimeron, the larger being the episternum.

Dissecting a coxa from its acetabulum and by manipulation observing its connections we find imbedded in the membrane between it and the body a small piece (Fig. 1 D t), which articulates with the coxa by a single condyle, but has no articulation with the body although it is provided with muscles. This little piece is generally accepted as the trochantin. The coxa itself is articulated to the body by a very distinct condyle which lies on the so-called pleurum just at the point where the pleurosternal suture (*ps*) meets the acetabulum. This condyle is very distinct and constitutes the major articulation of the leg with the body.

No pleural apophysis can be found. The impressed line which is supposed to be the "pleural suture" separating episternum and epimeron is possibly not homologous with the pleural fold of other forms, it being in the writer's opinion merely a surface indication of the underlying line along which the intersegmental membrane joins the prothorax.

We are thus reduced to two of the four possible landmarks, but these are absolutely clear. Accepting their indications as valid, we must consider the small piece at the base of the coxa to be the trochantin and the large piece commonly regarded as the pleurum to be so in fact. Crampton (ref. cited) has adopted the view that this larger piece is a part of the notum, secondarily cut off. There seems no reason to accept any such conclusion. To do so requires a series of entirely gratuitous assumptions. It must be assumed that the major condyle has either moved over to the notum, with a consequent suppression of the pleurum except for the trochantin, or that the pleurum has fused with the notum. It must then be assumed that this portion of the notum has been cut off by the suture *np*. It should be noted that this suture is not a mere line. In specimens that have been properly softened by boiling in caustic potash it can be demonstrated as actually the surface indication of a quite broad membranous area. We may conclude that in this case the commonly accepted interpretation is correct, with the possible exception of the application of the terms episternum and epimeron.

(To be continued)

Acridian Researches within Northeastern Texas (Orthoptera).

By F. B. ISELY, Trinity University, Waxahachie, Texas.

(Continued from page 43)

DICHROMORPHIA VIRIDIS (Sc.). Locally common in woods and along streams in moist situations; VIII-X; Ellis, Anderson, Smith, Tarrant and Van Zandt Counties.

GENEOTETTIX DEORUM (Sc.). Occasional to frequent upland prairie species; VI-X; Ellis, Dallas, Hill, Johnson, Palo Pinto, Parker, Tarrant and Van Zandt Counties.

PSOLOESSA TEXANA TEXANA (Sc.). A frequent March to April species in sand oak woods; peak collection "Tarrant county, east cross timber open woods, III, 31, '33, 7 ♂, 11 ♀, 3 juv., four collectors"; III-VIII; Denton, Harrison, Hill, Johnson, Marion, Palo Pinto and Tarrant Counties.

BOPEDON NUBILUM (Say). Only taken at one station in the west cross timbers, VII, 31-VIII, 2, '34, 6 ♂, 3 ♀, in a level pasture covered with a heavy growth of fine mesquite grass and an open growth of mesquite trees, Worth Ranch, Palo Pinto County.

B. MACULATUM Caudell. Common to abundant in upland weedy pastures and virgin prairie tracts; VI-VIII, Ellis, Dallas, Johnson, Palo Pinto, Navarro and Tarrant Counties.

B. AURIVENTRIS McNEILL.⁶ Checked as rare until VI, 19, '34, McWhorter's Ranch, May Pearl, Ellis, 12 ♂, 22 ♀, 6 juv.; only ten other individuals taken; VI-VII; Ellis and Tarrant Counties.

AULOCARA ELLIOTTI (Thos.). Only a few specimens of this "great plains" acridine taken and most of these at the west cross timber and grand prairie stations; VI-IX; Ellis, Palo Pinto and Tarrant Counties.

OEDIPODINAE.

ARPHIA CONSPERSA Sc. This wide ranging western species has been taken at two upland limestone prairie stations. Thirteen juveniles taken in December, January and March, were all in the fifth instar. It reaches maturity late in March, to early April; my latest record is May 15; Dallas and Tarrant Counties. At Gothic, Gunnison County, Colorado, I took *A. conspersa* during July at 9,000-10,000 feet elevation.

A. XANTHOPTERA (Brum.). A late summer species in northeastern Texas. So far only an occasional *Arphia* in sandy soil open woods; VII-XI; Anderson, Dallas, Denton (Dr. Harris), Johnson and Van Zandt Counties.

A. SIMPLEX Sc. An abundant and striking species in its climax habitat. The outstanding oedipodid of this area. Peak of abundance in late May and June, adults taken from April to December. Taken from every general type of soil: Chalk, Houston stony clay, Ellis clay, Houston black clay, cross timber sandy loams, alluvial soils and others. Shows a strong preference for timber margins but occasionally taken on open prairie. Unlike any other oedipodid that I have studied, it is most abundantly found in this area in a dense mat of vegetation, frequently a heavy tangle of curly mesquite grass, IV-XII; generally distributed throughout this area.

CHORTOPHAGA VIRIDIFASCIATA (DeGeer). Apparently a year-around breeder, juveniles taken January to December, peak of adult abundance, III-IV. Ubiquitous in its habitat throughout northeastern Texas.

ENCOPTOLOPHIUS SUBGRACILIS Caudell. An occasional to frequent black land, cotton field species, VI-XI; Ellis County.

E. SORDIDUS COSTALIS (Sc.).⁷ Like *C. viridifasciatus*, juveniles and adults are found the year-around. However, the adult peak for this species is X-XII; Ellis, Bosque, Dallas, Hill, Johnson, Palo Pinto, Parker and Tarrant Counties.

HIPPISCUS RUGOSUS (Sc.). An occasional to common late summer and fall species; Ellis, Dallas, Denton, Freestone, Johnson, Palo Pinto, Parker, Smith, Tarrant and Van Zandt Counties.

PARDALOPHORA PHOENICOPTERA (Burn.). An occasional open post oak, sandy soil, species; V-VI; Dallas, Denton, Johnson, Marion, Tarrant and Wise Counties.

P. SAUSSUREI (Sc.). This *Pardalophora* also shows a preference for sandy soils, but it is much more abundant and more widely distributed than *P. phoenicoptera* in this area. Peak of adult abundance late May and June, taken as late as September; Ellis, Dallas, Denton, Harrison, Johnson, Kaufman, Palo Pinto, Van Zandt and Wise Counties.

XANTHIPPIUS CORALLIPES PANTHERINUS (Sc.). A common, wary, alert, strong-flying, upland limestone prairie species during May and June, infrequent in July and August; IV-VIII; Ellis, Dallas, Denton, Hill, Parker, Tarrant and Wise Counties.

DISSOSTEIRA CAROLINA (L.). This well-known American grasshopper has only been taken occasionally; V-X; Ellis, Anderson, Dallas, Hill, Tarrant and Van Zandt Counties.

SPHARAGEMON BOLLI Sc. An occasional species of sandy oak woods; VI-IX; Anderson, Dallas, Freestone, Johnson, Kaufman, Palo Pinto, Tarrant and Van Zandt Counties.

S. COLLARE CRISTATUM (Sc.). Common to abundant in sandy fields; VI-X; Ellis, Dallas, Denton, Johnson, Palo Pinto, Parker, Tarrant, Van Zandt and Wise Counties.

S. EQUALE (Say). Common in favorable habitats; VI-XI; Ellis, Bosque, Denton (Dr. Harris), Johnson, Palo Pinto, Parker, Tarrant, Van Zandt and Wise Counties.

PLATYLACTISTA AZTECUS (Sauss.). Fifty individuals of this elusive, low-flying, ground-hugging oedopodid have been checked in my field notes; most of these were taken IX-XII; Ellis, Dallas, Bosque, Somervell, Palo Pinto and Parker Counties (Camp Wisdom).

TRACHYRHACHIS KIOWA FUSCIFRONS (Stal.). Two hundred eight specimens of this small, active hopper have been checked; sometimes swarming along golf fairways, adults taken IV-XII; Ellis, Bosque, Dallas, Denton, Hill, Johnson, Palo Pinto, Parker, Somervell, Tarrant, Van Zandt and Wise Counties.

"*MESTOBREGMA*" *CAPITO* (Stal.). This species has not been taken in the blackland prairie belt but at four bare, stony, localities in the grand prairie and west cross timber belts; VI-VIII; Johnson, Palo Pinto, Parker and Tarrant Counties.

PSINIDIA FENESTRALIS FENESTRALIS Stal. One of my students, Miss Jean Wilson, has found this sandy soil species frequent at Ben Wheeler, Van Zandt County; VI-IX.

TRIMEROTROPIS CITRINA Sc. Common on sandy flats along streams and on gravel roadways; VI-XII; Ellis, Bosque, Dallas, Denton, Palo Pinto, Smith, Tarrant, Van Zandt and Wise Counties.

T. PISTRINARIA Sauss. Common on "white rock" ridges and hill-sides; also taken on red-beds; VII-XII; Ellis, Dallas, Johnson, Somervell and Tarrant Counties.

T. SAXATILIS McNeill. Worth Ranch, Palo Pinto County, VIII, 1, '34, 3 ♂, 1 ♀; Western Parker County, highway No. 1; VIII, 2, '34, 5 ♂, 4 ♀.

HADROTETTIX TRIFASCIATUS (Say). This spectacular species is found on both calcareous and sandy loam soils, but in our records shows a preference for the former. The climax of adult activity is late June through July, only occasional individuals taken in September and October; taken at all black land and grand prairie stations, and at east and west cross timber stations.

BATRACHOTETRIGINAE.

BRACHYSTOLA MAGNA (Girard). Only three records for this "giant hopper," Wise County, VI, 3, '32, 2 juvs.; southwestern Johnson County, VII, 4, '33, 6 ♂, 1 ♀; western Tarrant County, VIII, 2, '34, 1 ♀.

CYRTACANTHACRINAE.

ROMALEA MICROPTERA (Beauvois). My records of this east Texas timber "giant" are based on specimens sent by students: Van Zandt County; VIII, '32, 1 ♀ (Jean Wilson); Anderson County, VII, '33, 2 juvs. (Ruth Dillon), Smith County, VII, '34, 1 ♀ (Charles Ferguson).

LEPTY SMA MARGINICOLLIS Serv. An infrequent species save for one locality, marshy pasture on highway 85, four miles west of Marshall, Harrison County, IV, 2, '34, 16 ♂, 7 ♀, also taken in Henderson and Tarrant Counties.

SCHISTOCERCA DAMNIFICA DAMNIFICA (Sauss.). An interesting timber-loving species, active on warm days; XI-IV; Ellis, Harrison, Marion, Tarrant and Van Zandt Counties.

SCHISTOCERCA AMERICANA AMERICANA (Drury). This, ubiquitous, migratory, bird-grasshopper has been collected in every month of the year in almost every habitat where tall grasses or tall weeds are found. It is the most difficult acridian to net of any taken in our area. Often only two or three are flushed on an all-day excursion and it falls into the infrequent class. Peak numbers have been recorded for X-XII. In the bend of the Trinity river, east of Hutchens, Dallas County, swarming numbers were noted X, 28, '33. These were among tall partridge peas (*Chamaecrista*).

S. LINEATA Sc. A tall-grass open sand woods *Schistocerca*, VI-X. Collected only in Johnson and Tarrant Counties.

S. OBSCURA (Fab.). A late summer and fall species with a protracted juvenile period. Taken occasionally among coarse weeds, growing in alluvial deposits along sloughs, timber margins, and fence rows; VII-XI; Ellis, Dallas, Palo Pinto, Parker and Tarrant Counties.

S. ALUTACEA (Harris). Elkhart, Anderson County, IX, 1, '33, 1 ♂ in open piney woods, two others seen.

HYPOCHLORA ALBA (Dodge). An occasional species usually taken on hoary sage, *Artemisia*. All of my records are for July; Ellis, Dallas, Johnson and Parker Counties.

PARAIDEMONA PUNCTATA (Stal.). Often swarming in upland, calcareous, waste fields and old pastures, V-VIII; Ellis, Dallas, Denton, Hill, Johnson, Parker, Tarrant and Wise Counties.

CAMPYLACANTHA OLIVACEA OLIVACEA Sc. A generally distributed, frequent, fall species of weedy pastures and waste fields; VIII-XII, Ellis, Anderson, Dallas, Denton (Dr. Harris), Johnson, Palo Pinto, Parker and Tarrant Counties.

HESPEROTETTIX VIRIDIS VIRIDIS (Thos.). An active, com-

mon to abundant, upland prairie and waste field grasshopper, VI-VIII; Ellis, Dallas, Denton, Hill, Johnson, Palo Pinto, Parker, Tarrant and Wise Counties.

H. VIRIDIS PRATENSIS (Sc.). This subspecies has been taken only at four stations. In a small rough prairie tract at Bell Branch, Ellis County, all three species of our northeastern Texas *Hesperotettix* were present in good numbers. At this place it appeared as if hybridization was in progress; VI-VII; Ellis and Dallas Counties.

H. SPECIOSA (Sc.). Often associated with *H. viridis* but more likely to be found abundantly in weedy pastures, VI-X; Ellis, Dallas, Denton, Hill, Freestone, Johnson, Palo Pinto, Parker, Tarrant and Wise Counties.

MELANOPLUS SCUDDERI TENENSIS Hart. A generally distributed, late fall, short-winged grasshopper, VIII-XII; Comanche and Walker Counties.

M. SCUDDERI LATUS Morse. A related race appearing generally as the above; Harrison, Van Zandt, Tarrant and Ellis Counties.

M. TEXANUS (Sc.). An abundant, limestone-prairie, spring and early summer, short-winged *Melanoplus*. Ellis, Dallas, Denton, Hill, Johnson, Tarrant and Wise Counties.

M. PLEBEJUS (Stal.). Our records show *plebejus* as an occasional VIII-XII, grasshopper; Ellis, Dallas and Tarrant Counties.

M. DISCOLOR (Sc.). Fairly common limestone prairie species, sometimes definitely associated with blue sage, *Salva farinaceae* Benth. Common during June but taken as late as December; Ellis, Dallas, Denton (Dr. Harris), Johnson and Tarrant Counties.

M. FLABELLATUS Sc. Common June-July, upland prairie and open woods, short-winged *Melanoplus*. Ellis, Dallas, Hill, Johnson and Tarrant Counties.

M. GLAUCIPES (Sc.). Infrequent to occasional in sandy post oak open woods of the east cross timbers also taken in west cross timbers; VI-VIII, Dallas, Johnson and Palo Pinto Counties.

MELANOPLUS ANGULARIS Little. A single male. Collected by Jean Wilson in June, '32, at Ben Wheeler, Van Zandt County.

M. DIFFERENTIALIS (Thos.). This yellow grasshopper is often swarming in weedy field margins, along drainage ditches, among the coarse weeds in bottom fields, and in weedy pastures. It is interesting to notice that it is often absent in over-

flow areas, although abundant on adjacent shelves above overflow; VI-XI; Ellis, Dallas, Henderson, Palo Pinto, Parker, Navarro, Smith, Tarrant and Van Zandt Counties.

M. BIVITTATUS Say. This common northern "two-liner" falls into the rare class, as my records show only five individuals taken at as many different stations in low lying weedy alluvial tracts during July; Ellis and Dallas Counties.

M. PONDEROSUS PONDEROSUS Sc. Common at a few upland weedy pasture stations; VI-VII, infrequent VIII-XII; Ellis, Dallas, Johnson, Palo Pinto, Parker and Tarrant Counties.

M. CONFUSUS Sc. On account of its early spring maturity this species gets a more thorough checking than mid-summer forms. 258 specimens have been checked and *M. confusus* is fairly common at all blackland prairie and open woods cross timber stations, from late April through May, but becomes infrequent in June; Ellis, Dallas, Denton, Johnson, Tarrant and Wise Counties.

M. FEMUR-RUBRUM (DeGeer). I have only two records of this widely distributed, economically important grasshopper; Eikhart, Anderson County, IX, 1, '33, 1 ♂, 1 ♀; Palmer, Ellis County, VI, 23, '34, 1 ♂.

M. LAKINUS (Sc.). Only one record, Worth Ranch, Palo Pinto County, VII, 31, '34, 1 ♂, 1 ♀.

M. MEXICANUS MEXICANUS (Sauss.). This species is ubiquitous in northern Texas. My field notes show *mexicanus* to have been taken on fifty-seven different study trips, although altogether only 203 individuals have been recorded, making an average of less than four for each trip. The peak record of any one day of study was Bell Branch, Ellis County, XI, 20, '33, 8 ♂, 6 ♀. On most trips *mexicanus* falls into the occasional and infrequent group.

M. KEELERI KEELERI (Thos.). A frequent late fall species showing preference for open alluvial woods but also occasionally taken in open post oak woods and weedy pastures; Ellis, Anderson, Dallas, Denton (Dr. Harris) and Johnson Counties.

M. PACKARDII Sc. This wide-spread western and northern species is represented by only 5 ♂, 2 ♀, from four localities, three in Ellis and one in Palo Pinto County.

M. FOEDUS FLUVIATILIS Bruner. Only three records: low lying weedy field western Parker County, VII, 31, '34, 4 ♂, 1 ♀; Brazos river margin, Worth Ranch, Palo Pinto County, VIII, 1, '34, 5 ♂; Brazos river margin Hill County, XI, 30, '33, 2 ♂.

M. FLAVIDUS ELONGATUS Sc. Two records: western Parker

County, associated with *M. foedus fluciatilis* VII, 31, '34, 1 ♂, 1 ♀; Elkhart, Anderson County, IX, 1, '33, 1 ♂.

M. IMPIGER Sc. This is the most characteristic and abundant long winged *Melanoplus* of sandy waste fields and old pastures, VI-XI; Ellis, Dallas, Hill, Freestone, Johnson, Palo Pinto, Parker, Smith and Van Zandt Counties.

M. BISPINOSUS Sc. More generally distributed but not as frequent as *impiger* in *impiger* habitats; VI-XII; Ellis, Dallas, Denton, Hill, Johnson, Parker and Tarrant Counties.

PHOETALIOTES NEBRASCENSIS (Thos.). This northern and western species is represented by a single macropterous specimen, Bell Branch, Ellis County, XI, 11, '31.

PARONYA ATLANTICA ATLANTICA Sc. This marsh acridian was taken only in the more humid east timbers at Edom, Van Zandt County and at Tyler, Smith County, VIII 1-2, '33, 6 ♂, 2 ♀.

DACTYLOTUM PICTUM (Thos.) Common locally in weedy upland pastures during June, infrequent VII-VIII, Ellis, Dallas, Hill, Johnson and Parker Counties.

Trisopsis in the United States (Dipt., Itonididae or Cecidomyiidae).

By E. P. FELT, Bartlett Tree Research Laboratories,
Stamford, Connecticut

The rearing in Louisiana of a species, described below, belonging to this genus discloses the occurrence of a unique form in an area widely separated from any previously known habitat. Four described species have been recorded, namely *T. oleae* Kieff., from Wellington, South Africa, and reared from the fruit of *Olea verrucosa*, *T. alluaudi* Kieff., a female taken in a forest at an altitude of 2400 meters in Kenya, *T. hyperici* Tav., characterized as a commensal of *Geocrypta hypericina* Tav., and *T. bifida* Brethes from Buenos Aires, South America. This latest find suggests a sparse world-wide distribution of the genus in the warmer tropical or subtropical portions of the earth.

The genus *Trisopsis* is easily recognized by the three compound eye masses, due to lateral divisions of the usually large, continuous compound eye of the gall midge, and the reduced

palpal segments, there being three or possibly two, and the simple claws. A related genus, *Trionmata* Barnes, (Bull. Ent. Res., Pt. 2, 22: 205-207, 1931) likewise with divided eyes, but with four, instead of three or fewer, palpal segments, with the claws of the anterior legs toothed and the lobe of the basal clasp segment spinose, has been erected for a species *cocctroctes* Barnes, recorded as predaceous on mealybug from Njala, Sierra Leone, Africa.

Trisopsis hibisci n. sp.

♂. Length .6 mm. Compound eyes three, the median somewhat narrow, on the apex of the head, arcuate, the lateral ones, just above the base of the mouth parts, broadly oval.

Antennae one-half longer than the body, rather thickly haired, pale yellowish; 14 segments, the first transverse, broadly cup-shaped, the second globose, the third and fourth fused, the fifth with stems each about one-half greater than its diameter, the basal enlargement subglobose, with a sparse sub-basal whorl of long, stout setae and a subapical circumfilum, the loops extending a little beyond the enlargement. The distal enlargement globose, with a length a little greater than its diameter, a sparse, subapical whorl of long, stout setae and sub-basal circumfilum, the loops not extending to the tip of the enlargement and a subapical circumfilum, the loops extending nearly to the base of the next segment. Terminal segment, basal enlargement roundly transverse, the stem slender, with a length four times its diameter, the distal enlargement broadly oval, with a length more than twice its diameter.

Palpi short, triarticulate, the first segment subquadrate, the second nearly twice the length of the first, the third longer, slender. Mesonotum light yellowish brown. Scutellum and post-scutellum pale yellowish. Abdomen fuscous yellowish.

Wings hyaline, slender basally, subcosta uniting with the anterior margin just before the basal half, the third vein a little before the apex, costa being interrupted, the fifth vein joining the posterior margin at the distal half, with a rudimentary anterior branch extending to approximately the distal fourth. Halteres pale yellowish. Legs pale straw, claws simple, moderately curved, pulvilli shorter than the claws. Genitalia, basal clasp segment moderately stout, slightly curved, terminal clasp segment slender, curved, dorsal plate broad, roundly emarginate, the lobes broadly rounded, ventral plate broad, broadly rounded, style long, slender.

♀. Length .75 mm., moderately stout. Antennae about three-

fourths the length of the body, sparsely haired, pale yellowish; 14 segments, the fifth with a cylindrical basal enlargement about two and one-half times its diameter and a moderately stout stem of nearly equal length. Palpi, first segment transverse, the second subquadrate, with a length one-half greater than its width and almost fused with a rudimentary third segment. Ovipositor short, the terminal lobes narrowly oval. Otherwise about as in the male.

This species was reared from the seed pods of *Hibiscus militaris* at Tallulah, LOUISIANA, in August, 1933, by Dr. R. W. Harned and submitted for study by Dr. Harold Morrison, in charge of the Division of Insect Identification, U. S. Bureau of Entomology and Plant Quarantine. *Type*: the male described above, United States National Museum, Washington, D. C.

Notes on the Taxonomic Status of Certain Species of the Genus *Chlorops* (Diptera, Chloropidae).*

By CURTIS W. SABROSKY,** Kansas State College.

An examination of the cotypes of *Chlorops ingrata* Williston [at present placed as a synonym of *Pseudogaurax anchora* (Loew)] has revealed its true status as a valid species, and has suggested a brief review of the case, with notes on the types.

The bulletin of the Ohio Agricultural Experiment Station for 1893 (11) contained the description of a new species, *Chlorops ingrata*, by S. W. Williston, based on "two specimens, Ohio, Prof. F. M. Webster." In the same bulletin were two short articles by Webster (9, 10), giving the rearing records of various insects and noting that *ingrata* had been bred from supposedly aborted galls on the grass, *Muhlenbergia mexicana* Trin., each gall containing a single puparium in a vertical position. Four years earlier, Webster (8) had summarized the records of insects affecting the upper portions of the culms and causing a dead and withered top. Among these were several undetermined species of *Chlorops*. One larva, in particular,

* Contribution from the Department of Entomology.

** The author's thanks are due to Dr. R. H. Beamer of the University of Kansas for many courtesies in connection with the study of types and material in the Snow Entomological Collection.

"was observed burrowing in the terminal internode of a species of grass belonging to the genus *Muhlenbergia*, possibly *M. mexicana* Trin.", and it is quite probable that this was the species later described as *C. ingrata*. Coquillett (6, p. 71) in 1898 gave more definite data, as follows: "On Aug. 12, 1884, several plants of *Muhlenbergia mexicana* were received from F. M. Webster, Oxford, Ind. At the tips of the plants were gall-like swellings, each containing a larva or puparium of this insect. The adult flies issued May 12, 15, 21 and June 1 of the following year."

Adams (1) included this species in his 1903 key to the genus *Chlorops*, and Aldrich (3, p. 633) listed it under that genus in his catalogue. In Theodor Becker's 1912 monograph of the Nearctic Chloropidae (4), however, we find it listed in a different subfamily, as a synonym of *Gaurax anchora* Loew, now known as *Pseudogaurax anchora*. The synonymy is given on the authority of Coquillett and apparently accepted by Becker.

The two cotypes (neither was designated as the type) are in the Snow Entomological Collection at the University of Kansas, and both agree in every detail with Williston's description. Both bear a small label, "Ohio," in addition to the type label. The fact noted by Williston that in the male, the triangle is "nearly contiguous above with the eyes," is probably due solely to the condition of the specimen, which was apparently slightly teneral, and shriveled somewhat in drying. Probably as a further result of this, the front of the male projects anteriorly to a distance subequal to the length of the eye (in dorsal aspect), whereas in the female and in compared specimens the projection is not as great. In the female type there is also a wider space between the triangle and the eyes at the vertex.

Upon comparison of Williston's description with a description or specimens of *Pseudogaurax anchora*, it is difficult to believe that they could be confused. In addition to the differences evident in the descriptions, there is a very distinct contrast in the biology as thus far recorded, the *Chlorops* being a gall-former on grass, and the *Gaurax* a scavenger in the egg-sacs of spiders, cocoons of various moths, etc.

The exact generic position of the species is difficult to determine. Adams (1) has it in his key to the species of *Chlorops*, but the types will not run to *ingrata* in that key by any stretch of the imagination. Instead, they run to a group of three species—*cuccra* Lw., *sanguinolenta* Lw., and *maculosa* Lw.—which then comprised the subgenus *Anthracophaga*. In Becker's key to *Chlorops* (4), the types run to a section including *palpalis* Adams, *crocota* Lw. var., and *abdominalis* Coq., but they agree with none of these species. In most respects, *ingrata* belongs in *Anthracophaga*, having the projecting front, receding face, large triangle, slightly produced third antennal joint, black palpi, thick brown wing-veins, dull color, and broad, stocky appearance usually associated with that genus. Becker apparently redescribed it under the name of *Anthracophaga interrupta*. It is proposed to place the species as *Anthracophaga ingrata* (Will.), with *interrupta* as its synonym.

ANTHRACOPHAGA INGRATA (Will.). New combination.

Chlorops ingrata Williston.

Anthracophaga interrupta Becker 1912, new synonym.

Redescription from the types.

♂ ♀. Large, broadly-built species, dull, yellow and black, with anteriorly extended head, black palpi, deep median sulcus on triangle, and heavy dark brown wing-veins. Length, 3-3½ mm.

Head very broad, dull yellow, the eyes small, front over one-half the head width in the female, less in the male due to shrinkage, projecting considerably beyond the eyes. Triangle very large, shining, three-fourths the width of front at base, apex reaching acutely to the anterior margin of the extended front, strongly punctate on the sides, each puncture bearing a minute hair, a deep median sulcus extending from the median ocellus to the apex. The posterior margins of the triangle, the ocellar spot, and a stripe down the median sulcus black in both specimens; rest of triangle dark cream-colored in the male ["shining luteous"—Williston], darkened to brown in the female. A black, divergent outer vertical bristle near corner of each eye, a smaller, convergent inner vertical at the hind corners of the triangle. Occiput yellow with two black vittae, as continuations from the triangle. In lateral aspect, the front moderately projecting, face strongly receding, eyes diagonally placed,

cheeks broad, equal to diameter of third antennal joint and over one-third the eye-height. Face, cheeks, mouth cavity and proboscis yellow, the cheek margins, lateral and median facial ridges, clypeus and palpi black. Third antennal joint slightly longer than broad, subreniform, orange with black apex. Arista dusky yellowish, brown at base, scarcely thickened.

Mesonotum dull clay-yellow, the three stripes, supra-alar vittulae, and a small spot on each humerus, moderately dull black. Median stripe about three-fourths the length of notum, the other vittae and the vittulae extending to the post-alar callus. One notopleural and one postalar bristle. Scutellum large, subtriangular with rounded apex, a pair of large apical and one pair of smaller subapical bristles, yellow ventrally, the sides of the disk light brown and beset with short black hairs, the center of the disk occupied by a pale yellow, glabrous, flattened and depressed triangular area. Metanotum black. Pleura dull yellow, with five blackish-brown spots, below the anterior spiracle, on the antero-ventral angles of mesopleura and pteropleura, large sternopleural spot, and a small one on hypopleura.

Abdomen: segments with broad, brown to blackish bands on the posterior margins, a median extension of pigment joining each band to the preceding. Base and venter yellow.

Legs: fore coxae dark brown and yellow-marked, femora black or dark brown, the tips yellowish, tibiae yellowish, the middle of hind tibiae and all tarsi brown. No "sensory area" on hind tibiae.

Wings cinereous hyaline, with dark brown veins. Costa slightly exceeds tip of third vein, second costal segment one and one-half times as long as the third, costal fracture weak. First vein thickened. Third and fourth veins widely divergent. Hind cross-vein twice as long as small cross-vein, and about one and one-quarter times its length from the small. Halteres with yellow pedicel and white knob.

Cotypes; two specimens, OHIO (F. M. Webster). Reared from galls on *Muhlenbergia mexicana*. In Snow Entomological Collection, University of Kansas.

Additional records: INDIANA: several specimens reared from galls on *Muhlenbergia mexicana* Trin., received from F. M. Webster, Oxford, Ind. (Coquillett, 1898). KANSAS: eight specimens, emerged March 28, 29, and 31, 1934, from galls at the tip of culms of *Muhlenbergia racemosa* (Michx.)*, collected in Pottawatomie County, near Westmoreland (D. A. Wilbur); one, Marion County, Mar. 28, 1934, reared from

Muhlenbergia sp. (D. A. Wilbur); one, Jackson County, Mar. 26, 1934, reared from *Muhlenbergia* sp., probably *schreberi* Gmel. (D. A. Wilbur).

Two other specimens were also found in the C. F. Adams Collection of Chloropidae at the University of Arkansas, bearing a handwritten label, "*Chlorops ingrata*," but no locality label. These specimens and four from Pottawatomie County, Kansas, were compared in detail with the types and found to be identical. Considerable variation was noted in the extent of puncturing on the triangle, color on the third antennal joint and scutellum, and intensity of color of the triangle.

The two males from Jackson and Marion Counties, Kansas, were also compared with the types, and found to be similar except for entirely black antennae and smaller size. These differences are of doubtful significance, and the specimens are therefore placed as *ingrata*. Further, they fit the description of *Anthracophaga interrupta* Becker (1912) exactly, and I believe that this species is a synonym of *ingrata* Williston.

Ingrata is very close to *Chlorops fossae* Becker (4), which has the deep median sulcus in the triangle, but which differs principally in having small, entirely black antennae, broad cheeks, and black legs. The other parts of the descriptions are so similar that these two species may be found to be synonymous when more material is available. Perhaps *fossae* should also be transferred to *Anthracophaga*.

***Chlorops adamsi* nom. nov.**

Chlorops annulata Adams nec Walker.

Francis Walker in 1849 (7) described a new species from Canada, which he called *Chlorops annulata*. Loew believed it to be a *Chloropsisca*, but Becker thought it more likely a *Diplo-toxa* or *Anthracophaga*. Years later, Adams (2) described a species from Louisiana to which he gave the same name, but Becker, although recognizing that it was preoccupied, continued

* Grasses identified by Dr. F. C. Gates, of the Dept. of Botany, Kansas State College.

to use *annulata* Adams on the ground that Walker's species undoubtedly was not a *Chlorops*. Prior use of the name in the genus, however, makes *annulata* Adams a homonym, and a new name is proposed to straighten out the difficulty.

CHLOROPS CINERAPENNIS Adams (1903, p. 40).

Chlorops albifascies Adams (1903, p. 42). New synonym.

The original spelling of each name is retained here, although Aldrich (3) emended the former to *albifacies*, and both Aldrich and Becker (4) used *cincrapennis* for the latter.

The types of both species are in the Snow Entomological Collection at the University of Kansas, and were recently studied and compared. The two descriptions are almost identical, except that *albifascies* is said to have a "shallow longitudinal sulcus" on the triangle, and black third antennal joint, whereas for *cincrapennis* no mention is made of a sulcus, and the antennal joint is black with yellow base. Using the latter character as a primary basis for separation, Becker locates the two in different sections of his key, and Adams himself separated them on this point. Strangely enough, however, in view of the close proximity of the two in Adams' publication, the types were found to be identical. *Cincrapennis* also has the sulcus, though it was not mentioned by Adams. Furthermore, it was found that the "wholly black" third antennal joint of *albifascies* was really reddish on the basal fourth. In all other particulars, also, the two type series were found to coincide, and *albifascies* therefore becomes an absolute synonym of *cincrapennis*, which has page priority. This species is very close to *sulphurea* Lw., and may eventually prove to be merely a variety of that species.

Incidentally, the figure labeled *Chlorops albifascies* in Becker's monograph (1912, pl. 1, fig. 3) is not *albifascies*, but some other species.

CHLOROPISCA GLABRA (Meig.).

Chlorops halteralis Adams.

Becker (4) noted that the description of *halteralis* Adams was very close to that of *Chloropisca glabra*, and he placed it as a probable synonym of Meigen's species, which is a very com-

mon fly in North America. The type of *halteralis* has been examined at the University of Kansas, and Becker's synonymy is verified. The specimen is smaller than the usual specimens of *glabra*, but otherwise is identical.

CHLOROPS LITURATA Adams (1903).

Chlorops stigmatalis Becker (1912) new synonym.

Becker's species was described as *quadrimaculata* in his monograph, but the name was found to be preoccupied and was later changed to *stigmatalis* (5). A specimen determined by Aldrich as this species was compared with the cotypic series of *liturata* in the Snow Collection at the University of Kansas, and found to be the same. Likewise, a number of specimens from Lander, Wyoming, were compared with the cotypes of *liturata* (type locality: Lusk, Wyo.) and found to be identical. Comparison of the descriptions showed their similarity, the essential difference being the presence of fine lateral furrows on the triangle of *stigmatalis*. The types of *liturata* Adams also show this peculiarity, although it passed unmentioned in Adams' description. *Stigmatalis* is therefore placed as a synonym of the earlier species.

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Dictionary of Entomological terms: In preparation.

Authors invite correspondence relative thereto and request new words as well as references to articles citing terms or dealing in any way with nomenclature.

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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, left, &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.

New Titles of Periodicals and Serials Referred to.

112. *Anales del Instituto de Biologia Mexico.*

GENERAL.—Aldrich, J. M.—Obituary and bibliography. By A. L. Melander. [5] 41: 133-149, ill. Dunn, L. H.—Entomological investigations in the Chiriqui Region

of Panama. [5] 41: 166-183. **Harmer, S. E.**—Publication of nomina nuda. [31] 134: 973. **Heikertinger, F.**—Wie ist ein manuskript auszustatten? [79] 20: 231-243. **Horn, W.**—"Aus der entomologischen welt." [110] 1: 304-308. **Hudson, G. V.**—A stable nomenclature? [8] 71: 16-17. **Jones, F. M.**—Further experiments on coloration and relative acceptability of insects to birds. [36] 82: 443-453, ill. Bird-feeding experiments in 1934, on Martha's Vineyard Island, Massachusetts: the return of the "17-year Cicada" to the island: notes on two of its butterflies. [Pro. R. Ent. Soc. London] 9: 80-82. **Jones, F. M. et al.**—Dr. McAtee and "Relative Acceptability." [Pro. R. Ent. Soc. Lond.] 9: 21-39. **Morse, A. P.**—The insect collections of a public museum. [5] 41: 158-163. **Silvestri, F.**—Compendio di Entomologia applicata 1934. 448 pp., ill.

ANATOMY, PHYSIOLOGY, ETC.—**Ancona, L.**—Los gusanitos del maguey. Aegiale (*Acentrocne hesperiaris*). [112] 5: 193-200, ill. **Andersen, K. T.**—Experimentelle untersuchungen ueber den einfluss der temperatur auf die eierzuegung von insekten [97] 54: 478-486. **Brittain, W. H.**—Apple pollination studies in the Annapolis Valley, N. S., Canada. [Canada Dep. Agr. Bul.] 162: 198 pp., ill. **Buxton, P. A.**—Further studies upon chemical factors affecting the breeding of *Anopheles* in Trinidad. [22] 25: 491-494. **Debaisieux, P.**—Les organes scolopidiaux des insectes; l'organe subgenual des fourmies. [An. Soc. Sci. Bruxelles] 54: 338-345, ill. **Eltringham, H.**—On some further remarkable structures in Trichoptera. [36] 82: 409-413, ill. **Fisher, R. C.**—Duration of life-cycle of the death-watch beetle. [31] 135: 102-103. **Glover, P. M.**—The developmental stages of *Bracon tachardiae*. [22] 25: 521-539, ill. **Grasse et Lesperon.**—Quelques donnees nouvelles sur la secretion de la soie chez le bombyx du murier. (*Sericaria mori*). [Arch. Zool. Exper. Gen., Paris] 76: (Notes.) 90-101, ill. **l'Heritier et Teissier.**—Une experience de selection naturelle. Courbe d'elimination du gene "bar" dans une population de drosophiles en equilibre. [77] 117: 1049-1051. **Herter, K.**—Eine verbesserte temperaturorgel und ihre anwendung auf insekten und saugetierte. [97] 54: 487-507, ill. **Hicks, C. H.**—Biological notes on *Sphex wrightii*. [5] 41: 150-157, ill. **Hora, S. L.**—Remarks on Tonnoir's theory of evolution of the ventral suckers of dipterous larvae. [Rec. Indian Mus.] 35: 283-286. **Koch, H.**—Essai d'interpreta-

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S.] XX: 471 pp., ill. (*). **Light, S. F.**—A collection of termites from Arizona. [55] 10: 159-160. **Navas, L.**—Insectos Suramericanos. [Rev. Ac. Cien. Madrid] 31: 155-184, ill. (*). **Thompson, G.**—Notes on Mallophaga. [75] 15: 153-156. **Thompson, W. L.**—Notes on *Neotermes castaneus*. [39] 18: 33-39, ill. **Walker, E. M.**—The nymphs of *Aeschna juncea* and *A. subarctica*. [4] 66: 267-274, ill. **Watson, J. R.**—Thysanoptera of the geenton. [39] 18: 44-46, cont. (*).

ORTHOPTERA.—**Caudell, A. N.**—Notes on some *Tettigoniinae* of California with descriptions of new species. [55] 10: 151-158, ill. **Hebard, M.**—New genera and species of *Melanopl*i found within the United States and Canada (*Acerididae*). Parts V-VI. [1] 60: 337-390, ill.

HEMIPTERA.—**Baker, J. M.**—Algunos afidos Mexicanos. [112] 5: 209-222, ill. (*). **Muir, F.**—The genus *Pintalia* (*Cixiidae*). [36] 82: 421-441, ill. (*S). **Van Duzee, E. P.**—A new pentatomid from Trinidad, W. I. [55] 10: 170. **Van Duzee, E. P.**—An interesting new fulgorid. [55] 10: 191-192. **Wymore, F. H.**—New California cicadas. A new variety of cicada. [55] 10: 166-169, ill., 174.

LEPIDOPTERA.—**Cockerell, T. D. A.**—The western invasion of *Samia cecropia*. [68] 81: 97-98. **Dos Passos & Grey.**—Additions and corrections to "A list of the butterflies of Maine." [4] 66: 278. **Garth, J. S.**—Butterflies of the Boundary Hill Research Reserve, Yosemite Nat. Park, Cal. [38] 33: 131-135. **Hemming, F.**—On the dates of publication of Hewitson (W. C.). *Illustr. diurn. Lep. Lycaenidae*. [75] 15: 117-120. Notes on seventeen genera of *Rhopalocera*. [107] 4: 1-3. (*). The generic names of the Holarctic butterflies. I. 184 pp. [Br. Mus. Pub.]. (*). **Hoffmann, C. C.**—*Lepidopteros nuevos de Mexico*. [112] 5: 201-207, ill. **Köhler, P.**—*Dos lepidópteros argentinos nuevos*. [104] 6: 39-40, ill. **Stichel, H.**—*Nacharbeiten zur Revision der Riodinidae (=Erycinidae)*. [18] 28: 480-483, cont. **Vazquez, L.**—*Contribucion al conocimiento de los lepidopteros Mexicanos*. [112] 5: 259-270, ill.

DIPTERA.—**Aldrich, J. M.**—*Diptera of Patagonia and South Chile. Tachinidae. VII. Pp. 1-170, ill. (*)*. **Darby & Kapp.**—*Studies on the Mexican fruit fly (Anastrepha ludens)*. 7 [U. S. D. A.] Tech. Bull. 444: 20 pp. **Edwards,**

F. W.—New neotropical Bibioninae. [107] 4: 19-24. **Fisher, E.**—Four new species of Mycetophilidae. [4] 66: 276-278, ill. **Malloch, J. R.**—Diptera of Patagonia and South Chile. Muscidae. VII. pp. 171-346, ill. (*). **Ouellet, J.**—Description d'un nouveau diptere du genre Chloropisca. [98] 61: 320-323. **Prado, A.**—Contribuicoes ao conhecimento dos culicideos de S. Paulo. V. Synopse das especies de *Mansonia*. [Mem. Inst. Butantan, S. Paulo] 8: 1-10, ill. (*). **Rees, D. M.**—Mosquito records from Utah. [55] 10: 161-165. **Reinhard, H. J.**—American muscoid flies of the genera *Ceratomyiella* and *Paradidyma*. [50] 83: No. 2973. 43 pp. (*). **Ripstein, C.**—Los mosquitos del valle de Mexico. [112] 5: 249-257, ill.

COLEOPTERA.—**Bertrand, H.**—Notes sur quelques larves de Coléoptères aquatiques. [24] 103: 363-382, ill. **Bierig, A.**—Un genero y especies nuevas de los Paederinae de Cuba. [Mem. Soc. Cubana H. N.] 8: 325-330, ill. **Bruner, S. C.**—La odisea de un picudo. [Mem. Soc. Cubana H. N.] 8: 350. **Chagnon, G.**—On the occurrence in North America of the European staphylinid beetle *Deleaster dichrous*. [4] 66: 282. **Davis, A. C.**—A revision of the genus *Plecoma*. [38] 33: 123-130, cont. **Fall, H. C.**—A new name and other miscellaneous notes. [55] 10: 171-174. **Fisher, W. S.**—New anobiid beetle from Canada. [4] 66: 275-276. **Hinton & Ancona.**—Fauna de coleopteros en nidos de hormigas (*Atta*), en Mexico y Centro America. [112] 5: 243-248, ill. (*). **Hopping, R.**—A change of name (*Buprestus contortae* to *B. murrayanae*). [55] 10: 174. **Ingram, W. M.**—Field notes on five species of the genus *Cicindela* of the family Cicindelidae from Balboa Bay, Orange County, California. [13] 26: 51-52. **Jules, F.**—Un coleoptere nouveau pour l'Amérique du Nord. [98] 62: 5. **Ochs, G.**—Ein weiterer beitrage zur kenntnis der gattung *Gyretes*. [Senckenbergiana, Frankfurt a. M.] 16: 137-152. (S*). **Saylor, L. W.**—Short studies in American Scarabaeidae, No. 1. [13] 26: 49-50. (*). **Uhmann, E.**—Hispinen-minen aus Costa-Rica. (Chrysomelidae). [110] 1: 272-277, ill. (*). **Van Dyke, E. C.**—Note on the Liebeck Collection. [55] 10: 158. **Van Dyke, E. C.**—New species of North American weevils in the family Curculionidae, subfamily Brachyrhininae. [55] 10: 175-191. **Voss, E.**—Ueber einen blattminierenden tropischen Rüssler. (Curculionidae). [110] 1: 267-271, ill. (*).

HYMENOPTERA.—**Cockerell, T. D. A.**—New records of bees. [40] 766: 8 pp. (*). New bees from Trinidad. [107] 4: 10-13. **Gallardo, A.**—Las hormigas de la República Argentina subfamilia Mirmicinas. [An. Mus. Argentino Cien. Nat.] 37: 37-170, ill. **Gemignani, E. V.**—La familia "Eucharidae" (Chalcidoidea) en la República Argentina. [An. Mus. Argentino Cien. Nat.] 37: 477-493, ill. (*). **Goetsch, W.**—Formicidae Chilensis. [Bol. Soc. Biol. Concepcion] 7: 11-28, ill. **Olsen, O. W.**—Notes on the N. Am. harvesting ants of the gen. Pogonomyrmex. [Bul. Mus. Comp. Zool.] 77: 493-514, ill. (*).

Special Note.—A biography of Charles Valentine Riley, eminent chief of the Division of Entomology, U. S. Department of Agriculture (1878-79, 1881-1894), by his successor, Dr. L. O. Howard, occupies a little more than one page (609-610) of Volume XV (Platt-Roberdeau) of the Dictionary of American Biography, which appeared January 25th, 1935. Published under the auspices of the American Council of Learned Societies, this distinguished biographical work is fast approaching the proportions of the one definitive source of information on the lives of America's great.

THE COMPLETE BOOK OF BRITISH BUTTERFLIES. By F. W. FROHAWK, with foreword by Lord ROTHSCHILD. Ward, Lock & Co. Ltd., London and Melbourne, December, 1934. 384 pages, 32 colour plates and over 160 unique sketches from life. 10 shillings, 6 pence, net.—This is a well printed and illustrated book, the colored plates giving excellent figures of all of the 68 British butterflies, their eggs, larvae and pupae, details of the seventh segment of the larvae, and a number of aberrations of the imagoes. There are introductory chapters on classification, a check list giving the new generic nomenclature prepared by the Committee on General Nomenclature of the Royal Entomological Society, on aberration and protective resemblance, migration, hints on collecting and rearing butterflies, and a list of the food plants of the species.

The numerous text figures were made by the author, and are excellently reproduced, showing many phases of the habits and life histories of these insects, as well as many aberrations not previously figured.

The book while intended for popular consumption, is scientifically accurate, and contains so much interesting information

about the butterflies concerned that it will be a valuable as well as a beautiful addition to the library of any lepidopterist.—
R. C. WILLIAMS, JR.

THE GENERIC NAMES OF THE HOLARCTIC BUTTERFLIES. Vol. I—1758-1863. By FRANCIS HEMMING. London, July, 1934. Printed by order of the Trustees of the British Museum and sold by the British Museum (Natural History), Cromwell Road, S. W. 7, and by Bernard Quaritch. (Price not mentioned.) 180 pages.—This work has a preface by Capt. N. D. Riley, and is in two parts, the first, introductory, being an account of the preparation of the work, the author's procedure, a discussion of the rules and some exceptions desired, and remarks on some of the books consulted. The second part is a synonymic catalogue of the 500 names proposed, the type fixation and the author's remarks and conclusions. This is followed by an appendix, being extracts from the code on the law of priority, and an alphabetical index.

Mr. Hemming began his research in 1931. It covers the period from the 10th edition of Linné, 1758, to the beginning of the Zoological Record, 1868, and the Holarctic butterflies only except where later references are necessary, or where extra-faunal insects have been credited to the region treated of. Mr. Hemming is to be congratulated on his industry which is well understood by the writer, who, with his friend, Mr. Ernest L. Bell, has spent years in assembling a card catalog of the neotropical Hesperidae alone. The suggestions for the suspension of the rules refer to the following genera of long use in literature: *Euploca* Fab., *Argynnis* Fab., *Vanessa* Fab., *Euthalia* Hüb., *Nymphidium* Fab., *Strymon* Hüb. and *Colias* Fab. Many prominent American entomologists have signed a petition to the International Commission requesting the suspension of the rules in these cases. The writer would have wished that more of the older, generally used names had been included in this list, but, in the interests of stability, will accept all of Mr. Hemming's findings, hoping that writers on the Rhopalocera will have this work before them, and follow it in future in their use of generic names. It is to be hoped that the author will continue the work, not only bringing it up to date, but also include the World genera, and it would appear he is so doing from the notes he is publishing from time to time in *Stylops* and *The Entomologist*. His work is of great value towards the goal, I hope attainable, of a stable scientific nomenclature.—R. C. WILLIAMS, JR.

EXCHANGES

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

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

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Geometers Wanted from all parts of United States, for cash or exchange. Edward Guedert, P. O. Box 305, Napa, California.

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ENTOMOLOGICAL NEWS

APRIL, 1935

Vol. XLVI

No. 4



JOHN MERTON ALDRICH;
1866-1934.

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No. 4

Tenodera angustipennis Saussure established in Southern New Jersey (Orthoptera: Mantidae).

By HENRY FOX, Associate Entomologist, U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine.

Early in 1933 Frank Morton Jones (ENT. NEWS, XLIV (1): 1-3) reported the presence in this country of a second species of oriental mantis, *Tenodera angustipennis* Saussure, material of which he had collected at several points in Delaware and the adjoining section of Maryland.

The earliest indication that this same species had become established in southern New Jersey came to my attention in the autumn of 1933, when Mr. Carl Ilg, of the Department of Entomology, New Jersey Agricultural Experiment Station, handed me several egg masses which he informed me had been collected at Cedarville, Cumberland County. These egg masses I subsequently placed in shrubbery growing on the grounds of an apartment in Riverton, which I occupied at the time. Whether the eggs hatched and gave rise to any adults at that place I am unable to say, as I vacated the apartment early in the summer of 1934, and a search made during a visit to Riverton in the autumn of the same year failed to reveal a trace of the insect, although egg masses of the older established form *T. sinensis* Saussure, were frequent on that and adjoining properties.

During a brief sojourn in northern Cape May County in mid-September, 1934, I found clear indications that *angustipennis* was well established in that section, adult examples being taken at Ocean View, South Seaville, and West Ocean City (Marmora). The greatest number was obtained in the nursery of Mr. Melvin Wills, South Seaville, where, if anything, it was rather more numerous than *sinensis*, which is known to have been present in the vicinity for many years.

About two weeks after finding the species in Cape May County I found an adult and several egg masses at Elmer, Salem County.

Diligent search on several occasions in the autumn of 1934 at Moorestown, failed to reveal any evidence of the presence of *angustipennis* at that locality, although the other species, *sinensis*, is common there.

In an effort to ascertain whether there had appeared any earlier announcement of the presence of *angustipennis* in New Jersey, I wrote to Mr. Ilg, who informed me that, while he knew of no published record, an egg mass of the same species had been collected in an apple tree at Glassboro as far back as October, 1929. Mistaking this for an egg mass of the native¹ *Stagmomantis carolina* (Johannsen), he paid no further attention to it until after the appearance of Mr. Jones' paper announcing the presence of the new form in this country, when he sent a similar egg mass to Mr. Rehn, who identified it as belonging to *angustipennis*.

I am also informed by Mr. Ilg that, since 1929, egg masses of the newly established mantis were collected in 1931 at Hamonton by A. J. Farley and in 1932 at Cedarville, by R. C. Burdette. In the autumn of 1933, accompanied by Burdette, Mr. Ilg visited the locality at Cedarville and there gathered about 30 egg masses. These included those presented by Mr. Ilg to me, as well as some sent to W. T. Davis, Staten Island, and to Mr. Herman Hornig, Reading, Pennsylvania. The remainder of the series, according to Mr. Ilg, was distributed about New Brunswick.

Besides those previously mentioned, Mr. Ilg informed me that in November, 1933, Mr. E. G. Scovell sent in for identification an egg mass of *angustipennis* collected in Salem County, along with the statement that numerous other egg masses of the same general appearance had been seen in the county.

From these various records, as well as from the observed frequency of the species in Salem, Cumberland and upper Cape May counties, it seems probable that *angustipennis* must be

¹That is, native to this country, but not definitely known to occur in New Jersey.

rather generally distributed throughout southern New Jersey, north, at least, to Glassboro and Hammonton. Also the possible future development of the species in the form of local colonies may perhaps be anticipated at the localities mentioned where egg masses were noted as intentionally introduced.

Since the preceding account was written, the writer, during a visit at Cape May Court House late in November, 1934, made an effort to determine the relative proportion formed by *angustipennis* in the total mantid population of that and one other nearby locality. The insects having disappeared at the time, the egg capsules were utilized for this purpose. At Court House a search on parts of two consecutive days showed that out of a total of 127 egg capsules observed, 38, or 30 percent, were of *angustipennis*, the remainder being *sinuensis*. On another day, at Stone Harbor, during about two hours' search between showers, 14 capsules, out of a total of 143, were of *angustipennis*, indicating it as forming only about 10 percent of the mantid population of that place.

A curious feature in the distribution of these egg capsules in the case of both species was their relative abundance within town limits and their apparent scarcity in open country away from the vicinity of dwellings.

In view of the fact that both species of mantids now established in New Jersey have similar habits, it would seem that they would form promising material for a study of competition in the struggle for existence. Apparently one way to get data in such a study would be to compare the relative abundance of the egg capsules of the two species over a series of years.

The Prothoracic Pleurites of Coleoptera.

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

(Continued from page 68.)

COMPARISON OF THE TWO TYPES.

The two forms here described may be regarded as types of the two great groups of the Coleoptera, the Adephaga and the Polyphaga. That a difference in the prothoracic pleurites of these two groups exists has long been recognized by coleopter-

ists, but the attempts to express these differences have been curiously unmorphological and reveal no clear understanding of the situation. Such statements in regard to the Polyphaga as "notum not separated from the pleura by distinct sutures," "prothoracic pleural sutures lacking," and "pleuron frequently undivided into sclerites and the suture between that region and the pronotum, on either side, likewise often absent," are but unsatisfactory—and for that matter quite untrue—descriptions of the actual morphological situation.

In the light of what has been shown, supported by the study of representatives of about forty well distributed families of the Coleoptera, we may attempt to re-define the differences in the prothoracic pleural structure of Adephaga and Polyphaga.

The Polyphaga always with the prothoracic pleurites much reduced in size and forming a single plate or "entrochantin," this plate usually being partially or even entirely concealed within the coxal acetabulum; prothoracic pleural apophysis usually well developed, although rarely lacking; sides of the prothorax formed entirely from the notum, which meets the sternum along a noto-sternal suture anterior to the coxae or this suture suppressed by fusion of the two parts, and frequently meeting the sternum posterior to the coxae.

The Adephaga always with the prothoracic pleurites strongly developed, forming a conspicuous part of the externally visible structure of the segment, a well defined noto-pleural, as well as a pleuro-sternal suture being present; notum meeting the sternum and forming a noto-sternal suture for at the most but a short distance near the anterior border of the segment and never meeting the sternum posterior to the coxae; trochantin present as a distinct piece; pleural apophysis never developed.

NOTES.

About forty families, well distributed throughout the major groups of the Coleoptera, have been examined in the course of this study. No departures from the two types as described appear to such a degree as to disturb the basic conclusion that as far as the prothoracic pleurites are concerned the beetles definitely fall into two great groups. Representatives of the

two doubtful families Rhyssodidae and Cupesidae have been examined and as far as these structures are concerned both these families are definitely Adephagous. The Adephaga, especially, cling closely to their common type.

In the Polyphaga extraordinary secondary developments occur in the families Histeridae, Scarabaeidae, Lucanidae, Curculionidae (subfamily Calandrinae) and especially in the Tenebrionidae as represented by the genus *Elcodes*. In this last named form there is a complete breakdown of the landmarks but the morphological interpretation attainable by comparison with less modified forms is clear. In spite of the modifications presented the adherence to the basic type is not disturbed.

It is evident that if the interpretations of the prothoracic pleurites which are here presented are valid, the existing literature contains many errors. Such, for example, is the statement used in some keys that in certain families of the Polyphaga the "trochantin"—meaning what is here considered to be the entire pleurum—is lacking. It is not lacking in any family that has been examined, this including some to which the quoted statement is supposed to apply. Such a statement as "prosternal epimera fused in the middle line behind the coxae" as applied to the weevils is obviously erroneous, it being the notum which in this group closes in behind the coxae. And so with numerous other statements which the student who accepts the point of view herein expressed will easily detect.

It would be well to call attention to certain methods which have been used in connection with this study. In order to make the necessary dissections from pinned material—which is all that is usually available—the tissues must be softened and in most cases bleached. The softening can be accomplished by the usual boiling in caustic potash. To render specimens translucent, a bleaching medium developed by Mr. Richard Blackwelder and later to be described by him in detail has been employed. This fluid consists of hydrogen peroxide and ammonia and has proven splendidly effective, reducing even very black specimens to a proper state in a time frequently measurable in minutes. It will constitute a notable addition to our available methods of study.

Four New Texas Coleoptera (Buprestidae and Cerambycidae).

By JOSEF N. KNULL, Ohio State University, Columbus, Ohio

Agrilus esperanzae n. sp. (Buprestidae).

Form slender, elongate, cupreous above and beneath, a dark blue area covering most of dorsal surface of pronotum, two similar areas on elytra, one back of scutellum and a transverse band back of middle, each elytron with four white pubescent spots.

Head with front convex, slight indication of a median depression on vertex; antennae short, extending to middle of pronotum when laid along lateral margin, serrate from the fifth joint.

Pronotum slightly wider than long, widest back of middle; sides arcuately rounded anteriorly, slightly constricted toward base, when viewed from the side the marginal and submarginal carinae are separated for their entire length; disk convex without trace of median depression, lateral depressions well marked, prehumeral carinae short, straight; surface obliquely rugose, the rugae well separated; lateral depressions pubescent. Scutellum transversely carinate.

Elytra wider than pronotum at base; sides strongly constricted in middle; apices broadly rounded, serrulate; disk slightly flattened, sutural margins elevated posteriorly, basal depressions moderately deep; surface imbricate punctate, sparsely clothed with short, inconspicuous hairs, each elytron ornamented with four spots of recumbent white pubescence, one in basal depression, a small round one in front of middle, an elongate patch at middle and a fourth one on apical third.

Abdomen beneath sparsely punctate, clothed with short recumbent white hairs which are more numerous on sides of third ventral segment, first two ventrals not modified in the middle, last ventral with a deep narrow emargination; prosternal lobe truncate. Tibiae slender, not mucronate. Tarsal claws similar on all feet, cleft near base, inner tooth broad, points not turned inward.

Length 4.3 mm.; width 1 mm.

Holotype, probably a female, labeled Brownsville, TEXAS, June 3, 1934, J. N. Knull, collector, in collection of the writer.

This species would run to *A. palmicollis* Horn in Fisher's* key. However it can be separated from this species by its more slender form, markings on elytra and structure of the last abdominal segment.

Agrilus viridescens n. sp. (Buprestidae).

Form and size of *A. egenus* Gory, head bright green on front, vertex and dorsal surface cupreous with viridescence luster, ventral surface shining cupreous.

Head with front convex coarsely granulose, becoming rugose on vertex, no trace of median depression; antennae reaching to about middle of pronotum when laid along lateral margin, serrate from the fifth joint.

Pronotum wider than long, slightly narrower at base than at apex, widest in the middle; sides arcuately rounded in front, sinuate at base; when viewed from the side the marginal and submarginal carinae are joined at basal fourth; disk convex, a lateral depression on each side, prehumeral carinae strongly elevated, a rather obscure line extending from scutellum to middle; surface coarsely transversely rugose. Scutellum transversely carinate.

Elytra wider than pronotum at base; sides constricted near middle, broadly expanded back of middle, tips separately rounded, finely serrulate; disk with sutural margins strongly elevated posteriorly; surface imbricately punctate, clothed with scattered, short, recumbent pubescence.

Abdomen beneath finely punctate, clothed with short pubescence; first and second segments rounded, a line of longer pubescence extending from prosternum to first abdominal segment. Prosternal lobe broadly emarginately truncate. Tibiae slender, the anterior and middle pairs mucronate on inner margin at apex. Tarsal claws somewhat similar on all feet, cleft, the outer tooth long, the inner one about one-half the length of the outer and not turned inward; anterior claws of male more deeply divided with inner tooth more pointed and nearly the length of the outer one.

The female differs from the male in having the front of the head cupreous with a viridescence luster, anterior and middle tibiae unarmed at apex and median line of long pubescence lacking on ventral surface.

Length 4.3 mm.; width 1.2 mm.

* Fisher, W. S., U. S. National Museum Bull. 145, pp. 1-347, 1928.

Described from a series of specimens collected from the foliage of mesquite (*Prosopis juliflora* D. C.) at Brownsville, TEXAS, May 25 to June 3; Ella, Texas, May 31, and Gillespie Co., Texas, June 12 to 14, 1934, by J. N. Knull.

Holotype male, labeled Brownsville, Texas, May 22, in the collection of the writer. Paratypes in the collections of Ohio State University and the writer.

According to Fisher's * key this species would run to *A. pubescens* Fisher, but it lacks the sutural pubescent stripe of this species. The male genitalia are somewhat similar to those figured by Fisher for *A. pusillus* Say.

The writer is indebted to Mr. W. S. Fisher for comparing specimens with the types in his care.

***Methia xanthocollis* n. sp.** (Cerambycidae).

Robust, piceous, head, pronotum, base of elytra and scutellum yellow.

Head wider than pronotum, coarsely confluent punctured; eyes small, finely granulate, separated by one-half the width of pronotum on vertex, deeply emarginate, lower lobe much larger than upper one, lobes connected by one row of facets; antennae when laid over the back, extending five joints beyond tips of elytra, scape stout, second joint small, one-half as long as broad, third joint twice as long as first, joints four to eleven gradually decreasing in length.

Pronotum broader than long, widest back of middle, more constricted at base than at apex; sides arcuately rounded; disk convex; surface sparsely irregularly punctured in center, punctures becoming confluent laterally, each bearing a long fine hair. Scutellum triangular.

Elytra about one-half the length of the body; sides subparallel; apices broadly rounded; disk densely punctured, crenulate, each elytron containing two irregular indistinct costae.

Beneath sparsely pubescent with short fine hairs.

Length 5.2 mm.; width 1.5 mm.

Holotype, labelled Davis Mountains, TEXAS, July 9, J. W. Green, collector, in the Wenzel collection at Ohio State University.

The short elytra, distance between eyes on vertex, color of head and pronotum will separate this species from our other forms in the genus.

Superficially this species resembles *Tessaropa bicolor* Horn. However, Mr. E. T. Cresson, Jr., who kindly compared the type states, "The type of *T. bicolor* Horn has the upper and lower portions of the eye connected by a hairlike line, having no facets. They are, however, not disconnected as in another of our species of that genus."

***Elytroleptus floridanus immaculipennis* n. subsp.** (Cerambycidae).

Form and size of *E. floridanus* Lec., piceous on both surfaces with a small, triangular, fulvous spot on front and a similarly colored stripe on each side of median line on pronotum, running from base to anterior margin then along anterior margin to lateral margin and along lateral margin to middle of pronotum. Fulvous areas containing a dense vestiture of recumbent hairs of same shade as background.

Head densely irregularly punctured; antennae when laid over the back extending to approximately one-third the length of the elytra, serrate from the fifth joint, scape stout, second joint as long as broad, third joint nearly as long as scape, fourth joint shorter than third, fifth joint longer than fourth, sixth joint shorter than fifth, joints seven to eleven gradually decreasing in length, eleventh joint slightly longer than tenth.

Pronotum broader than long, constricted at base and apex; sides broadly rounded; surface coarsely irregularly punctured. Scutellum triangular, deeply sulcate.

Elytra elongate, dilate behind, wider than pronotum at base; sides nearly parallel near base; apices rounded; disk of each elytron bearing three costae which are more pronounced at base, but which become obsolete toward apex; surface coarsely confluent punctured, clothed with short recumbent fuscous pubescence.

Beneath more shining than above; abdomen sparsely punctate. Length 9.8 mm.; width 3.2 mm.

Holotype, female, labeled Davis Mountains, TEXAS, July 9, H. A. Wenzel, collector, in the Wenzel collection at Ohio State University.

This form is more elongate than *E. floridanus* Lec., and lacks the humeral markings on the elytra.

**A New Form of *Leptotes marina*
(Lepid.: Nymphalidae).**

By C. HENNE, So. Pasadena, Calif.

My friend Mr. William N. Burdick has brought to my attention a form of *Leptotes marina* Reak., collected near his home at Lennox, California, that is so distinct from the typical insect in the unusual markings on the underside of the wings as to be deserving of a separate name. I have examined the type of *Leptotes marina* ab. *violacea* Gunder and find the underside to be the same as typical *marina*, its distinguishing characteristics being found only on the upper surface of the wings. In my estimation this new form holds the same relationship to *Leptotes marina* as *Philtotes sonorensis comstocki* Gunder does to typical *sonorensis*.

I take pleasure in naming this new form of *marina* after Mr. Burdick.

LEPTOTES MARINA Reak., form **burdicki** forma nov.

♂. Expanse 20-24 mm.

Superior surface primaries and secondaries. Violet the same as parent species.

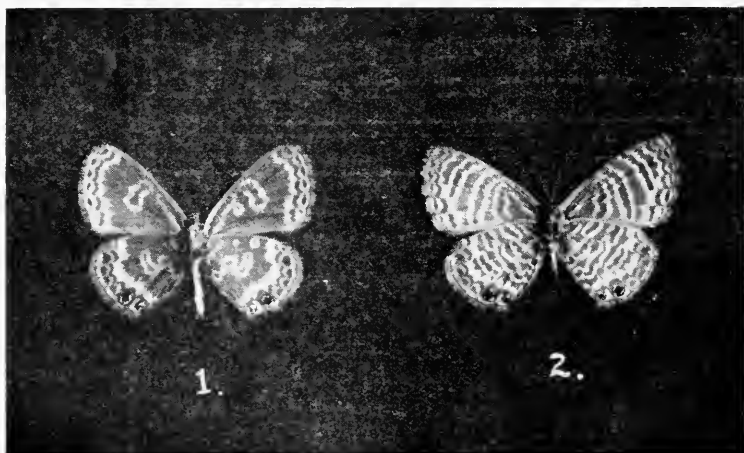


Figure 1. *Leptotes marina burdicki* (underside).

Figure 2. *Leptotes marina* (underside).

Inferior surface, primaries: Ground color: grey brown. An oblong white spot, with the center the same shade as the ground color, concave on the side nearest the base of the wing and about twice as long as wide, crosses the wing at the end of the discal cell and extends from the subcostal vein to the second median nervule. A similar but smaller and more indistinct spot lies between the subcostal vein and the inner margin, closer to the basal area. A narrow white line runs from the base of the cell. The costal margin is light grey widening at the base, and the inner margin is of the same shade. The double limbal row of spots does not differ from *marina*.

Secondaries: Ground color: same as primaries. A small spot similar to that on the primaries, but longer in relation to its width, runs from the upper radial vein to the second median nervule, and is surrounded by an indefinite number of small circular spots. The double limbal row of spots is similar to that on the primaries. The eye spots on the anal angle are the same as in *marina*.

♀. Expanse 22 mm.

Superior surface, primaries: Ground color: Lustrous violet with brown limbal area the same width as in the parent species, but the usual two or three spots within the discal area have been reduced to one. This is probably merely a case of variation, as the number of spots also varies in a series of typical *marina*. *Secondaries:* The same as *marina*.

Inferior surface, primaries: Ground color: The same as male, only a shade lighter. The markings are similar to those of the male. *Secondaries:* Ground color same as primaries and markings same as the male.

Described from two males and one female: *Holotype*, male, 10-10-'32; *allotype*, female, 10-10-'32; one *paratype*, male, 9-16-'34, all from Lennox, Los Angeles County, CALIFORNIA.

The types are in the Burdick collection. The paratype is in the National Museum at Washington, D. C., and any subsequent topotypes will be placed with other collections.

Odonate Fauna of Some of the East Indies.

Mr. M. A. Lieftinck has published "An Annotated List of the Odonata of Java with notes on their distribution, habits and life-history" in *Trenbia*, xiv, livr. 4, pp. 377-462, Buitenzorg, Dec., 1934. The following numbers of species are given for the Odonate fauna of near-by areas: Malay Peninsula 167, Sumatra 180, Java 142, Borneo 213 (p. 381).

A New Species of *Phyllophaga* from Florida (Coleop.: Scarabaeidae).

By O. L. CARTWRIGHT, Clemson College, South Carolina.*

Phyllophaga youngi n. sp.

Type ♂: length 16.5 mm., width 8 mm. Elongate oblong. Head dark castaneous, pronotum ferruginous, elytra ferruginotestaceous at base, shading quickly to testaceous, abdomen testaceous, legs ferruginous, the tibia darker. Upper surface shining, glabrous. Mesosternum with sparse, fine, long, yellowish hair. Abdomen with scarcely noticeable, fine, sparse, short hair at sides, somewhat longer on penultimate.

Antennae 9-jointed, club shorter than funicle, equal to scape. Clypeus moderately emarginate, sides arcuate; margin broadly not abruptly reflexed; rather coarsely punctate, closer at suture and middle where the punctures are separated by about their own diameters or less, gradually increasing to three or four times their diameters at the sides; suture impressed, subangulate at middle, arcuate to sides. Frons slightly convex, punctures about equal to those of clypeus in size, sparse near suture, separated by three or four diameters, gradually closer to about their own diameters at vertex, smooth above vertex, a few scattered punctures along occipital margin and at sides; a median longitudinal impressed line from suture almost to occiput.

Pronotum one-half wider than long, a slight depression anteriorly each side of median line; narrowed anteriorly, sides arcuate, anterior angles sharply rounded, posterior angles broadly rounded, not well defined; lateral margins crenate, reflexed narrowly at middle, less abruptly at angles; sub-evenly ocellately punctured, punctures somewhat finer and closer anteriorly where they approximate in size the punctures of the head; basal margin interrupted at middle.

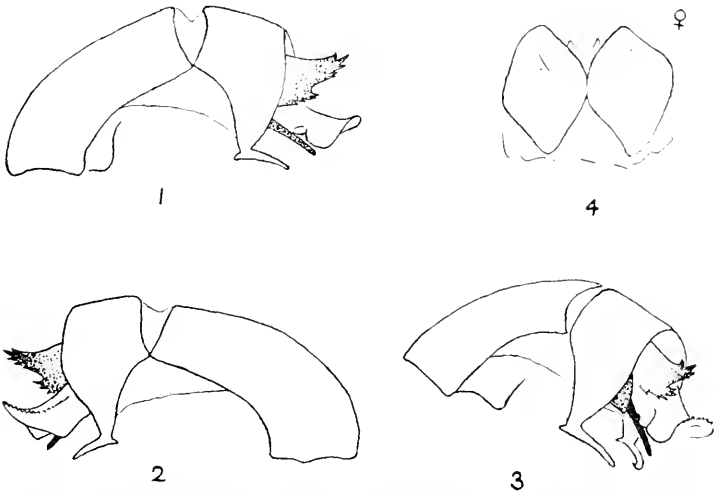
Elytra semi-transparent; sutural costae distinct, discal costae obliterated; punctures finer than on thorax, evenly distributed, deeper on discal area, subrugulose just back of scutellum. Scutellum with close punctures laterally.

Metasternum closely, moderately coarsely punctured, posterior coxal plates less closely so, the punctures bearing fine hairs. Abdominal segments more finely and less densely punctured, especially at middle. Penultimate segment with close

* Technical Contributions No. 39, from the South Carolina Experiment Station, Clemson College, South Carolina.

mixed coarse and fine punctures. Abdomen apparently constricted just before terminal segment. Posterior half of terminal segment eroded. Pygidium evenly punctate as on elytra.

Both spurs of hind tibiae free, the long spur slightly longer and short spur one-third shorter than first tarsal joint. Tooth of claw median, strong, right angled. Aedeagus, Fig. 1.



Genitalia of *Phyllophaga youngi* Cartwright; 1, 2, 3, Male aedeagus; 4, Female genitalia.

♀. Allotype: length 17 mm., width 8.5 mm. Similar to male except that the short spur of the hind tibia is subequal to and the long spur one-third longer than the first tarsal joint; the penultimate abdominal segment is but slightly constricted; the club of the antenna is much shorter than the funicle and less than the length of the scape.

The typical series includes 50 males and 63 females. The males vary in length from 16.5 to 18 mm., in width from 8 to 9 mm. The females vary from 17 to 19 mm., in length, and 8.5 to 9 mm., in width. The species was found feeding upon the Florida Tremas, *Trema floridana* Britton. The entire series was collected in an area of approximately one-half square mile in Brickell Hammock, Miami, Florida, by Mr. Frank N. Young, for whom the species is named. Three specimens were

collected in June, 1933, and all others between June 3 and July 17, 1934.

The male *holotype* and female *allotype* deposited in the United States National Museum. *Paratypes* placed in the Museum of Comparative Zoology at Harvard University, in the Canadian National Collection, and in the private collections of Mr. Young and the writer.

Phyllophaga youngi keys to Horn's group XV ("Revision of the Species of *Lachnosterna* of America North of Mexico."—Geo. H. Horn. Trans. Am. Ent. Soc. XIV 1887 p. 215). In this group it is easily separated from *P. costata* Horn, the only other species having the hind angles of the thorax rounded. *P. costata* Horn lacks sutural costae, has the clypeus entire, and the tooth of the claws small and basal. *P. youngi* is closely allied through genitalia to various Cuban species but differs from the known Cuban species listed by Dr. Chapin in his "Revision of the Pleurostict Scarabaeidae of Cuba and the Isle of Pines" (Ann. Ent. Soc. Am. XXV, 1932, p. 179), in that it is less than 20 mm. in length, with the lateral margins of the pronotum crenate.

Rohdendorfia New Name (Diptera, Muscoidea).

In proposing the name *Rhodendorfia* (ENT. NEWS, XLV, 213), the writer overlooked the fact that Smirnov used the same name in 1924 for a syrphid. The new name *Rohdendorfia* is herewith proposed for *Rhodendorfia* TTE., preoccupied (nec Smirnov), genotype *Tachina oestracca* Fll.

Oestrocara gen. nov. (Family Oestridae, Order Diptera).

Genotype, *Semisuturia nitidiventris* Malloch, Malay Peninsula.

Runs out with *Oestrophasia*, from which it differs by the poststigma being less than twice length of stigma, 5R open, single pair of MD on intermediate abdominal segments. Differs from *Doddiana* (syn. *Semisuturia* Mall.) by cubitulus angular and with stump, MD on intermediate segments, fifth sternite of male with a terminal pair of narrowly separated, knoblike processes.

C. H. T. TOWNSEND.

**Gasterophilus inermis Brauer, a Species of Horse Bot
not previously recorded from North America
(Diptera: Oestridae).**

By E. F. KNIPLING, Bureau of Entomology and Plant
Quarantine, U. S. Department of Agriculture.

While examining the stomach, duodenum, and rectum of horses slaughtered in a packing plant at Rockford, Illinois, on May 21, 1934, two bot-fly larvae determined by the writer as *Gasterophilus inermis* Brauer, a European species, were found attached to the rectum of one horse. Apparently this is the first record of the occurrence of this species in North America.

The two larvae were attached to the wall of the rectum approximately 6 to 8 inches from the anal end, the two being separated by a distance of approximately 1½ inches. The general appearance of the larvae together with that of the lesions at the point of attachment indicated that the specimens were different from *G. haemorrhoidalis*, which is the North American species that frequently, if not always, attaches to the rectum and anus before maturity.

The lesions at the point of attachment to the rectum were rather deep, resembling those caused by *G. intestinalis* in the stomach and *G. nasalis* in the duodenum, and distinctly more conspicuous than those of *G. haemorrhoidalis*.

The previously mentioned parts of the digestive tract from 65 horses were examined. Since these animals were collected from various points, the specific locality from which the infested host came is not known. The management of the slaughtering plant, however, stated that the animals were gathered from Illinois with possibly a few from near the boundary of bordering States. The host harboring this European species, therefore, probably became infested either within, or near, the State of Illinois.

The larvae were taken to Ames, Iowa, where they were determined as *G. inermis*. After the specimens had been examined and the distinguishing features recorded, the larvae were placed on moist sand, where they were allowed to remain at

room temperature. One of them pupated between 24 and 31 hours after collection, while the other required between 54 and 69 hours for this process. On June 12, 21 days after pupation, one male emerged and the other, also a male, emerged the following day. The adults were determined as *G. incrimis*, the determination of the larvae being thereby substantiated.

Since there is a possibility that this species has become established in this country, it may be well to state briefly the characteristics by which the species may be distinguished from our common similar species in both the larval and adult stages, and also to give a brief review of the life history as recorded by Dinulescu.*

The mature larvae of *G. incrimis* measured 15 and 15.5 mm., in length and 5.5 mm., in width at the widest point. The body is widest near the middle, tapers anteriorly, and is slightly narrower near the posterior end than near the middle, thereby differing from *G. haemorrhoidalis*, in which the body of the larva is widest near the posterior end. The color is similar to that of *G. nasalis* but slightly paler yellow, differing in this respect from that of larvae of *G. haemorrhoidalis* and *G. intestinalis*, which generally have a pink to reddish color.

The spines are situated at the anterior margin of the segments, and for the most part are arranged in two closely approximated, alternating rows; the spines in the anterior row are larger than in the more posterior one. Segments 2-11 are provided with spines. On segment 11 the spines are restricted to the ventral surface and on segment 10 approximately one-half the dorsal surface on either side of the middle is without spines. Segment 9 has a more narrowed spineless area than 10, but a wider area than on the segments anterior to it. On segments 9, 10, and 11 the second row of smaller spines is reduced. On segment 2 there are three rows of small spines on the dorsal surface, the number of rows increasing to five or six on the ventral surface. The spines on the ventral surface of segment 3 are very nearly as numerous as on segment 4; in *G. haemor-*

* Dinulescu, G. Recherches sur la biologie des Gastrophiles. Anatomie, physiologie, cycle évolutif. Ann. Sci. Nat. Zool. (10) 15: 1-183, illus. 1932.

rhoidalis the ventral spines on segment 3 are generally greatly reduced. The spines are broad at the base and come to a point more abruptly than in the other species of *Gasterophilus* larvae found in this country. Spines are lightly pigmented, with the pigmented area limited to the tip.

The adult is rather small, and densely covered with silvery to yellowish hair, contrasting with the more or less orange-colored hair in *G. haemorrhoidalis*, *G. nasalis*, and *G. intestinalis*. The third trochanter is without a prominent spur, which will readily distinguish this species from *G. intestinalis*. The abdomen is paler, but is somewhat mottled as in *intestinalis*. Dark spots on the wings will immediately distinguish this species from *G. nasalis* and *G. haemorrhoidalis*. Small spots are also present near the apex of the wings of *intestinalis*. However, there are two of these, whereas in *inermis* there is only one.

The eggs of *G. inermis*, according to Dinulescu, are deposited on the hairs on the cheeks of the host, and upon hatching the larvae penetrate the epidermis and work their way under it until they reach the mouth. The larvae then burrow in the sub-epithelial layer of the cheek until they molt. After molting the larvae migrate to the rectum, where they remain attached until they are mature.

A Veteran's Appeal.

[In view of Dr. Blatchley's invaluable contributions to North American entomology, especially his manuals of Coleoptera, Rhynchophora, Orthoptera and Heteroptera, we are glad to publish the following note.—EDITORS.]

On account of failing eyesight and other infirmities, I am no longer able to collect or study insects. I have to have something to do and part of my time is devoted to the collection and study of postage and revenue stamps, especially those of the countries of the western continent. I have hundreds of duplicates and will be glad to enter into exchange with any of the readers of ENTOMOLOGICAL NEWS or their friends, who are stamp collectors. If not collectors, perhaps some of the many entomologists who have used my manuals will kindly donate any old postage, cut-square envelope, or revenue stamps which they may have on hand.

W. S. BLATCHLEY, Dunedin, Florida.

Further Notes on Utah Heteroptera and Homoptera.¹

By GEORGE F. KNOWLTON.

This report deals with additional records of Utah Heteroptera and Homoptera,² the distribution of which is incompletely recorded for this inter-mountain area. The writer is indebted to Messrs. H. G. Barber and P. W. Oman, of the U. S. Bureau of Entomology and Plant Quarantine, for the identification of the material. Unless otherwise indicated localities are in Utah and collections (since 1923) made by the writer.

Order HETEROPTERA.

COREIDAE.

- ALYDUS PLUTO Uhl. Ft. Duchesne, Aug. 27, 1932 (F. K. Stoffers); Logan, July 10, 1933 (L. Greene).
 CORIOMERIS HUMILIS (Uhl.). Avon, Aug. 10, 1930 (Knowlton::M. J. Janes); Logan, Oct. 11, 1909; Providence Canyon, June 7, 1933.
 AUFEIUS IMPRESSICOLIS Stal. Salt Lake City, Sept. 15, 1925; Taylorsville.
 CORIZUS HYALINUS var. SANGUINEUS (Costa). Junction, June 27, 1933.
 C. PARVICORNIS Sign. Alton, June 7, 1933.
 C. TUBERCULATUS Hambl. On *Artemisia tridentata* at Keetley, April 27, 1933.

ARADIDAE.

- ARADUS FUNESTUS Bergr. Logan, April 7, 1933 (Stoffers).
 A. LUGUBRIS Fall. Logan, June 11, 1931 (W. L. Thomas); Salt Lake City, Sept. 6, 1932.

NEIDIDAE.

- JALYSUS SPINOSUS (Say). Ft. Duchesne, June 15, 1932 (Stoffers); Logan; on *Artemisia tridentata* in Sardine Canyon, July 14, 1925.
 J. SPINOSUS WICKHAM Van D. Ft. Duchesne, May 17, 1933 (Stoffers); Logan, July 4, 1907 (E. G. Titus).

LYGAEIDAE.

- LYGAEUS PUSIO (Stal). Logan, Oct. 11, 1909.

¹ Contribution from the Department of Entomology, Utah Agricultural Experiment Station. Authorized for publication by Director.

² ENT. NEWS 42: 40-43, 68-72; 44: 261-264.

- L. LATERALIS Dall. Troutcreek, July 25, 1933 (H. B. Stafford).
- NYSIUS THYMI (Wolff). Plain City, Aug. 5, 1903.
- N. STRIGOSUS Uhl. Payette, Aug. 27, 1907, Idaho.
- N. COLORADENSIS Bak. Strawberry, Sept. 10, 1933 (E. W. Anthon).
- ARPHNUS TRISTIS Van D. Kelton, May 15, 1934.
- A. CORIACIPENNIS (Stal). Cache Junction, June 11, 1933.
- GEOCORIS BULLATUS (Say). Castlegate, Duchesne, Hoytsville, Kamas, Snowville, Strawberry, Tabiona, and Zion National Park.
- G. PALLENS Stal. Kanosh, Lampo, Redwood, Riverside, Snowville, and Thompson.
- G. ATRICOLOR Montd. Deseret, Layton, Locomotive Springs, Logan, and Snowville.
- CROPHIUS ANGUSTATUS Van D. Gunnison. Butte, Green River, May 7, 1933 (Stafford).
- SPHAEROBIUS INSIGNIS (Uhl.). Brigham City, Sept. 25, 1916.
- LIGYROCORIS NITIDULUS (Uhl.). Kanab, June 26, 1933; Logan, July 7, 1931 (T. O. Thatcher).
- PERITRECHUS FRATERNUS Uhl. Logan, March 20 and April 24, 1933 (Thatcher).
- P. TRISTIS Van D. Logan, March 20, 1933 (Thatcher).
- P. SASKATCHEWANENSIS Barber. Benson, July 23, 1909 (Titus::Hoff); Logan, April 15, 1909 (J. H. Horton); Troutcreek (Stafford). Also Loma, Colorado, June 19, 1933.
- SPHRAGISTICUS NEBULOSUS (Fall.). Price, May 4, 1916; Whitney (Horton).
- EMBLETHIS VICARIUS Horv. Logan, April 5, 1905.
- SCOLOPOSTETHUS THOMSONI Reut. Logan Cany., May 29, 1933; Parley's Cany. (Titus).

PHYMATIDAE.

- PHYMATA BORICA Evans. Richfield; Snowville, Aug. 22, 1931.
- P. METCALFI Evans. Lucin, Aug. 11, 1931; West Jordan.
- P. VICINA Handl. Ft. Duchesne, June 15, 1932 (L. Cutler). Also Ft. Collins and Palmer, Colorado.
- P. EROSA SALICIS Ckl. Ogden, Aug. 18, 1927; Randlett; Rosette.

REDUVIIDAE.

- REDUVIUS PERSONATUS (L.). Delta, June 26, 1930; Logan (J. H. Linford); Providence (D. Hammond). Also Lorenzo, Idaho, July 26, 1931 (Thomas).

- TRIATOMA PROTRACTA (Uhl.). Troutcreek, July 23, 1933 (Stafford).
 APIOMERUS SPISSIPES (Say). Logan, July 4, 1907 (Titus);
 Timpie, June 18, 1933.
 ZELUS RENARDII Kolen. Moab, Aug. 10, 1906; St. George,
 July, 1928 (H. J. Pack).
 RHYNCORIS VENTRALIS (Say). Cache Junction, June 3, 1912
 (H. R. Hagan); Farmington; Ft. Duchesne (Stoffers).
 ACHOLLA AMPLIATA Stal. Lampo, Aug. 1, 1931 (Knowlton::
 Thomas).
 SINEA COMPLEXA Caud. Whitehouse, June 19, 1933.

NABIDAE.

- NABIS INSCRIPTUS (Kirby). Logan Canyon, May 29, 1933
 Knowlton::Anthon).
 N. ALTERNATA Parsh. Ft. Duchesne, May 21, 1933 (C. J.
 Sorenson); Logan (Anthon); Manti (Pack); Provo Can-
 yon; Stansbury Island (Knowlton::Thomas); Springville;
 Strawberry (Anthon).
 N. ROSEIPENNIS Reut. Logan Canyon, May 17, 1933 (Knowl-
 ton::Anthon).
 N. RUFUSCULUS Reut. Logan, April 6, 1905.

ANTHOCORIDAE.

- ANTHOCORIS ANTEVOLENS White. Logan Canyon, July 10,
 1933.
 A. MELANOCERUS Reut. Found to attack potato psyllid, *Para-
 trioza cockerelli* (Sulc), when placed in a cage with them.
 Logan Canyon, July 16, 1933; Joseph (Titus).

Order HOMOPTERA.

CICADELLIDAE.

- AGALLIA QUADRIPUNCTATA Prov. Providence, June 3, 1930
 (Janes).
 A. BIGLOVIAE Bak. On beets at Delta, June 24, 1927.
 ACERATAGALLIA HELVEOLA Oman. Helper, June 17, 1933;
 Hurricane; Jensen; Orr's Ranch in Skull Valley.
 A. UHLERI Van D. The Delle and Grantsville, June 2, 1933;
 Duchesne; La Sal; Stansbury Island; Torry.
 IDIOCERUS AMABILIS Ball. Logan Canyon, July 31, 1933.
 I. DUZEEI Prov. Strawberry, Sept. 10, 1933 (Anthon).

- I. FEMORALIS Ball. Logan Canyon, March 12, 1934 (Knowlton:: Thomas).
- I. LACHRYMALIS Fitch. Ft. Duchesne, Aug. 20, 1932 (Stoffers); Salt Lake City (Stafford).
- I. SNOWI G. and B. Salt Lake City, July 15, 1933 (Stafford).
- BYTHOSCOPIUS ATER (Bak.). Indian Canyon and Willow Creek, June 12, 1933.
- GYPONA VERTICALIS Stal. Lehi, Sept. 10, 1931; Logan (Thomas); Nibley; Providence (Janes); Holliday.
- MESAMIA STRAMINEA (Osb.). Bountiful, Oct. 5, 1933 (Knowlton::J. A. Rowe); Fillmore; Hot Springs; Magna; Promontory; Warren.
- OSBORNELLUS CONSORIS (Uhl.). Sardine Canyon, Aug. 9, 1933.
- TWININGIA BLANDA (Ball). Trout Creek, July 25, 1933 (Stafford).
- PLATYMETOPIUS ACUTUS (Say). Bountiful, Oct. 5, 1933; Ft. Duchesne, June (Stoffers); Manti; Price; Wellington.
- P. OREGONENSIS Bak. Logan and Logan Canyon, June 31, 1933; Mendon; Sardine Canyon.
- P. VITELLINUS Fh. Troutcreek, July 27, 1933 (Stafford).
- LAEVICEPHALUS UHLERI Oman. Logan, June 13, 1933 (Anthon).
- L. COLLINUS Boh. Indian Canyon, June 12, 1933.
- DELTOCEPHALUS SONORUS Ball. Provo, May 21, 1933.
- ATHYSANELLA UTAHINA Osb. Flux, Aug. 28, 1933; Howell.
- A. TEREBRANS (G. and B.). Grassey, June 18, 1933.
- ATHYSANUS ALMUS (Van D.). Nat, Idaho, Aug. 13, 1932 (Knowlton:: Janes).
- OPSIUS STACTOGALIS Fieb. On juniper at Grantsville, Oct. 19, 1931.
- O. CLARIVADUS (Van D.). Cisco, June 19, 1933; Erda; Kanab; Locomotive Springs; on *Atriplex* at Promontory; Thompson; on *Chrysothamnus* at Valley Junction; Whitehouse.
- O. INSANUS Ball. On Russian thistle at Deseret, June 18, 1933.
- O. PAUPERCULUS (Ball). Delle, April 12, 1930.
- NOVELLINA SCITULA (Ball). On sugar-beets at Hooper, Sept. 5, 1930.
- N. SAUCIA (Ball). Promontory, Aug. 6, 1930.
- PHLEPSIUS SPATULATUS Van D. Troutcreek, July 25, 1933 (Stafford).
- P. CUMULATUS Ball. Bountiful, Oct. 5, 1933 (Knowlton:: Rowe).
- P. EXTREMUS Ball. On *Artemisia tridentata* at Curlew, April 28, 1933.

- P. OREGONUS* Ball. Troutcreek, July 25, 1933 (Stafford).
ACINOPTERUS VIRIDIS Ball. Lampo, Aug. 12, 1932; Thompson, June 19, 1933.
THAMNOTETIX SCHWARZI Ball. Indian Canyon, June 12, 1933; Magna; Parowan.
T. BELLI (Uhl.). Logan, July 31, 1933; Logan Canyon, Ogden.
T. ATRIDORSUM Van D. Amalga, Aug. 31, 1927; Blanding; Cedar; Cisco; Clover; Coyote; Kanosh; La Sal; Lewiston; Monticello; Nephi; Piñon Canyon; Promontory; Tooele, and Whitehouse. Also near K-Ranch, Colorado, June 11, 1933.
EMPOASCA CEREAE De L. Indian Canyon and Monticello, July 27, 1932.
E. DILUDA De L. Logan Canyon, July 31, 1933.
E. MALIGNA (Walsh). Mt. Pleasant, June 28, 1933; Orem.
E. NIGRA G. and B. Currant Creek, June 11, 1933; Fillmore; Indian Canyon; La Sal; Logan; Skull Valley.
E. NIGRA var. *NIGROSCUTA* G. and B. Glendale, June 27, 1933; Logan Canyon; Monticello.
E. NIGRA var. *TYPHLOCYBOIDES* G. and B. Castlegate, June 12, 1933 (Knowlton::Thomas); Fillmore; Kanab; Lynndyl; Manderfield; Millcreek; Snowville; Spring City; Strawberry (Anthon) and Verdure.
E. FILAMENTA De Ll. Bountiful, Oct. 5, 1933 (Knowlton::Rowe); Clinton; Coalville; Harrisville; Layton; Magna; Rockville; and Springdale.
EUPTERYX MELISSAE Curtis. Logan, June 9, 1933.
TYPHLOCYBA POMARIA McA. Cornish, Sept. 11, 1930; on apple and rose, Logan; Providence (Hammond).
T. ROSAE (L.). Providence, Oct. 5, 1930 (Janes) and July 18, 1931 (Hammond).

Popenoe Entomological Club.

A hectograph copy of a circular of fifteen sheets, dated March 28, 1933, has recently been received by the American Entomological Society, containing an account of "Entomology at the Kansas State College, Manhattan, Kansas; of the Popenoe Entomological Club and its recent activities; a list of the Kansas State College alumni that have been and are now doing entomological work"; and other notes on entomology at that College. The present officers of this club are: President, Merle W. Allen, Secretary-Treasurer, Harold L. Nonamaker.

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, left, &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.

New Titles of Periodicals and Serials Referred to.

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ENTOMOLOGISCHE BEIHEFTE AUS BERLIN-DAHLEM. Organ der Wanderversammlungen Deutscher Entomologen. Herausg. von der Biologischen Reichsanstalt und dem Deutschen Entomologischen Institut der Kaiser Wilhelm-Gesellschaft. Band 1 (Aug. 7, 1934) contains the proceedings of the Fifth "Wanderversammlung" of German Entomologists, a list of the members, the speech of welcome by the President, Prof. Dr. A. Hase, and greetings by the officers of several allied associations. Papers on the following subjects are published: The old and the new entomology, by Dr. A. Hase (page 19) [limited to German entomologists.] The salt-content of water and egg-laying of malarial mosquitoes, Prof. E. Martini (28). Problems of research on insect miners, M. Hering (44). The new organization of the warfare against forest insects in Prussia, discussed by H. Eidmann (47). Condition and form of hygienic entomology, J. Wilhelmi (48). Importance of German entomological faunistics, F. Rüschkamp [in which Titschack is quoted as stating that of the 5,732 European entomologists more than half, or 3,713, are in Germany] (53). Entomological instruction, K. Friederichs (55). Polyeder-virus in *Argynnis lathonia* L, W. A. Collier (56). The bases of the phylogenetic development of ant-parasitism newly illuminated by the discovery of an additional parasitic ant, K. Gösswald (57). Demonstration of the bee-eater (Bienenwolf) plague on the Werra, and liability to inheritance in sour cherries of the cherry fruit-fly, H. Thiem (62). The distress of the German entomological publications, W. Horn (63). Sugarbeet injurers and landscape in Turkey, F. Eckstein (64). The guest relations of *Atta serdens*, H. Eidmann (69). The ecological race group of *Chrysis ignita*, H. Bischoff (72). The technique of identification of blood sucked up by piercing flies by the precipitin method, F. Weyer (76). Contributions to the history, distribution and ecology of insects injurious to stored products, F. Zacher (83). Genetics of the geographical variability of *Epilachna chrysomelina*, K. Zimmermann (86). Phenological data on mass distribution of scale insects, H. Thiem (90, ill.). Insects injuring stored products, G. Kunike (96). Biological insect photographs, E. Krause (99). Variability in Phasmoids and other Orthoptera and its consequences for classification, K. Günther (100). Migratory grasshoppers, E. W. Schleich (105). Fauna of the drug bazaar at Cairo, F. Zacher (107). The Apollo butterfly in the mirror of art, F. Bryk (108, ill.). Alternation of generations of the Blastophaga gall wasp in connection with the development of cultivated and wild figs, E. Werth (113, ill.). Seasonal migration of Spilngidae, R. Mell (117). Structure and significance of the Malpighian vessels of Coleoptera, H. J. Stammer (118). Mikroklima and distri-

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OBITUARY.

FREDERICK AUGUSTUS DIXEY, M.A., D.M., F.R.S.—It is with profound regret that we announce the tragic death of this well-known and greatly esteemed entomologist. On the evening of January 14th he was knocked down by a motor-car in Park Lane, London, and sustained a fractured skull and other severe injuries; and two days later he passed away in St. George's Hospital, whither he had been conveyed after the accident. He was born in London on December 9th, 1855, and was educated at Highgate School, whence he went up in 1874 as a scholar to Wadham College, Oxford. His active association with Wadham, except for a brief interval (1880-3), during which he was Demonstrator of Physiology at University College, London, remained unbroken until 1928, and he held in succession the responsible offices of Junior Bursar, Bursar and Sub-Warden; and on his retirement was elected an Honorary Fellow of his college. [He was] a finished classical scholar and . . . author of several memoirs on medical science of high importance. As our leading authority on the Pierine butterflies of the world, the succession of exhaustive memoirs from his pen, most of which appeared in the Transactions of the Entomological Society of London, dealing with the phylogeny, mimetic associations, geographical distribution and general bionomics of this important section of the Lepidoptera, and more especially his elaborate researches in connection with the characteristic scent-scales or plumules and their importance in the indication of the affinities and determination of species, have taken high rank as entomological classics. He occupied the presidential chair of the Entomological Society in 1909-10. In the latter year he was elected a Fellow of the Royal Society, and in 1919 he was President of the Zoological Section of the British Association.—J. J. WALKER in *The Entomologists' Monthly Magazine*, February, 1935 (condensed).

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.

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.

Wanted—Names and addresses of those desiring Cocoons of *Actias luna* and *Automeris io*. Exchange considered. Eggs in season. Virginia Weaver, 822 S. College Ave., Tulsa, Okla.

Literature Wanted—Barnes & McDunnough's "Contributions," Henry Edward's "Pacific Coast Lepidoptera" and other publications relative to North American Lepidoptera. C. F. dos Passos, Mendham, New Jersey.

Geometers Wanted from all parts of United States, for cash or exchange. Edward Guedet, P. O. Box 305, Napa, California.

Wanted—Tabanidae (Horseflies and Deerflies). Exchange, purchase, or for determination. G. B. Fairchild, P. O. Box 272, Monticello, Fla.

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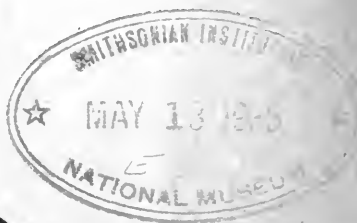
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Facts Determined by Rearing Species of *Coniontis* (Coleoptera: Tenebrionidae).

By FRANK E. BLAISDELL, SR., Stanford Medical School and
Associate in Research, California Academy of Sciences,
San Francisco, California.

On April 25th, 1931, the author collected a pair of *Coniontis* Esch., which according to Thos. L. Casey's table was identified as *elongata* Casey. These were secured on Peek's ranch in the Black Lands district, midway between Stockton and Lodi, San Joaquin County, California. The two specimens—male and female—were taken to my laboratory and placed in a breeding jar. Each week the contents of the jar were poured out on paper and carefully examined. Eggs and larvae were soon found. The eggs were laid at varying intervals and the larvae varied in size, indicating differences in age. As the larvae increased in numbers they were divided up into smaller groups and placed in different jars to reduce the chances of cannibalism, and the parental adults were isolated. Sixty larvae were counted. From time to time a limited number of larvae of different ages were preserved in alcohol for study.

The larvae increased in size and began to show evidences of approaching full growth. By August 18th, 1931, many began to be listless, and finally became alternately dormant and active. Their appearance changed, becoming more opaque and filled with fatty bodies. The largest measured 3.5 cm. in length and 3 mm. in width. The larger larvae at this time excavated cells and by March, 1932, pupae were observed, a limited number of which were preserved. In about fourteen days imagos appeared; others appeared in diminishing frequency up to about June 17th, 1932. In August another group of imagos emerged. The number of larvae at this time was reduced to six, these repeated the actions of the earlier larvae and became noticeably

larger than any of those which had pupated. For some reason not determined, these died one by one, although apparently healthy and filled with fatty bodies. The last one was found dead May 19th, 1933. The parental adults continued to live, but produced no more larvae than those mentioned above.

My object in rearing species of Tenebrionidae was to obtain larvae and pupae for specific taxonomic determinations and correlation. It must be kept in mind that the eggs were deposited over a period of several weeks, but none after a certain time. It is not only interesting, but significant that the spring or first adults were referable to *protensa* Casey. The first, a male, was elongate, a little wider in the region of the prothorax and somewhat narrowed to elytral apex, similar to the type which I have seen and studied; elytra and pronotum extremely finely punctate, surface alutaceous or extremely finely reticulogranulate; prosternal process finely margined at apex and finely punctate; abdomen sparsely punctate. Length 14 mm.; width 6 mm.

The second or late summer group of emergents (August) were like the parents, *clongata* Casey. These were elongate oblong-oval in outline. In all probability the oldest and largest larvae that lived over into 1933, would have developed as *obsidiana* Casey: "The largest species of the group," stout oblong-oval, length 15.5 mm.; width 6.6 mm. These three forms in nature inhabit the same geographical area.

Now, what bearing have the above facts on the specimens collected in the field? Any coleopterist who has taken series of *Coniontis* in any very restricted area, could not have failed to note the differences in size, form and punctuation presented by the specimens. These constitute the problem that caused Col. Casey to describe a considerable number of new species. Specimens that I have collected in the field and others that were reared, have lived from one to two years. The adults hibernate in the soil at considerable depth, during the seasons that are unfavorable to them; those in the breeding jars remain at the bottom of the soil.

I have demonstrated by the rearing of *Coniontis clongata* Casey, that individuals developing from eggs laid by a single female, may develop into at least two, possibly three, forms

which have been recognized as species or subspecies. It is evident, therefore, that these are in the main seasonal phases of but one species. These facts account for the differences observed between individuals taken in the field, excepting of course the possibility of other and distinct species inhabiting the same geographical area. Adults hibernate through one or two winters and appear in the spring and summer, when they occur in vast numbers in some localities. The intermingling of the different phases, of possibly more than one species, constitutes the difficult problem that a taxonomist has to deal with.

Coniontis viatica Esch. has been similarly reared from specimens collected in the suburbs of San Francisco and presents similar facts. The pupae of *Coniontis* are characteristic: They are clothed throughout with a soft, short pubescence, are without anal cerci which are so obvious in other Tenebrionid tribes. In the pupae of *elongata* the pubescence is longer and shaggy on the vertex of the head and apical area of the pronotum. This is not observed in the pupa of *viatica*. These differences point to the probability that the two are distinct species, although their distributional areas may at times overlap.

In 1904, about seventy specimens of *viatica* were collected from an area about a quarter acre in extent, near the Russian River, on the opposite side from Duncan Mills, not far from the railroad bridge, Sonoma County, California. In this series were seen variations analogous to those observed in *elongata*. The different forms were separated and sent to Col. Casey for identification. He returned specimens labeled *lucidula* Casey and *innocua* Casey, leaving the bulk of the series without a name, they being distinctly more strongly punctate. Specimens of *viatica* from the vicinity of San Francisco, include such forms as *timida* Casey and *conicicollis* Casey.

During the month of July, 1934, I collected about Bass Lake, Madera County, California, and secured a large series of a species that I consider to be *Coniontis rotundicollis* Casey. I have taken this species in Yosemite Valley, across the road directly in front of Bridal Veil Falls. They are found under pine needles and chip debris. These are quite typical and best represent the species. The species occurs at altitudes of 4000

to 5000 ft.; at the latter altitude *Coniontis montanus* Casey appears and ranges up to 7500 ft. elevation. Below 3000 ft. a different species occurs. *Rotundicollis* Casey is a distinct species and has definite and constant characters, namely: A highly polished and shining surface, very fine sparse punctation, more or less rufous antennae and tarsi, the prosternal process always strongly margined throughout.

Coniontis montanus Casey is a pubescent and distinct species, constant in facies; it evidently does not develop seasonal forms, as the altitude at which it lives is not favorable. In the extremes of its distributional area north and south it passes into *canonica* Casey (Oregon) and *perspicua* Casey (Tulare County). *Montanus* Casey has been identified as *affinis* Lec. by Dr. George Horn, as observed from specimens in the British Museum, London, examined by me, the name being in Dr. Horn's handwriting. *Affinis* Lec. is also a sparsely pubescent species, of larger size, described from specimens collected at Benecia, California; it may also occur in the Sacramento Valley and bordering foot hills, but not occurring at higher altitudes.

Coniontis blaisdeli Casey was described from specimens collected at Mokelumne Hill, Calaveras County, California. I secured at one collecting a large series from an area not greater than a quarter acre on French Hill at the out-skirts of the town. The series presented an amazing degree of variation, both in form and sculpturing. I am inclined to consider that it is the species which inhabits the eastern foot hills of the great valleys in central California, up to an altitude of about 2000-3000 ft.

Coniontis sanfordi Blais, also occurs in the vicinity of Mokelumne Hill; it is smaller, shorter oblong-oval, with rufous antennae and tarsi and of different habits, lives under the leaves beneath trees in shaded localities. Specimens of a species of similar habits taken on Mt. Tamalpais cannot be separated from those taken at the type locality, elev. 1000-2000 ft.

Casey has made some very pertinent remarks regarding those phases referable to *clongata* and *viatica*, in a foot note in his Revision of the Coniontinae, (Proc. Wash. Acad. of Sciences, vol. X, Apr. 25, 1908, p. 108).

For several years I have had a Review of the Species of *Coniontis* in mind, and have accumulated much material for that purpose. The study has proved very unsatisfactory, as it became increasingly evident that the problems involved had to be solved in some other way than by the study of dried museum specimens. I decided upon rearing the species as the way out of the dilemma. Research in rearing was commenced some four years ago and the study has been most elucidative. The above facts that I have presented will show the trend of the research, and the hopes and suggestions which it offers in finally determining specific limitations where the problems have been most confusing.

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**Another Record of the Occurrence of *Strymon*
ontario in Missouri, with Notes on the
Larva (Lepid.: Lycaenidae).**

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

Mr. Harold O'Byrne's interesting discovery of *Strymon ontario* in Missouri (ENT. NEWS, vol. 45, 1934, p. 212) led me to investigate in detail the history of a ragged, but unworn, female that long was the sole representative of the species in the collection of the U. S. National Museum.

This specimen was mentioned by Dr. W. J. Holland in 1931 (Butterfly Book, 2nd ed., p. 235) and was figured by myself in 1932 (Bull. 157, U. S. Nat. Mus., pl. 23, figs. 7, 8).

It bears the following labels: "No. 42 L, May 31, 1872," and "Scudder writes Dec. 23, 1875, that this is *autolytus* Edw." The number 42 L refers to notes by Prof. C. V. Riley on file in the Bureau of Entomology, Department of Agriculture, which I have been courteously permitted to consult. These notes, headed *autolytus*, read:

Thecla autolytus Edw. May 8, 1872. Under oak tree, beneath stones and bricks. A rather curious conchiform larva. Head and first segments retractile. Color dull straw yellow, variegated with pale fulvous and olive green. Minutely granulated with black spots, each giving rise to a short stiff hair. Dorsum narrow, flattened; sides sloping roof-fashion. Venter

glaucous, with full complement of legs well developed. Stigmata large, but so concolorous with body that with difficulty seen.

May 9, 1872. It has changed to pupa. .

The butterfly emerged from the pupa on May 31, 1872. Later the butterfly was sent to Samuel H. Scudder for determination, and, under date of December 23, 1875, he wrote that it was *autolycus* of W. H. Edwards.

In notes on *Strymon liparops*, included under the same number, frequent mention is made of "Mary" (Miss Mary E. Murtfelt). The locality where these notes were written was Kirkwood, Missouri, about thirty miles west of St. Louis, where Professor Riley and Miss Murtfelt resided at the time.

This seems without doubt to be the specimen on the basis of which Scudder in 1876 added Missouri to the range of *Thecla autolycus*, and from which he acquired the information that the food plant of *autolycus* is *Quercus obtusiloba*. It represents, however, not *Strymon ontario autolycus*, but quite typical *Strymon ontario ontario*.

All of the citations of *autolycus* from Missouri and all the references to its larva and food plant refer to this specimen of *Strymon ontario ontario*. Nothing is known of the early stages of *S. o. autolycus*.

Note on the Occurrence of a Rare Fly (Diptera, Cœnomyidæ).

I wish to record the capture of a male specimen of *Glutops singularis* Burgess, at Amherst, Massachusetts, taken in early May, 1934, by myself. Three female specimens were taken in early May, 1931, at Orient Springs, West Pelham, Massachusetts, by Mr. Frank R. Shaw. At this time it may be well to make a correction in the records of the occurrence of this fly as given by Leonard (Mem. Amer. Ent. Soc., 7:51-52; 1930). The two specimens, therein stated as being collected by Doctor C. P. Alexander and as being males, are in reality females, and the present specimen constitutes the first record of the male sex in the Connecticut Valley since the original capture of the unique type of Edward Burgess at Springfield, Massachusetts, in or about 1872.

HOWARD R. DOBBIE, Haverhill, Massachusetts.

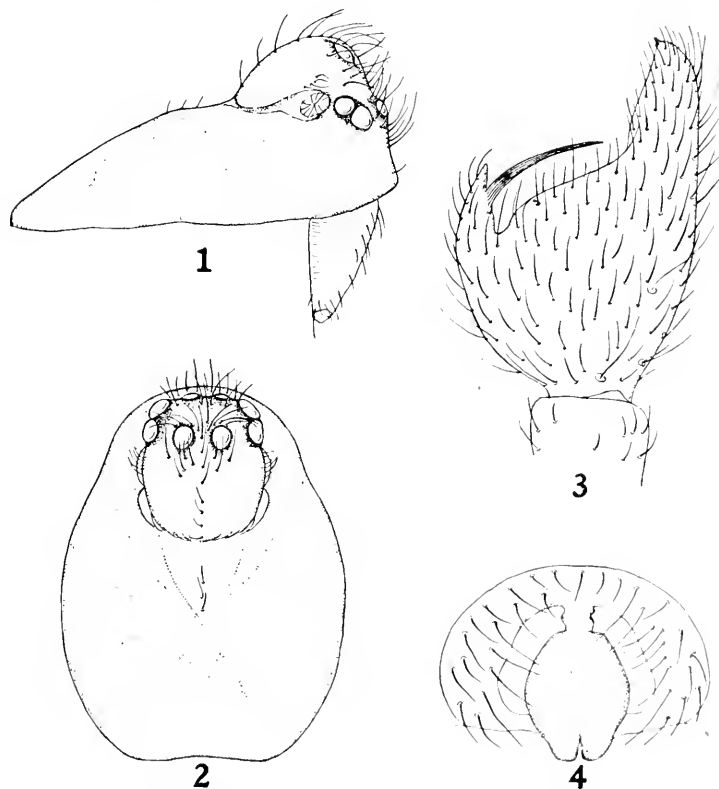
A New Species of *Hybocoptus* from New York (Araneae).

By C. R. CROSBY and S. C. BISHOP.

Since the publication of our revision of the section of the Erigoneae in which the males possess cephalic pits,¹ the new species described below has been collected at a number of localities in New York State. It is closely related to *H. dentipalpis* Emerton by the form of the tibia and bulb of the male palpus and the epigynum of the female.

Hybocoptus cymbadentatus, n. sp. (Fig. 1-4).

Male. Length, 2.3 mm. Cephalothorax smooth and shining.



Hybocoptus cymbadentatus 1. ♂, cephalothorax, lateral view. 2. ♂, cephalothorax, dorsal view. 3. ♂, tibia, right palpus, dorsal view. 4. ♀, epigynum.

¹ Ann. Ent. Soc. Amer. 26:105-182, 1933.

grayish yellow with the radiating lines and margin darker, cephalic lobe lighter; viewed from above evenly rounded on the sides to the cervical groove, then gently converging to the broadly rounded front. Cephalic lobe with the sides nearly parallel in front, slightly converging posteriorly. Cephalothorax viewed from the side, rather gently ascending behind, then nearly level to the cervical groove, evenly and broadly rounded over the head to the posterior median eyes, clypeus straight and nearly vertical. Cephalic pit close behind the posterior lateral eye, large, nearly round, lying in the anterior end of a groove which extends to the back of the lobe. A single row of fine hairs on the back of the lobe, a row of longer, dark curved hairs directed forward on the top of the lobe, and a cluster of shorter recurved hairs in the median ocular area, a small cluster of slender hairs below the anterior median eyes.

Posterior eyes in a straight line, the median smaller than the lateral, placed on the front of the lobe, separated by the diameter and from the lateral by a little more than twice the diameter. Anterior eyes in a straight line, the median smaller than the lateral, separated by the radius and from the lateral by three times the radius.

Sternum gray over yellow, broad, convex, smooth and shining. Endites orange-yellow lighter distally. Legs and palpi orange-yellow. Abdomen mottled grayish yellow.

Femur of palpus nearly straight. Patella rather stout, widened distally. Ratio of length of femur to that of patella as 25 to 11. Tibia deeply hollowed out leaving a thin shell, dorsally produced into a large triangular lobe which ends in a minute incurved tooth; on the mesal side there is another smaller pointed lobe which bears on its dorsal margin a long, slender spine-like process directed laterally. Paracymbium stout, broad at base, sharply hooked distally. Cymbium armed basally beneath the dorsal process of the tibia with a stout black tooth. The embolus is a long, slender, black style; it arises under the edge of the cymbium near the tip on the mesal side and passes between the bulb and the cymbium, emerging on the lateral side near the tip of the paracymbium; it then curves up along the lateral side of the bulb, crosses close to the tip of the cymbium and passes across the face of the bulb so that the tip lies near the bezel.

Female. Length, 2.3 mm. Similar to the male in form and color. Head normal. Posterior eyes in a straight line, equal, the median separated by two-thirds the diameter and a little nearer to the lateral. Anterior eyes in a very slightly recurved

line, the median smaller than the lateral, subcontiguous and narrowly separated from the lateral. The epigynum is a plate, straight behind, rounded in front, the lateral margins straight, converging posteriorly, the middle lobe is fusiform in outline and is raised into a high ridge projecting backward beyond the edge of the epigynum and ends in two approximate rounded points. At the base of the middle lobe on each side there is a shallow, light colored depression.

Holotype ♂, *allotype* ♀ McLean, NEW YORK, Oct. 13, 1934. 2 ♂, 3 ♀ *paratypes* with the same data. Collected by sifting in the Cornell University Wild Life Preserve. Types in Cornell University, Dept. of Entomology.

New York: Wilmington Notch, Oct. 23, 1934, 1 ♂ 2 ♀; Wawbeek, Oct. 23, 1934, 5 ♂ + ♀; Raquette Lake, Oct. 23, 1934, 1 ♂ 1 ♀; Ithaca, Oct. 14, 1934, 1 ♂.

A New *Acanthoscelides* from Eastern United States (Bruchidae: Coleoptera).

By L. J. BOTTIMER, Haddon Heights, New Jersey.

Acanthoscelides tenuis, new species.

Oblong; black except base of antennae; unevenly clothed with coarse appressed cinereous pubescence slightly concealing surface sculpture, that on elytral intervals interrupted by denudate areas; surface with very fine and indistinct punctuation.

Head moderate in length; front not carinate; eyes normally prominent, emarginate for nearly two thirds their length and separated by about their width. Antennae (with front of head vertical) reaching just beyond posterior angle of prothorax, segments scarcely produced apically, joints 3-11 forming a compressed club, joints 1 and 2 nearly oval, subequal in width, 1 slightly longer, 3 narrow at base, widening a little apically, as long or longer than 2, 4 nearly quadrate, as long as 3, 5-10 widening apically, outer joints strongly transverse but not at all serrate, terminal joint as wide as 10, slightly longer and obliquely pointed, joints 1-4 usually reddish especially beneath. Prothorax slightly wider at base than long, sides slightly convexly arcuate, converging to about two thirds of width of base, hind angles acute, surface with numerous coarse shallow punctures. Scutellum subquadrate, emarginately bidentate at apex, appearing round because of dense pubescence. Elytra one quarter longer than wide, only slightly wider at base than

thorax, widest in middle, sides slightly arcuate; striae well impressed, punctures not perceptible, 4th and 5th abbreviated apically; intervals nearly flat. Pygidium elongate triangular, convex, oblique at base, apex nearly vertical in female, more convex and somewhat reflected in male. Sternites not modified, not much different in sexes, male with two to five subequal in length, five not appreciably narrowed in front of pygidium, female with two to four subequal in length, five slightly longer. Hind femora rather slender, slightly narrower than hind coxae; lower margin nearly straight, armed near apex with a small tooth and two minute denticles, the latter sometimes quite rudimentary or absent. Hind tibiae scarcely carinate externally; mucro short, approximately as long as width of first tarsal segment.

Length of type from apex of thorax to apex of elytra, 1.25 mm., total length, 1.4 mm., width, 0.7 mm. Others vary in total length from approximately 1.3 to 1.8 mm.

Described from male type and 52 paratypes (sexes about equally divided) from four sources:

1. Ten specimens in the U. S. National Museum collection representing the following localities: Detroit, MICHIGAN; Eagle Lake, TEXAS; Columbus, TEXAS; TEXAS; Enterprise, FLORIDA; and Haw Creek, FLORIDA.

2. One specimen in the Horn collection in the Academy of Natural Sciences of Philadelphia, labeled "LA."

3. Seven individuals given the writer by Mr. Chas. Liebeck. They are from Detroit, MICHIGAN; St. Louis, MISSOURI; TEXAS; Citronella, ALABAMA, and Enterprise, FLORIDA.

4. Thirty-five examples collected by the writer in Eastern Texas, the localities being Robstown, Pearland, Goose Creek, Liberty, and Hillsboro.

The *type* is one of a series of ten specimens labeled "Pearland Tx Brazoria Co 11 March '25 L J Bottimer In flower of wild blackberry." Type and five paratypes from writer's collection deposited in the U. S. National Museum with ten paratypes originally in the Museum collection (Cat. No. 50860). Two paratypes, including the Horn specimen, in the Academy collection. Balance of material in the writer's collection.

Acanthoscelides tenuis is easily distinguished from related species by its slender form and small size. *Acanthoscelides atomus* (Fall) is slightly shorter, more robust, and has a much longer mucro. Small individuals of *Acanthoscelides alboscui-*

tellatus (Horn) resemble the present species, but are more robust and have the pronotum more densely and coarsely punctate. From its more distant relative, *Acanthoscelides seminulum* (Horn), *A. tenuis* differs in having the 4th and 5th elytral striae abbreviated instead of the 5th and 6th, in the shorter mucro, and in the unmodified first ventral of the male.

A. tenuis was apparently first collected by Hubbard and Schwarz at Detroit, Mich., sometime during the period 1874 to 1877. Unfortunately, the species has not been reared, so the host plant is unknown. The adults have been taken in Texas on flowers of blackberry and red haw and by sweeping miscellaneous flowers, mainly during March and April.

Bruchus irresectus Fahraeus 1839 (*Bruchus obtectus* Say 1831) has been designated as genotype of *Acanthoscelides* Schilsky 1905 by Bridwell 1929 (Proc. Ent. Soc. Wash. 31:42). The species mentioned in the present paper are assigned to this typically American genus, in spite of the absence of the frontal carina.

Notes on the Structure and Position of *Drasteriodes* Hampson (Lepid.: Noctuidae).

By A. GLENN RICHARDS, JR., Zoology Department,
University of Rochester.

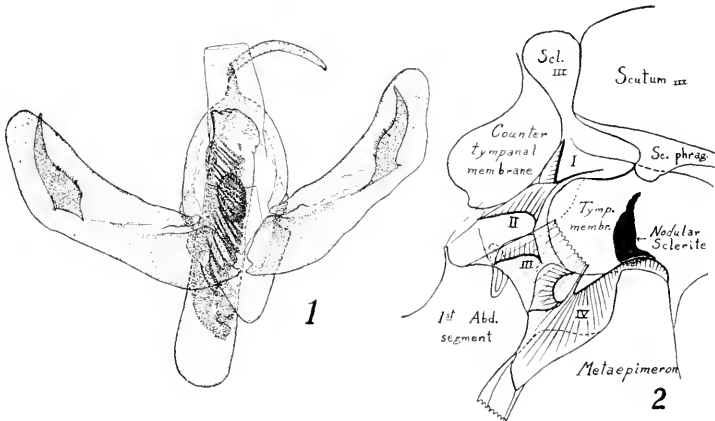
Drasteriodes—Hampson, Lepid. Phal., N. Gen. & Spec. Noct., p. 41, 1926. (genotype: *Phothedes limata* Christ., sole species & designated type).

Through the courtesy of Capt. Riley and Mr. Tams of the British Museum, I have had the opportunity of examining a male of *D. limata* (Christ.) from "Jolatan, Transcaaspian," and offer the following notes on its structure.

Male Genitalia: (textfig. 1). Symmetrical. Uncus simple, with few very short setae scattered over its surface. Anal tube moderately long, without scaphium or subscaphium. Tegumen moderate and rounded. Harpes simple, lightly chitinized, with a few marginal macrosetae and many setae over the surface (omitted from drawing); without patch of long scales at base. Clasper a large, strongly chitinized, somewhat hook-shaped structure arising from a rudimentary foot-like base; the curved basal margin with a partial row of short setae; clasper of left harpe slightly larger and longer than that of right harpe. Sac-

culus weak; clavus rounded with a few short setae near its margin. A line of membrane separates the sacculus from the costal margin of the harpe. Juxta large, not strongly chitinized, pointed below. Transillae absent. Penis with terminal blunt tooth, the ventral subterminal area with large patch of small spines; vesica with many cornuti plus a row of large spines (setae) almost as long as width of penis (19 in number but difficult to count accurately in the central part) and a compact patch of slightly smaller spines about two-thirds the distance from base, the latter group directed longitudinally.

Tympanum :* (textfig. 2). Hood rudimentary, entirely



Drawings made by the author with the aid of a camera lucida.
Textfig. 1. Male genitalia of *Drasteriodes limati* (Christ.). All setae omitted from uncus, clavus and harpes.

Textfig. 2. Internal view of tympanal frame and associated structures of *D. limata*. The dotted line running from the dorsal corner of pocket IV to the center of pocket I represents the external margin of the deep and oblique tympanal frame. The Roman numerals represent pockets I-IV respectively.

membranous. Alula normal. Counter-tympanal cavity large. Tympanal membrane of moderate size. Nodular sclerite produced and slightly curved at both ends giving a somewhat crescentic appearance. Scutal phragma bluntly pointed, extending well medially but only a short distance ventrally. Tympanal frame deep, the dorsal part slightly oblique in the dorso-ventral direction, produced at dorso-medial corner due to large size of the counter-tympanal cavity. Pocket I developed dorsally

* For a description of the tympanal region and the nomenclature here used the reader is referred to my paper on the Noctuid tympanum in *Entomologica Americana*, vol. 13 (n. s.), pp. 1-43, pls. 1-20, 1933. I regret it is too lengthy to repeat here.

as an oblique, shallow but deep pocket, ventrally and anteriorly rudimentary or open; II moderate, asymmetrical, produced above, not quite reaching III; III instead of being a membranous rounded pocket is reduced to a shallow, squarish pocket with a heavy, ridge-like wall, not fused with tympanal air-sac; IV a single, overhung pocket with a small mouth and a moderate flange extending slightly beyond the nodular sclerite.

On a basis then of both the δ genitalia and the tympanal structures, *Drasteriodes* Hmps. cannot remain between *Drasteria* Hbn. and *Syneda* Gn. as placed by Hampson, but must be removed from the *Melipotis-Syneda* group of *Erebinae* entirely. In a synopsis of the *Melipotis-Syneda* group soon to appear, it will be seen that *Drasteriodes* Hmps. differs from this group in practically every genitalic (δ) and tympanal structure. There is no genus in North America with which *Drasteriodes* can be profitably compared. Nor do any of the few southern palaeartic genera in my collection compare with it. Its correct placement must be deferred.

It may seem a bit premature or like "rushing into print" merely to remove a genus from a group when unable to place it more correctly, but in view of my interest in and forthcoming synopsis of the *Melipotis-Syneda* group in which Hampson placed this genus, I feel it is not inappropriate to point out how distinct *Drasteriodes* Hmps. is from *Drasteria* Hbn. & *Syneda* Gn. and to add the above additional description and figures to Hampson's original description of the genus.

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Obituary Notes of Authors Whose Names Appear in Leng's Catalogue of the Coleoptera of America, North of Mexico.

The following data were obtained by consulting the catalogue and supplements: 693 names of authors are mentioned in the catalogue, of whom 248 have passed on. Seventeen passed away whose age is not known, and sixty-two before reaching the age of 60. Sixty-three between 60 and 70. Sixty-seven between 70 and 80. Thirty-four between 80 and 90. Three between 90 and 96, and two 99 or over; these two lived to a remarkable age: L. Reiche was born in 1790 and died in 1890, so he was 99 or may have been 100. Philogene Duponchel was born in 1744, and died January 10, 1846, at the age of 101 or 102.

PHILIP LAURENT.

1774

L. Reiche 1790-1890

Notes on the Tachinid Genus *Pseudotachinomyia* with Descriptions of Two New Species (Diptera).

By H. J. REINHARD, College Station, Texas.

A brief discussion of the generic characters of *Pseudotachinomyia*, with a key to species, and descriptions of two new forms are presented on the following pages. Types of the new species are in my collection.

The genus was described by Smith (*Psyche*, Vol. 24, 1917, p. 54) with *zebbberi*, new, as the type and sole species. The holotype male and allotype female are in the U. S. National Museum. One of the outstanding characters of the genus is the peculiar structure of the genitalia. Both sexes of all the species here included have the apical abdominal sternite unusually developed and prominent. In the female it is undivided in front and deeply U-shaped, forming a sheath for the reception of the short heavy piercer. In the male the sternite is deeply incised with each lobe bearing a narrowed ventral projection near the middle. The inner forceps are broad, united, and strongly convex behind with the arcuate sides tapering to a short apical beak, effecting a boat-shaped structure. The outer forceps are thin and rather closely appressed to the ventral side of the second genital segment, moderately wide at base with the greatly narrowed tips beset with long hairs. Aldrich has pointed out that the only known North American species with closely similar genitalia is *Phorocera solossonae* Townsend, which has hairy eyes.

The remaining essential characters are about as in *Tachinomyia*. The females of the latter genus possess no piercing organ which seemingly implies important biological differences. The host relationships of both genera, so far as known, are with lepidopterous larvae.

Key to Species of *Pseudotachinomyia*.

1. Parafacial on narrowest part barely wider than third antennal segment 2
- Parafacial much broader, about two-thirds the width of facial depression; third antennal segment one and two-thirds times length of second; front very prominent;

- check nearly one-half eye height, female only (Washington) *compascua*, new species.
2. Intermediate abdominal segments with discals; antennae mostly black; parafrontals blackish near vertex, clothed with fine longish hairs, more thickly so in male (New England and North Carolina to Illinois) . . . *webberi* Smith. Intermediate abdominal segments without discals; proximal antennal segments wholly red; parafrontals with dense pollen extending to vertex, sparsely clothed with short hairs in both sexes (Texas) . . . *aequalis*, new species.

PSEUDOTACHINOMYIA WEBBERI Smith.

Pseudotachinomyia webberi Smith, Psyche, Vol. 24, pp. 54-56.

Smith's description which is readily accessible, furnishes most of the essential details. The principal characters distinguishing the species from the other members of the genus are listed in the key. Front in male 0.308, in female 0.349, of the head width. The genitalia as described above.

The species ranges from New England to North Carolina and westward to Illinois.

Pseudotachinomyia aequalis, new species.

♂: Front 0.29 of head width (one specimen), widening rapidly downward from triangle, and projecting about three-fourths width of eye at base of antennae when viewed from the side; parafrontal with thick grayish pollen extending to vertex, sparsely clothed with rather short black hairs; median stripe reddish-brown, uniform in width on entire length; frontals in a single row descending below base of third antennal segment, uppermost two reclinate the remainder directed inward; ocellar bristles large, proclinate; inner verticals well developed, outer ones vestigial; entire face, cheeks and posterior orbits covered with rather dull dense gray pollen; antennae reaching almost to oral margin, basal segments red, third black, about four times longer than second; arista long, slender beyond basal third, finely pubescent, penultimate segment hardly twice as long as thick; face receding, deeply excavated, its ridges bearing rather short bristly hairs on lower half or less; vibrissae strong, situated just above mouth; para-facial bare, on lower part about as wide as third antennal segment; eyes bare; cheek clothed with fine black hairs, fully one-fourth the eye height; proboscis short and thick, labella fleshy; palpi ordinary, yellow, beset with numerous black hairs; back of head gray pollinose, thickly clothed with whitish hairs.

Thorax black, covered with rather dense gray pollen, which is interrupted on mesonotum by four black stripes before the suture and five behind; scutellum tinged with red apically, dusted with somewhat changeable gray pollen. Chaetotaxy: Acrostichals 2, 3; dorsocentrals 3, 3; humerals 4; posthumerals 2; notopleurals 2; presuturals 2 (inner one weak); supraalars 3; intraalars 3; postalars 2; pteropleurals 1; sternopleurals 2, 1; scutellum with three strong marginals, besides a much smaller discal and upturned decussate apical pair; side of mesonotum beneath calypter bare; postscutellum normally developed, gray pollinose; prosternum haired at sides; propleura bare; calypters opaque, white.

Abdomen narrowed and curved downward toward apex, wholly black; last three segments entirely covered with dull gray pollen which, when viewed from behind, shows rather well defined dark reflecting spots on each side of the middle above on segments three and four; basal segment with thinner gray pollen, bearing a pair of median marginal bristles; second and third segments without discals, former with marginal pair and latter bearing a marginal row of about 10, large; fourth segment with a row of discals situated well behind middle, besides the usual marginal row; hairs on all segments except fourth rather short and subdepressed; genital segments unusually slender, reddish-black, gray pollinose and clothed with fine hairs behind; forceps as in *webberi*, but with the outer pair distinctly wider at base; fifth sternite black, each lobe with a prominent ventral projection near middle, inner margins tinged with red and clothed with soft short hairs.

Legs mostly black, basal segments and tibiae with a reddish tinge; claws and pulvilli elongate; middle tibia bearing three strong bristles on outer front side; hind tibia not ciliated.

Wings grayish hyaline; fourth vein with a rather angular stumpless bend, thence concave to costa which it reaches slightly beyond apex of third vein and far before extreme wing tip; third vein with three setulae at base; hind cross vein bicurved, joining fourth about two-fifths the distance from bend to small cross vein; costal spine small; epaulets black.

♀: More robust in build than male; front of vertex 0.33 of the head width (average of three: 0.33; 0.33; 0.33); two proclinate orbitals present; outer verticals one-half length of inner pair; third antennal segment barely two and one-half times longer than second; abdomen thick, thinly pollinose and subshining above; genitalia with a piercer as in *webberi*.

Length: Male, 10 mm.; female, 11 to 12 mm.

Described from four specimens. One male (*holotype*) and two females, College Station, TEXAS, April 19, 1920 (H. J. Reinhard); and one female from the same locality, April 22, 1919 (H. J. Reinhard).

***Pseudotachinomyia compascua*, new species.**

♀: Front at vertex 0.38 of the head width (one specimen), prominent below, projecting about the width of eye as viewed from the side; antennae slender, distinctly shorter than face, third segment about one and two-thirds times length of second; facial ridges with bristly hairs extending above middle; parafacial unusually broad, about two-thirds the maximum width of facial depression; cheek fully two-fifths eye height. Scutellum wholly black. Abdomen with longish but depressed hairs on intermediate segments above; third bearing a weak reclinate pair of discals; genitalia with a piercer as in *webberi*. Legs black; claws and pulvilli moderately long. Wings gray; third vein bearing four setulae at base. Otherwise as in *P. aequalis*. Length, 8.5 mm. Male unknown.

One specimen, *Type*, Moses Coulee, WASHINGTON, April 2, 1933 (J. Wilcox).

The decidedly prominent front and wide parafacials readily distinguish the species from the others included herein.

An Epidemic of the Giant Sand Wasp *Sphecius speciosus* (Drury) at Narrows, Virginia (Hymen.: Sphecidae).

On July 23, 1934, Mr. John C. Fox, an engineer at Narrows, Virginia, brought to the Mt. Lake Biological Station of the University of Virginia a box of insects for identification. The insects were collected in the yards of the electric substation of the Virginian Railway Co. at Narrows, Va. The writer identified the insects as specimens of the Giant Sand Wasp *Sphecius speciosus* (Drury).

Mr. Fox stated that the wasps were first noticed about five years ago at the electric plant. Since that time the numbers have steadily increased each year until they have attained epidemic proportions. Although the activities of the wasp have caused no material loss as yet, the resident engineers feared that continued increase would lead to damage to the underground conduit ducts. In addition, the wasps were proving to be a source of much annoyance to the personnel of the station.

The writer visited the substation a week later and found the situation substantially as described by Mr. Fox. The electric

plant is located on the banks of the New River, about one hundred yards from the water's edge and at a slight elevation. The soil is loose and sandy and comparatively dry. The burrows were found scattered through the yards of the plant and in the adjacent fields. The wasps were flying back and forth in considerable numbers and quite a bit of reproductive activity was observable. There were no large trees nearby to aid the insect in bringing Cicadas to the burrows, as has been described by Fuller and others.

An examination of the nests revealed a considerable mound of dirt usually about a foot in diameter placed loosely about the entrance. Frequently the mound was in front of the underground opening. In other cases there was a trail through the dump heap reminding one of a groove. On excavation there was disclosed an underground passage about a foot long slightly enlarged at the terminus. In some of these cells a single Cicada was found, in others the cell was empty. Although there had been an extremely heavy rain the night before, the burrows seemed comparatively dry.

The officials of the plant were quite anxious to know just how the wasp might be controlled. The immaculate grounds usually found around electric substations were marred by many mounds of fresh dirt. An effort was being made to iron out these mounds but evidently it was not too successful. The writer observed that a collection of old tennis racquets was kept in the building and whenever an official emerged he was armed with a racquet to strike the wasps.

The habits of the wasp and occurrence of colonies have been often described in the past. This occurrence seems worth reporting because of the long duration of the settlement at one place and the extremely large number of individuals composing the colony. An entomologist interested in the study of this species might easily have collected hundreds of specimens in a few hours this past summer within an area of a few hundred square feet.

HOMER C. WILL, Juniata College, Huntingdon, Pennsylvania.

Notes on the Lists and Catalogues of the Coleoptera of the United States and America North of Mexico.

The first list or catalogue was that of Friedrich Ernst Melsheimer, entitled "Catalogue of the Described Coleoptera of the United States," which after being revised by S. S. Haldeman and J. L. Le Conte, was published by the Smithsonian Institution in July, 1853. 4,816 species are listed. Some eight years after the publication of the Melsheimer catalogue, at the request of the Smithsonian Institution, Dr. Le Conte started

on a new list of the Coleoptera of North America, only Part I, of which was ever issued (1863). Owing to his many professional duties, he was unable to find time to finish the task he had started. Part I only lists the species to the end of the Elateridae. 4,017 species are listed. In 1873, G. R. Crotch published his "Check List of the Coleoptera of America North of Mexico." All the species, of which there are 7,450, are numbered. A supplement to the Crotch list, by E. P. Austin, was published in 1880, bringing the total number of species up to that time to 9,704. Henshaw's "Coleoptera of America North of Mexico" was published in 1885. Three supplements by Henshaw appeared first in February, 1887, the second July, 1889, and the third in 1895; number of species listed 11,256. The latest catalogue is the one by Charles W. Leng. "Catalogue of the Coleoptera of America North of Mexico," published in 1920, with three supplements issued in 1927 and 1933. In the catalogue of 1920, 18,547 species are enumerated, while the three supplements contain 3,503 additional species, making a total of 22,050 species. Too much can hardly be said regarding this, our latest catalogue: for in addition to the species, the subspecies, synonyms, etc., are also listed. The geographical distribution following the name of the species will be a great help to those who are interested in the study of our Coleoptera. The "Catalogue of the North American Coleoptera Described as Fossils" by H. F. Wickham, will prove of value to many. Last but not least, is the "Bibliography of Taxonomic Coleopterology." This latter feature will save much time to one seeking for a publication relating to the Coleoptera of America North of Mexico.

PHILIP LAURENT.

Early Publications Referring to Coleoptera.

There are close to 4,000 titles of publications listed by Leng, in his "Catalogue of the Coleoptera of America, North of Mexico," of which the following antedate all the others as to time of publication:

- Frisch—Besch. von allerley insecten in Teutschland. 1720-1738.
 Catesby—The Natural History of Carolina, Florida, etc. 1731.
 " The Natural History of Carolina, II, 1743.
 Reamur—Mém. pour serv. à l'hist. des insectes. 1734-1742.
 Linné—Fauna Suecica, etc. 1746 and 1761.
 " Systema Naturae 1758-1759 and 1766-1768.
 " De Meloe vesicatorio. 1763.
 " Museum S. R. M. Ludovicæ Ulricæ, etc. 1764.
 " Mantissa, p. a. g. 1771.
 De Geer—Mémoires pour servir à l'histoire des Insectes (Part 1, 1752).

- Geoffroy—Histoire abrégée des Insectes que trouvent, etc. 1762.
 Scopoli—Entomologia Carniolica, etc. 1763.
 Mueller—Fauna Insectorum Friedrichsdalina, etc. 1764.
 " Manipulum Ins. Taurinesium Mélanges, etc. 1766.
 Stroem—Beskriveise over Norske Insecter, etc. 1765.
 Schaeffer—Elementa Entomologica, Ratisbonæ. 1766.
 Voet—Cat. Syst. Col., La Haye. 1766.
 Drury—Illustrations of Natural History, etc. (Part 1, 1770.)
 Forster—A Catalogue of the Animals of North America. 1771.
 Fabricius—Systema Entomologiæ. 1775.

PHILIP LAURENT.

The Bite of *Melanolestes picipes*, Herrick-Schaeffer (Hemip.: Reduviidae).

On the evening of Friday, Oct. 16, 1934, while working at my desk I heard something strike the screen of a window at my side and turning, saw a large black reduviid crawl under it, run across the sill, and fly to my desk. I immediately caught it up by the thorax and noticed that it was *Melanolestes picipes* Herrick-Schaeffer, or the Kissing Bug. While I held it, it squealed loudly by rasping its proboscis, the labium, back and forth in the ventral groove by an up and down movement of its head.

In its struggles it slipped from my fingers and ran across the desk. I snatched at it and as I picked it up it drove its beak into the tip of the fourth finger of my right hand. The pain was excruciating and, as I dropped the insect, it flew and disappeared in a closet.

The pain of the bite retained its severity and ran up and down the finger in throbs with each heart beat. A small red spot about the size of a common pin head showed where the insect had bitten. A sort of small blood blister formed at this point and I opened it with a sterilized needle bathed in iodine, but there was no blood present, only a spot of browned flesh. The pain continued unabated during the evening and Saturday, by the afternoon, the end of the finger was numb and it had become swollen down to the second joint. Sunday morning the entire finger was swollen and the swelling was passing into the muscles along the side of the hand. The small brown spot was still present.

The family doctor was visited and he wrapped the finger in hot wet gauze and put an air tight oilcloth cover over it. The finger continued to heat, throb, and have fever in it, but by Monday noon most of the fever was gone and the swelling was going down. The bandage was removed by the doctor, for he had said when he put it on that, if I took it off myself,

I needn't come back at all. By Wednesday the finger was normal size, but the spot remained and the last joint was numb. This numbness remained almost a week longer and after the brown spot came away with a scab, a small dent remained in the end of the finger for nearly a month. Now, Feb., 1935, a small bit of scar tissue is all that shows.

H. ELLIOTT McCLURE, Danville, Illinois.

The Sixth International Congress of Entomology.

The V. International Congress of Entomology held in Paris in 1932, having acceded to the Spanish Delegates' motion, agreed to select Madrid as the seat for the following Congress in 1935, the honour of occupying the Chair at the Meeting being conferred upon the undersigned. In view of this decision, the Spanish Government has given the Congress an official character and I am able to announce that the inaugural session will take place in Madrid on September 6 under the patronage of H. E. THE PRESIDENT OF THE SPANISH REPUBLIC. The Spanish Government has issued invitations to foreign countries and is hopeful that official delegates from many countries will attend this scientific gathering in Madrid. By means of this Circular I have the honour to invite, in the name of the Madrid Organizing Committee, the Foreign Academies, Universities, Museums and other Scientific Institutions, including Institutes of Agricultural, Medical and Veterinary Entomology, etc., to send their respective Delegates. The undersigned likewise tenders an invitation to all investigators in any branch whatsoever of the extensive Science of Entomology, or any who may feel in any way attracted to it, to foregather at the Madrid Congress where they will receive a cordial welcome from their Spanish colleagues.

Madrid, February, 1935.

PROF. IGNACIO BOLIVAR,

Chairman of the VI. International Congress of Entomology.

PROGRAMME.

Congress Meetings:

Friday, September 6: Preliminary Sessions.—Opening ceremony with speech by H. E. THE PRESIDENT OF THE REPUBLIC and the Foreign Delegates.—Election of Vice-Chairmen, General Secretary and Chairmen of the Plenary Sitings and of the Sections.

Saturday, September 7: Meeting of the First Plenary Sitting—Meeting of the Sections.

Sunday, September 8: Entomological Excursion to the Sierra of Guadarrama, including visit to the Biological Alpine Station and the classic Entomological seats of San Ildefonso (La Granja) and Forest of Valsain.

Monday, September 9: Meeting of the Second Plenary Sitting.—Sections and Nomenclature Committee.

Tuesday, September 10: Third Plenary Sitting and Meeting of the Sections held on the premises of El Escorial Monastery.

Wednesday, September 11: Fourth Plenary Sitting.—In the afternoon, excursion to Toledo.

Thursday, September 12: Meeting of the Permanent Committee of the International Congresses of Entomology.—Presentation of Motions by the Sections.—Arranging place and fixing date for the holding of the VII. International Congress of Entomology, and election of its Chairman.—Motions of general interest.—Closing of the Congress.

Excursions: Before the commencement of the Congress, there will be a 5 days' excursion to the Picos de Europa (Asturias). Two simultaneous excursions are planned to take place after the Congress: one of a week's duration to Andalusia and the North of Morocco, and another lasting 12 days to the Canary Islands, with 3 days' sojourn in Gran Canaria and 4 days in Teneriffe, when the classic Entomological localities will be visited. The cost of the last named excursion (1st class, with everything included) will not exceed 1,000 pesetas per head.

Festivities and receptions: "Soirée intime," September 5, after dinner.—Reception by H. E. THE PRESIDENT OF THE REPUBLIC.—Visit to the National Palace and its gardens.—Visit to the Prado Museum.—Gathering devoted to Spanish Art.—Visit to El Escorial Monastery and Toledo.—Official Congress Banquet.

Sections of the Congress: 1. General Entomology.—2. Anatomy and Physiology.—3. Ecology and Biogeography.—4. Biogeology.—5. Agricultural Entomology.—6. Forestal Entomology.—7. Medical and Veterinary Entomology.—8. Apiculture.—9. Sericulture.—10. Nomenclature.

Papers, lectures, etc.: Members are requested to notify the Secretarial Office of the Congress of the titles of their papers and other communications, at the very earliest possible date.

Those received in time will be included in a special pamphlet which will be issued prior to the Congress. The official premises of the Congress will be the Museo Nacional de Ciencias Naturales.

Registration: There will be two classes of Congressmen: (A) *Regular members.* These will have the right to vote, submit papers and motions during the meetings as well as take part in debates and be present at receptions, festivities and excursions. They will receive printed matter published by the Congress. (Fee: Pesetas 60=£ 1.10.0=RM. 20=French Francs 125=Liras 100=Dollars 8.)

(B) *Associate members,* namely the persons accompanying the Regular Members. These will be admitted to receptions, festivities and excursions as well as to the Congress Sittings but will not be entitled to vote, submit papers, nor will they receive the publications issued. (Fee: Pesetas 30=£ 0.15.0=RM. 10=French Francs 62.50=Liras 50=Dollars 4.)

Persons desiring to attend the Congress as Members are requested kindly to fill in the Application Form and send it without delay to the Secretarial Offices of the Congress with the respective fee in any of the currencies named. A Member's Card will be forwarded with a second circular containing full details of Congress arrangements to those registered. The VI. International Congress of Entomology has been organized under agreement with the XII. International Congress of Zoology which will meet in Lisbon from September 15-21.

Travelling and hotel arrangements: The Organizing Committee of the Congress has commissioned the *Wagons-Lits-Cook Company* to make the necessary travelling arrangements, provide hotel accommodation and arrange excursions. The agents of this Company will furnish Members with all travelling information.

Organizing Committee of the Congress: I. Bolivar, *Chairman*; M. Benlloch, J. M. Dusmet, M. M. de la Escalera, *Vice-Chairmen*; F. Bonet, J. del Cañizo, G. Ceballos, J. Gil Collado, F. M. de la Escalera, A. de Zulueta, *Members of the Committee*; C. Bolivar y Pieltain, *Secretary*.

All correspondence, communications of a scientific nature, registration of Members, remittances, etc., should be addressed to

PROF. C. BOLIVAR Y PIELTAIN,

Musco Nacional de Ciencias Naturales, Madrid-6 (Spain).

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, part, part, &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.

New Titles of Periodicals and Serials Referred to.

- 112. Anales del Instituto de Biología Mexico.
- 113. Entomologische Beihefte aus Berlin Dahlem.
- 114. Occasional Papers of the Museum of Zoology, University of Michigan.

GENERAL.—Osborn, H.—The place of entomological collections in entomological research. [7] 28: 56-59.

ANATOMY, PHYSIOLOGY, ETC.—Ancona, L.—Histología de los gusanitos de Maguey. Orugas de *Aegiale hesperiaris*. [An. Inst. Biol. Mexico] 5: 353-361, ill. **Carter, W.**—The symbionts of *Pseudococcus brevipes*. [7] 28: 60-71, ill. **Fisher, R. A.**—The effect of acetic acid vapor treatment on blood cell counts in the cockroach, *Blatta orientalis*. (Blattidae). [7] 28:146-153. **Gentil, K.**—Die entsehung der schillerfarben bei *Morpho sulkowskyi*. [17] 52: 41-44, ill. **Goodrich, A. L., Jr.**—The thoracic sclerites of a trichopterous pupa *Dicosmoecus atripes* (Limnophilidae). [Trans. Am. Micro. Soc.] 54: 57-64. **Hafiz, H. A.**—The embryological development of *Cheyletus eruditus* (a mite). [Pro. R. Soc. Lond.] B. 117: 174-201, ill. **Harrison, J. W. H.**—The experimental induction of melanism and other effects, in the geometrid moth *Selenia bilunaria*. [Pro. R. Soc. Lond.] B. 117: 78-92, ill. **Hill, R. B.**—Habitos alimentecios de algunos anofeles venezolanos. [Bol. Soc. Venez. Cien. Nat. Caracas] No. 19: 411-416. **Iragorry, L. B.**—Contribucion al estudio morfológico de los huevos de algunos Reduvidos. [Bol. Soc. Venez. Cien. Nat. Caracas] No.

18: 398-400, ill. **Mordvilko, A.**—Die blattläuse mit unvollständigem generationszyklus und ihre entstehung. [Ergebn. u. Fortschr. Zool. Berlin] 8:36-328, ill. **Pussard, R.**—Observations sur la biologie de *Capnodis tenebrionis* et sur les méthodes de lutte contre cet insecte. (Buprestidae.) [25] 40: 23-26. **Rau, P.**—The sting of the male wasp, *Monobia quadridens*. [5] 41: 245. **Rau, P.**—A note on the attachment of the wasp, *Bembix nubilippennis*, to their nesting sites. [5] 41: 243-244. **Rau, P.**—Pompilid wasps and prey-transportation by water. [5] 41: 241-242. **Roonwal, M. L.**—An abnormality in the boyau calicial (female accessory glands) of the desert locust, *Schistocerca gregaria*. [31] 135: 394-395, ill. **Sautet, J.**—Contribution a l'étude du tube digestif des larves d'anopheles et de *Theobaldia*. [An. Parasit. Hum. et Comp.] 13: 97-108, ill. **Taylor, A.**—Experimentally induced changes in the cell complex of the blood of *Periplaneta americana* (Blattidae). [7] 28: 135-145, ill. **Webster, W. J.**—Bed bugs in rarefied air. [Indian Jour. Med. Res.] 21: 523.

ARACHNIDA AND MYRIOPODA.—**Crosby & Zorsch**—Spiders from the Lac St. Jean region of Quebec. [4] 67: 38-42, ill. **Roewer, C. F.**—Bronns klassen und ordnungen des tierreichs. Bd. 5, Abt. 4, Buch 4, pp. 609-723. Solifugae, Palpigradi.

THE SMALLER ORDERS OF INSECTS.—**Arcona, L.**—Contribucion al conocimiento de los pisjos de los animales de Mexico. *Columbicola columbae*. (Mallophaga.) [An. Inst. Biol. Mexico] 5: 341-351, ill. **Leonard, J. W.**—The naiad of *Celithemis monomelaena* (Odonata.) [114] No. 297: 5 pp., ill. **Liu, C.-Y.**—The new bird *Ceratophylli* from Minnesota (Siphonaptera). [7] 28: 121-125, ill. **Tillyard, J.**—The evolution of the scorpion-flies and their derivatives (Mecoptera). [7] 28: 1-45, ill. **Traver, J. R.**—Two n. g. of North American Heptageniidae (Ephemerida). [4] 67: 31-38, ill. **Watts, J. G.**—Two n. sp. of *Stephanothrips* from South Carolina and key to the known sp. (Urothripidae: Thysanoptera). [7] 28: 126-130, ill.

ORTHOPTERA.—**Pickett, A. D.**—Some observations on an outbreak of the two-striped grasshopper (*Melanoplus bivittatus*) in Nova Scotia. [4] 67: 24-27.

HEMIPTERA.—**da Costa Lima, A.**—Sobre alguns Coccideos. [Arch. Inst. Biol. Veg. R. d. Janeiro] 1: 131-138, ill. (S*). **DeLong, D. M.**—Some n. sp. of Deltocephaloid leafhoppers (Cicadellidae). [7] 28: 154-159, ill. **Drake &**

Harris.—The Gerrinae of the western hemisphere. [An. Carnegie Mus.] 23: 179-240, ill. (*). Concerning neotropical species of Rhagovelia (Veliidae). [Pro. Biol. Soc. Washington] 48: 33-37. **Janes, M. J.**—Oviposition studies on the chinch bug, *Blissus leucopterus*. [7] 28: 109-120, ill. **Osborn, H.**—Insects of Porto Rico and the Virgin Islands. Homoptera excepting the Sternorhynchi. [Sc. Sur. P. R. & Virg. Isls.] 14: 111-260, ill. (*).

LEPIDOPTERA.—**Bryk, F.**—Lepidopterorum Catalogus. Pars. 62. Lymantriidae. 441 pp. **Busck, A.**—Lepidopterorum Catalogus. Pars. 67. Stenomidae. 73 pp. **Dohanian, S. M.**—The European corn borer on Long Island. [5] 41: 214-220, ill. **Hemming, F.**—A note on Jacob Hübner's Verzeichniss der Fertigen Blätter und Werke of 12th March, 1814, with a facsimile. A note on Jacob Hübner's Erste Zuträge zur Sammlung Exotischer Schmetterlinge of 1808. [107] 4: 36-38; 38-46. **Houser, J. S.**—Cacoecia rileyana. An unusual occurrence (Tortricidae). [7] 28: 105-107, ill. **Kotzsch, H.**—Zwei neue *Morpho hecuba*-formen. [14] 48: 178-180, ill. **Prout, L. B.**—Lepidopterorum Catalogus. Pars. 63. Geometridae: Sterrhinae II. 177-432. **Querci, O.**—An account of my studies in the biology of *Pieris rapae*. III. [21] 47: 14, cont. **Schüssler, H.**—Lepidopterorum Catalogus. Pars. 65: Saturniidae: 3. Ludiinae II. 485-769. **Shepard, H. H.**—Lepidopterorum Catalogus. Pars. 64. Hesperidae: Pyrginae II. 145-272.

DIPTERA.—**Bromley, S. W.**—Notes on Texas robberflies with the descr. of a n. sp. of *Proctacanthella*. (Asilidae.) [114] No. 304: 7 pp. **da Costa Lima, A.**—Notas sobre *Tripetidas* brasileiras. II-III. [Arch. Inst. Biol. Veg. R. d. Janeiro] 1: 115-130; 139-141, ill. (*). **Dampf, A.**—Nuevos datos sobre la fauna de los mosquitos de Mexico. [Rev. Mex. Biol] 16: 1-4. **Fluke, C. L.**—Revision of the Epistrophe flies of America north of Mexico (Syrphidae). [70] 15: 57 pp. ill. (*). **Reinhard, H. J.**—New gen. and sp. of American muscoid flies. (Tachinidae.) [7] 28: 160-173. **Rozeboom, L. E.**—A new nycteribiid from Florida. [Jour. Parasit.] 1935: 315-316, ill. **Tulloch, G. S.**—Mosquito investigations in Alaska. [5] 41: 201-210, ill. **Wheeler, W. M.**—A specimen of the Jamaican Vermileo. [5] 41: 236-237.

COLEOPTERA.—**Blaisdell, F. E.**—Two n. sps. of *Eleodes* from the Pacific Coast Region (Tenebrionidae). [4] 67: 28-31. **Boucomont, A.**—Description de trois Coprides de l'Amérique du Sud. [Misc. Ent.] 36: 9-10. (*). **Klima,**

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THE FIELD BOOK OF INSECTS. By FRANK E. LUTZ. Third Edition. 510 pp. 77 black and 23 colored plates. G. P. Putnam's Sons, New York, 1935.—This is one of the most useful books on American Entomology, especially for the general reader. It is a textbook for the beginner and should be in every scout library and that of every institution having reference books on the natural sciences. As stated by the publisher, this book will be an indispensable guide to amateur naturalists, young or old; to the student it will supply much basic knowledge conveniently assembled; to the general reader it will provide a revelation of the magnitude of the insect world and the close dependence of human life upon the activities of insects. This is the book I always recommend to those inquiring for one which will enable them to identify the insects they find about their homes and gardens and in the fields. Of course it does not give the means for identifying all the species, as it would be impossible to do this in a book of this nature. But it is the only one that gives this information for the most conspicuous insects. For the specialists in butterflies and moths, we have Holland's Butterfly and Moth Books, but for the other orders, especially the Hymenoptera, Coleoptera and Diptera, there is none that covers the ground as this little book does. I am glad to see that another edition has just been printed, thus continuing its availability, and at its usual price of \$3.50. The text of this third edition has been entirely reset, but with many of the headings omitted. This and the setting of the keys in "solid" has accomplished a reduction in pagination from 562 pages of the previous edition to 510 pages of the present. Much of the text has been rewritten with additions, and much of the classification as well as the definitions have been revised to bring these more in agreement with present usage. However, I am glad to see that considerable conservatism in nomenclature is maintained. We miss the bold-face type side heading of the previous edition, which so materially aid in locating the part of the text referable to the insect in question; and these omissions are to be regretted. Also the omission, in some orders, of the descriptions of and notes on these insects. However, to some extent, these have been included in the keys where they are not easily located. As a whole, I do not think the present edition is an improvement over the previous one, and would have preferred to see the style of the previous edition maintained. This little book has seen at least ten printings since it first appeared in 1918, and has been revised three times. It is one of a series of non-technical Nature Field Books which now covers nearly all phases of nature-study; most of them priced around \$3.50.—E. T. CRESSON, JR.

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

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

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.

Wanted—Names and addresses of those desiring Cocoons of *Actias luna* and *Automeris io*. Exchange considered. Eggs in season. Virginia Weaver, 822 S. College Ave., Tulsa, Okla.

Literature Wanted—Barnes & McDunnough's "Contributions," Henry Edward's "Pacific Coast Lepidoptera" and other publications relative to North American Lepidoptera. C. F. dos Passos, Mendham, New Jersey.

Geometers Wanted from all parts of United States, for cash or exchange. Edward Guedet, P. O. Box 305, Napa, California.

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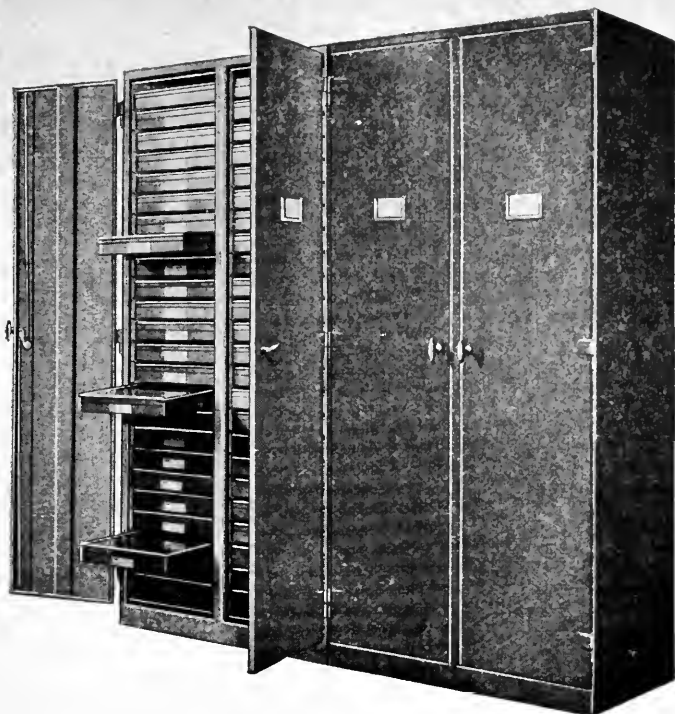
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JUNE, 1935

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Insects Collected in Flight Traps in the Willamette Valley, Oregon, in 1931 and 1932.

By FRANK G. HINMAN and A. O. LARSON,

Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture.

An account of the insects collected in flight traps near Moscow, Idaho, has been published by Paul L. Rice (2). Flight traps were also operated by the writers, in studying the pea weevil in the Willamette Valley, and it was thought that the record of a similar study might be of value by furnishing data on the insects occurring in the Willamette Valley, the time of their occurrence, and the effect of climatic factors on their abundance, as well as furnishing data for a comparison with the results obtained by Rice in a different locality.

METHOD.

The trap used was very similar to that designed and described by Wakeland (3) and employed by Rice (2). It was made of a vertical wire screen bordered at the sides and top by a metal frame extending out from it at right angles for a distance of about six inches on either side of the screen and fitted with two square-topped funnels at the base, one on either side of the screen. Metal cans were fitted at the lower ends of the funnels. Insects striking the screen fell down through the funnels into the cans. No attractants or killing agents were used.

The traps were held by two wooden uprights so that the cans would be from 3 to 6 feet above the ground. All were on level ground, in or at the edge of cultivated fields, chiefly pea fields, with the exception of Trap I, which was situated on top of a solitary hill several hundred feet above the fields. This hill was heavily wooded with oak trees on the north side, and a few firs grew on the south side.

Twelve traps were set up in March, 1931, but 1 was taken down on April 29 and another on June 22. In 1932 there

were 11 traps in use, the one taken down in June of the year before having been put up again. In 1931 they were visited at intervals of from 5 days to 2 weeks from March 13 to December 9, and in 1932 from January 6 to December 3, and at somewhat longer intervals in a number of cases. There were 632 can collections made in 1931 and 524 in 1932. It was seldom that all of the traps were visited on the same day. Usually part were examined on one day and the rest on the day following. Rainy weather interfered considerably with trap collections, especially in the spring.

INSECTS COLLECTED.

The insects caught in 1931 were sent to the taxonomists of the Bureau of Entomology who identified all except most of the Diptera, which were in very poor condition; several families of Coleoptera, including the Chrysomelidae; and the Tenthredinidae. Those caught in 1932 were not determined by taxonomic specialists, but records were kept of their numbers, and the families to which they belonged were determined in as many cases as possible. The following tabulation shows the numbers of families, species, and specimens found in the 14 orders collected in 1931:

*Insects Collected in Flight Traps in the Willamette Valley,
Oregon, in 1931.*

Order	Number of Families	Number of Species	Number of Specimens
Orthoptera	2	4	7
Isoptera	1	2	27
Neuroptera	2	5	33
Ephemera	1	3	17
Plecoptera	1	1	7
Corrodentia	1	3	13
Hemiptera	15	63	1,518
Homoptera	7	49	405
Dermoptera	1	1	1
Coleoptera	39	197	4,012
Trichoptera	2	3	22
Lepidoptera	7	18	76
Diptera	25	32	663
Hymenoptera	25	115	768
Total	129	496	7,569

The pea aphid, *Illinoia pisi* (Kalt.), occurred in such large numbers that it was not included in the table. More than 3,650 individuals were counted, and there were many more. Collembola also occurred at times in large numbers.

It is interesting to note the similarity between the above table and that given by Rice (2). In both Idaho and Oregon the greatest number of species were obtained in the order Coleoptera followed by the Hymenoptera, while the Hemiptera and Homoptera, each with much fewer species, ranked third and fourth respectively in both localities. In comparison with the insects obtained in Idaho 2 more orders, 21 more families and the same number of species are represented in the 1931 collections in Oregon.

In 1931 the following species were obtained in numbers above 100:

<i>Illinoia pisi</i> (Kalt.) (Aphidae).....	More than 3,650
<i>Bruchus pisorum</i> L. (Bruchidae).....	992
<i>Corizus scutatus</i> Stal (Coreidae).....	912
<i>Diabrotica soror</i> Lec. (Chrysomelidae).....	470
<i>Hippodamia ambigua</i> Lec. (Coccinellidae).....	367
<i>Bibio nervosus</i> Loew (Bibionidae).....	191
<i>Meligethes mutatus</i> Har. (Nitidulidae).....	141
<i>Prenolepis imparis</i> (Say) (Formicidae).....	140
<i>Pleurophorus caesus</i> Creutz (Scarabaeidae).....	131
<i>Leptocoris trivittatus</i> (Say) (Coreidae).....	119
<i>Rhyparochromus chiragra californica</i> VanD. (Lygaeidae)	117
<i>Polyamia inimica</i> (Say) (Cicadellidae).....	116

A number of new or rare species were identified from the trap collections. Two specimens of a carabid beetle were marked "genus unknown" by L. L. Buchanan. Six specimens of Hymenoptera, including 3 braconids, were found to be new species. There were 5 new species of Cicadellidae and a new species of *Corizus* (Coreidae). Many of those insects not determined as to species by the taxonomists were probably also new. One andrenid was determined by G. A. Sandhouse as a male of *Halictus kincaidii* Ckll. Only the female had been known previously. R. A. Cushman identified one ichneumonid as *Phytodictus parvus* Rohwer, and reported it to be the second

known specimen of the species. *Buprestis gibbsi* (Lec.) is a very rare buprestid in Oregon, yet 5 specimens of this species were taken in the traps, 3 in 1931 and 2 in 1932.

In 1932 only 3,445 specimens, exclusive of 304 pea aphids, were obtained. This is less than half the number collected the year before. In 120 of the 129 families represented in the collections in 1931 there was either a decrease in numbers or a total lack of representatives in 1932. The four species caught in the greatest numbers the year before were the only ones of which more than 100 specimens were taken in 1932. These were: *Bruchus pisorum*, 526; *Illinoia pisi*, 304; *Corizus scutatus*, 239; and *Diabrotica soror*, 167. Coccinellids dropped from 704 to 78, bibionids from 307 to 41, *Meligethes mutatus* from 141 to 20. The catch of most of the other insects dropped to from 90 to 15 percent of the number obtained the year before.

REASONS FOR THE DECREASE IN THE NUMBER OF INSECTS CAUGHT IN 1932.

There are three reasons for the difference in the numbers caught in the two years:

(1) The traps were visited somewhat less frequently in 1932 than in 1931, and in 1932 some trouble was experienced with live stock knocking the cans loose from the traps. The less frequent the visits, the greater the likelihood of some of the insects escaping, or being eaten by the predacious species caught, or decomposing owing to the collection of water in the cans.

(2) In 1931 ten of the 12 traps were in or at the edge of pea fields. In 1932 most of the fields were planted to hay or grain; only 2 traps were adjoining peas, 2 were within a few hundred yards of pea fields, and 3 were in fields with quite a number of scattered volunteer peas in them. So there was much less chance in 1932 of collecting pea insects, which in 1931 constituted a large part of the catch. The pea aphid was very abundant in 1931, its presence resulting in a large population of coccinellids, cantharids, syrphids, and other predators.

These in turn attracted insects predacious on themselves. In 1932 there were very few aphids, and this resulted in a decrease in the number of species directly or indirectly associated with them.

(3) Perhaps the most important single factor causing this difference in numbers was the difference in the weather of the two years. The winter of 1930-31 was very mild. April, May, most of June, and July and August of 1931 were dry and warm. On the other hand, the winter of 1931-32 was more severe than usual, beginning with a very cold November in 1931. March, 1932, was the wettest March on record in western Oregon. April and May, 1932, were wet and very cloudy. The cold winter and the long-continued wet weather in the spring seemed to have resulted in a decrease in numbers of almost every species. The almost total absence of the pea aphid and consequent decrease in its predators was probably due to the difference in the weather of the two years.

RELATION OF TRAP CATCHES TO WEATHER CONDITIONS.

The fact that the trap collections were made at irregular intervals over only a two-year period precludes any definite conclusions being drawn as to the effect of weather conditions on the individual collections. However, it may be of interest to mention the effects that the data seemed to indicate.

During the spring and early summer trap collections appeared to increase after warm weather and to decrease after a rain. During the fall they apparently increased following a rain and decreased in periods of hot, dry weather.

There seemed to be two peaks and two low points in the trap collections. The first peak occurred early in the spring, about April, when insects were leaving hibernation or emerging as adults after passing the winter in an immature stage, and seemed favored by dry, warm weather; the second came in the fall, in September or October, when insects developed during the summer were seeking hibernation quarters or were flying away from their food plants which had become unfit for food

by this time, and this peak seemed favored by just the opposite conditions—wet, cool weather. The two low points occurred, one in the winter when insect development and movement was retarded by cold and rain, and one in July and August when many insects were in the immature stages or may have been aestivating or keeping under cover because of high temperatures.

FURTHER CONSIDERATIONS.

The number of species, like the number of specimens, was greatest in the spring, decreasing during the summer and increasing again in the fall. Rice (2) reported exactly similar results.

No correlation was found between the direction in which the trap was facing and the insect catch. Trap I, on top of a hill, caught twice as many insects as any other trap in 1931 and nearly twice as many as any other in 1932. It also held more species. The other traps varied considerably in their catches and in the number caught in the two cans on each trap, but a study of the position of the traps in relation to their surroundings failed to show why these differences occurred. Rice (2) also failed to find any consistent relationship between the location of the traps or the directions in which they were facing and the number of specimens or species caught, except that, "As a rule, more species were captured in traps on high ground than in those on low ground."

Since the trap collects only those insects that fly into it and are not agile enough to escape, it is doubtful whether its catches are representative of the entire insect population in its vicinity. In 1931, as stated, 10 of the 12 traps were in or at the edge of pea fields. From July 10 to August 17 of that year 78 plats, each 10 feet square, were examined in harvested pea fields adjoining these traps, and all of the insects found on them were picked up (1). Of the 64 species obtained in this way 44 were also collected in the traps. Those not caught by the traps were obtained in numbers of from 1 to 4 specimens, except in three cases: 17 specimens each of *Nabis ferus* (L.),

Nabis major Costa, and *Coccinella hieroglyphica humboldtensis* Nun. were found on the fields but were not represented in the collections made with the traps.

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The Coleoptera or Beetles of Georgia (Cicindelidae, Carabidae).

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

Since very little has been published concerning the Coleoptera of Georgia, I am submitting a list of the beetles that I have taken in Georgia during the past eight summers.

My collecting of beetles has not been very thorough, since I have always done general collecting. It is my intention to do very thorough collecting of beetles during the next few years. I will appreciate having any one send me a list of the beetles in their collection that have been taken in Georgia, giving me the date, locality and name of collector.

I am greatly indebted to Drs. H. S. Barber, L. L. Buchanan, E. A. Chapin, and W. S. Fisher, of the U. S. National Museum, and to Dr. J. Chester Bradley, of Cornell University, for their identification of a large number of the beetles listed in this paper. I have compared many of the Georgia specimens with Florida specimens, which were identified by Dr. W. S. Blatchley of Indianapolis, Indiana.

The CICINDELIDAE that I have taken belong to two genera and twenty-six species and varieties. The list follows, using the numbers of Leng's Catalog. The numbers in parenthesis refer to the number of specimens taken.

37—*TETRACHIA CAROLINA* Linn. Vienna VI, 17, '31; Bainbridge VI, 18, '31; Atlanta VII, 4 to VIII, 8 (13); Rome VIII, 16, '31.

38—*T. VIRGINICA* Linn. Albany VI, 1, '32 (3); Griffin VI, 12, '27 (2); Canton VII, 17, '31 (2); Atlanta VII, 30 to IX, 6 (239).

44a—*CICINDELA SPLENDIDA TRANSVERSA* Leng. Clayton V, 28, '34; Yonah Mt. V, 30, '34.

48—*C. ANCOISCENENSIS* Harr. Clayton VIII, 17, '29.

49—*C. DUODECIMGUTTATA* Dej. Cartersville V, 23, '31; Marietta VI, 5, '30; Douglasville VII, 15, '27; Atlanta VIII, 25 to X, 7, '34 (17).

50—*C. REPANDA* Dej. Cartersville III, 23, '27; Perry IV, 13, '31; Atlanta IV, 18 to X, 7 (67); Stone Mt. IV, 19, '31; Convers V, 14, '33 (20); Waycross V, 15, '32; Columbus V, 20, '31 (16); Snellville VI, 12, '31 (5); Bainbridge VI, 19, '31; Cairo VI, 19, '31 (115); Thomasville VI, 19, '31 (6); Toccoa VI, 22, '31; Clayton VIII, 17, '29; Waleska VIII, 28, '28 (4).

51—*C. HIRTICOLLIS* Say. St. Simons Is. V, 5 to VIII, '31 (145).

53—*C. TRANQUEBARICA* Hbst. Tallapoosa V, 6, '28.

68e—*C. SCUTELLARIS UNICOLOR* Dej. Cairo VI, 19, '31.

68f—*C. SCUTELLARIS NIGRIOR* Schaupp. Cairo VI, 19, '31.

69—*C. SENGUTTATA* Fab. Stone Mt. IV, 17 to VI, 16 (9); Macon IV, 29, '31 (6); Atlanta IV, 29 to VII, 11 (36); Echeconnee V, 3, '33 (2); Hamilton V, 19, '31 (2); Blood Mt. V, 21 to V, 29 (54); Pomona VI, 5, '30; Kennesaw Mt. VI, 8, '28; Neel Gap VI, 14, '31 (9); Helen VII, 11, '34; Yonah Mt. VIII, 5, '34; Clayton VIII, 17, '29.

69c—*C. SENGUTTATA HARRISI* Leng. Clayton VIII, 17, '29.

70—*C. PATRUELA* Dej. Blood Mt. V, 21 to IX, 1 (24); Clayton V, 28, '34; Yonah Mt. V, 30, '34; Neel Gap VI, 14 to IX, 1 (5).

74—*C. PUNCTULATA* Oliv. St. Simons Is. V, 30 to VI, 5 (7); Waycross VI, 10, '31; Colquit VI, 18, '31 (3); Stone Mt. VI, 18, '31; VI, 26, '27; VII, 10, '29; Kennesaw Mt. VI, 21, '30; Dahlonega VI, 22, '32; Tallulah Falls VI, 28, '31; Atlanta VII, 5 to VIII, 26 (11); Helen VII, 11, '34; Clayton VIII, 17, '29.

79—*C. ABDOMINALIS* Fab. Bainbridge VI, 18, '31; Tallulah Falls VI, 28, '31.

81—*C. RUFIVENTRIS* Dej. Tallulah Falls VI, 28, '31; Toccoa VII, 3, '31; Yonah Mt. VII, 12 to VIII, 5 (80); Clarkesville VII, 25, '31; Clayton VIII, 17, '29; Atlanta IX, 22, '32.

93—*C. UNIPUNCTATA* Fab. Stone Mt. IV, 27 to VI, 9 (26); Blood Mt. V, 21 to V, 29 (12); Kennesaw Mt. VI, 8 to VII, 4 (6); Tallulah Falls VI, 28, '31; Yonah Mt. VII, 12, '34, VII, 15, '34, VII, 28, '34 (2); Clayton VIII, 17, '29.

98a—*C. TRIFASCIATA TORTUOSA* Lec. Folkston V, 8, '32; Conyers V, 14, '33 (2); Bainbridge VI, 19, '31.

101—*C. DORSALIS* Say. St. Simons Is. V, 30 to VII, 23 (83).

101a—*C. DORSALIS MEDIA* Lec. St. Simons Is. VI, 4, 29 (2).

101d—*C. DORSALIS VENUSTA* Laf. Bainbridge VI, 18, '31.

104—*C. MARGINATA* Fab. St. Simons Is. V, 30 to VII, 23 (43).

105—*C. BLANDA* Dej. Swainsboro V, 31, '31 (3); Cairo VI, 19, '31 (2); Thomasville VI, 19, '31 (6).

106—*C. WAPLERI* Lec. Cairo VI, 19, '31 (37); Thomasville VI, 19, '31 (12).

112—*C. GRATIOSA* Gúer. Cornelia VI, 28, '31.

112a—*C. GRATIOSA HIRTILABRIS* Lec. St. Simons Is. VI, 5, '29 (33).

The CARABIDÆ that I have taken belong to fifty-nine genera and one hundred and thirty species and varieties.

125—*SCAPHINOTUS ELEVATUS* Fab. Atlanta VII, 14, '27.

125a—*S. ELEVATUS TENEBRICOSUS* Roes. Atlanta VI, 4, '29.

127b—*S. UNICOLOR SHOEMAKERI* Leng. Atlanta VI, 5 to XI, 2 (8); Yonah Mt. VIII, 5, '34.

129—*S. ANDREWSI* Harr. Blue Ridge VI, 14, '29.

160—*SPHAERODERUS CANADENSIS* Chd. Toccoa VI, 16, '29.

SPHAERODERUS sp. near *LECONTEI*—Atlanta VI, 7, '28.

163—*S. BICARINATUS* Lec. Toccoa VI, 16, '29.

170—*CARABUS SYLVOSUS* Say. Clayton VIII, 17, '29; Kennesaw Mt. X, 24, '28.

172—*C. LIMBATUS* Say. Clayton VIII, 17, '29.

173—*C. VINCTUS* Web. Gainesville VI, 3, '29; Toccoa VI, 16, '29; Stone Mt. X, 24, '31.

176—*CALOSOMA EXTERNUM* Say. Cairo VI, 19, '31.

180—*C. SCRUTATOR* Fab. Atlanta VII, 4, '31; Clayton VIII, 17, '29; Waleska VIII, 28, '28.

181—*C. WILLCOXI* Lec. Griffin VI, 9, '28.

184—*C. SAYI* Dej. Cairo VI, 19, '31; Atlanta VII, 16, '31.

204—*C. CALIDUM* Fab. Atlanta VIII, 3 to VIII, 24 (5); Kennesaw Mt. VIII, 3, '28; Rome VIII, 16, '31 (4); Macon VIII, 19, '31.

246—*NOTIOPHILUS AENEUS* Hbst. Toccoa VI, 16, '29.

- 251—*N. NOVEMSTRIATUS* Lec. Brunswick VI, 4, '29; Toccoa VIII, 16, '29.
- 302—*PASIMACHUS SUBLAEVIS* Beauv. Atlanta VII, 4, '29; Clayton VIII, 17, '29.
- 305—*P. SUBSULCATUS* Say. Macon IV, 30, '28.
- 307—*P. MARGINATUS* Fab. Stone Mt. IV, 2 to VI 2 (6); Atlanta IV, 23, '33, X, 13, '31; Blood Mt. V, 21, '33; Toccoa VI, 16, '29; Yonah Mt. VIII, 5, '34.
- 308—*P. DEPRESSUS* Fab. Jonesboro VI, 12, '27; Tallulah Falls VII, 15, '28.
- 308a—*P. DEPRESSUS MORIO* Lec. Stone Mt. V, 25, '28; Macon VI, 21, '29; Kennesaw Mt. VII, 4, '28; Atlanta VIII, 17, '28.
- 309—*P. PUNCTULATUS* Hald. Stone Mt. IV, 23, '27; Atlanta V, 16, '31; VIII, 11, '28; Kennesaw Mt. VI, 19, '27; VI, 24, '34, VIII, 11, '28; Yonah Mt. VIII, 5, '34.
- 316—*SCARITES SUBTERRANEUS* Fab. Stone Mt. IV, 24, '32; Atlanta VI, 15, '28; Clayton VI, 16, '29; Cairo VI, 19, '31.
- 317—*S. SUBSTRIATUS* Hald. Waycross VI, 10, '31; Cairo VI, 19, '31.
- 331—*DYSCHIRIUS GLOBULOSUS* Say. Blue Ridge VI, 14, '29; Toccoa VIII, 16, '29.
- 334—*D. HAEMORRHOIDALIS* Dej. Gainesville VIII, 18, '28.
- 358—*CLIVINA DENTIPES* Dej. Ellijay VI, 27, '31; Dahlonega VIII, 17, '29.
- 361—*C. PLANICOLLIS* Lec. Toccoa VI, 16, '29.
- 369—*C. AMERICANA* Dej. Cornelia VI, 16, '29.
- 373—*C. FERREA* Lec. Blood Mt. VI, 25, '31.
- 375—*C. BIPUSTULATA* Fab. Rome V, 26, '31; Marietta VII, 4, '28; Atlanta VIII, 1, '29.
- 380—*ASPIDOGLOSSA SUBANGULATA* Chd. Cornelia V, 16, '28; Jesup VI, 4, '29; Dalton VIII, 15, '28.
- 382—*SCHIZOGENIUS PLANULATUS* Lec. Toccoa VIII, 16, '29.
- 392—*ARDISTOMIS OBLIQUATA* Putz. Bainbridge VI, 19, '31.
- 395—*A. VIRIDIS* Say. Albany VI, 1, '32; Bainbridge VI, 19, '31.
- 399—*PANAGAEUS FASCIATUS* Say. Atlanta III, 30, '28, VII, 20, '30; Toccoa VI, 16, '29; Americus VI, 20, '31.
- 406—*MORION MONILICORNIS* Latr. Stone Mt. IV, 18 to V, 11 (13); Atlanta VI, 4, '28; Macon VI, 15, '28; Griffin VI, 26, '32.
- 432—*BEMBIDION AMERICANUM* Dej. Valdosta III, 21, '31; Cairo VI, 18, '31.

- 512—*B. NIGRUM* Say. Toccoa VI, 16, '29.
783—*ANILLUS FORTIS* Horn. Toccoa VI, 16, '29.
792—*PERICOMPSUS EPHIPIATUS* Say. Rockmart VIII, 7, '28.
805—*TACHYURA INCURVA* Say. Jonesboro VII, 2, '29.
830—*T. VIVAX* Lec. Toccoa VI, 16, '29; Rockmart VIII, 7, '28.
898—*TACHYMENIS FLAVICAUDA* Say. Toccoa VIII, 16, '29; Rockmart VIII, 7, '28.
901—*PATROBUS LONGICORNIS* Say. Toccoa V, 14, '30.
929—*MYAS CORACINUS* Say. Macon VI, 3, '28; Atlanta IX, 16, '29; Stone Mt. X, 25, '31.
1006—*PTEROSTICHUS ADOXUS* Say. Atlanta VI, 29, '27; Toccoa VIII, 16, '29.
1027—*GASTRELLARIUS BLANCHARDI* Horn. Clayton VIII, 16, '29.
1045—*CYCLOTRACHELUS UNICOLOR* Say. Atlanta VIII, 7, '34.
1047—*C. SPOLIATUS* Newm. Blairsville VI, 15, '29.
1048—*C. VINCTUS* Lec. Toccoa VI, 16, '29.
1100—*REFONIA MOESTA* Say. Blairsville VI, 15, '29; Clayton VIII, 17, '29.
1102—*ABACIDUS FALLAX* Dej. Griffin V, 12, '31.
1105—*A. PERMUNDUS* Say. Atlanta X, 7 to X, 20, '34 (62).
1229—*LOXANDRUS CRENATUS* Lec. Fort Valley VI, 1, '31; Cairo VI, 18, '31.
AMARA sp. Atlanta IV, 18, '33 (2).
1450—*DICHAELUS DILATATUS* Say. Jonesboro VI, 12, '27; Toccoa VI, 16, '29; Yonah Mt. VIII, 5, '34; Kennesaw Mt. X, 24, '28; Stone Mt. X, 24, '31.
1454—*D. PURPURATUS* Bon. Neel Gap V, 21, '33; Macon VI, 21, '29; Atlanta VII, 11, '27; Albany VII, 30, '31.
1460—*D. FURVUS* Dej. Toccoa VI, 16, '29.
1464—*D. OVALIS* Lec. Blairsville VI, 15, '29; Atlanta VII, 5, '32; VIII, 26, '28.
1465—*D. ELONGATUS* Bon. Atlanta IV, 18 to VIII, 2 (6); Okefenoke Swp. V, 6, '33; Columbus V, 27, '31; Toccoa VI, 16, '29; Yonah Mt. VIII, 5, '34; Stone Mt. X, 24, '31, XI, 3, '28.
1466—*D. AMBIGUUS* Laf. Atlanta III, 30, '28, III, 28, '29; Fort Valley IV, 29, '31; Clayton VI, 16, '29.
1467—*D. TETER* Bon. Toccoa VI, 16, '29.
1468—*D. POLITUS* Dej. Blairsville VI, 15, '29.

- 1484—*CALATHUS OPACULUS* Lec. Brunswick VI, 5, '29.
 1513—*PLATYNUS DECENS* Say. Neel Gap V, 29, '32; Blue Ridge VI, 14, '29; Yonah Mt. VIII, 5, '34.
 1518—*P. CINCTICOLLIS* Say. Brunswick IV, 12, '31; Neel Gap V, 21, '33.
 1519—*P. REFLEXUS* Lec. Blairsville V, 14, '31; Blue Ridge VI, 26, '31.
 1522—*P. EXTENSICOLLIS* Say. Cornelia VI, 16, '29.
 1555—*P. EXCAVATUS* Dej. Gainesville VIII, 16, '29.
 1556—*P. FERREUS* Hald. Blue Ridge V, 14, '31.
 1578—*P. LIMBATUS* Say. Macon VI, 3, '28.
 1581—*P. PUNCTIFORMIS* Say. St. Simons Is. VI, 5, '29; Cairo VI, 18, '31; Toccoa VIII, 16, '29.
 1584—*P. RUFICORNIS* Lec. Toccoa VI, 16, '29.
 ANCHOMENUS REFLEXUS Lec. Atlanta V, 16, '31 (2).
 CIRCINALIA PUNCTIFORMIS Say. Atlanta VI, 5, '32; VI, 10, '29.
 CIRCINALIA LIMBATA Say. Stone Mt. V, 10, '29 (?).
 1595—*OLISTHOPUS PARMATUS* Say. Blairsville VI, 15, '29.
 1612—*CASNONIA PENNSYLVANICA* Linn. Toccoa VI, 16, '29.
 1616—*GALERITA JANUS* Fab. Atlanta IV, 7, '30; Augusta IV, 10, '31; Stone Mt. IV, 13, '30, IV, 18, '32, V, 9, '31; Waycross V, 8, '33; Quitman VI, 17, '31; Clayton VIII, 17, '29.
 1620—*G. BICOLOR* Drury. Atlanta IV, 16, '27; Griffin VI, 12, '27; Douglasville VII, 15, '27.
 1633—*EGA SALLEI* Chev. Brunswick VI, 5, '29.
 1635—*TETRAGONODERUS INTERSECTUS* Germ. Cairo VI, 18, '31.
 1641—*LEBIA GRANDIS* Hentz. Cornelia V, 16, '28; Atlanta VI, 29, '27, VIII, 2, '31.
 1655—*L. VIRIDIS* Say. Quitman VI, 18, '31; Atlanta VII, 9, '29 (2).
 1658—*L. PUMILA* Dej. Clayton V, 28, '34.
 1667—*L. ORNATA* Say. Blairsville VI, 15, '29.
 1671—*L. ANALIS* Dej. Americus VI, 20, '31.
 1688—*COPTODERA AERATA* Dej. Atlanta VII, 9, '29.
 1691—*DROMIUS PICEUS* Dej. Cornelia VI, 28, '31.
 1710—*CALLEIDA PUNCTATA* Lec. Atlanta V, 29, '27.
 1725—*PINACODERA LIMBATA* Dej. Toccoa VIII, 16, '29.
 1726—*P. PLATICOLLIS* Say. Americus VI, 20, '31.
 1756—*APENES SINUATA* Say. Quitman VI, 17, '31.
 1789—*BRACHINUS FUMANS* Fab. Okefenoke Swp. V, 5, '33; Cairo VI, 18, '31.

1806—*CHLAENIUS TOMENTOSUS* Say. Blue Ridge VI, 14, '29; Valdosta VII, 24, '27; Atlanta VIII, 3 to VIII, 20 (8); Clayton VIII, 17, '29.

1817—*C. PENNSYLVANICUS* Say. Atlanta V, 18 to VIII, 8 (4); Clayton V, 28, '34; Albany VII, 30, '31; Dalton VIII, 15, '28.

1822—*C. NEMORALIS* Say. Jonesboro VI, 14, '27.

1822(?)—*C. NEMORALIS*, var. Athens VI, 12, '31; Atlanta VI, 12, '29, VI, 19, '30, VII, 2, '31, VII, 11, '31; Americus VI, 20, '31.

1838—*C. AESTIVUS* Say. Valdosta VII, 24, '27.

1841—*C. DIFFINIS* Chd. Toccoa VI, 16, '29.

1846—*C. SERICEUS* Forst. Atlanta IV, 2, '33, VII, 24, '31 (2); Cleveland V, 4, '28; West Point VI, 4, '32; Bainbridge VI, 19, '31.

1856—*ANOMOGLOSSUS EMARGINATUS* Say. Quitman VI, 17, '31.

1878—*GEOPINUS INCRASSATUS* Dej. Augusta IV, 10, '31; Albany VI, 1, '32; Atlanta VI, 5, '32.

1886—*CRATACANTHUS DUBIUS* Beauv. Blue Ridge V, 14, '31; Augusta VI, 9, '32; Cairo VI, 19, '31; Stone Mt. VII, 12, '29; Atlanta VIII, 2 to IX, 5 (5).

1896—*HARPALUS CALIGINOSUS* Fabr. Fort Valley VI, 1, '31; Atlanta VI, 12 to X, 24 (17); Blue Ridge VI, 14, '29; Toccoa VII, 3, '31; Helen VII, 11, '34; Albany VII, 30, '31.

1897—*H. ERRATICUS* Say. Atlanta V, 6, '29, VI, 12, '27, VI, 21, '28; Clayton V, 28, '34; Dalton VI, 7, '31.

1910—*H. ERYTHROPUS* Dej. Atlanta VI, 12, '29, VII, 2, '31, VII, 8, '31; Blue Ridge VI, 14, '29; Americus VI, 20, '31.

1915—*H. COMPAR* Lec. Blue Ridge VI, 14, '29.

1925—*H. PENNSYLVANICUS* DeG. Columbus V, 19, '31; Brunswick VI, 5, '29; Atlanta VI, 12 to IX, 8 (123); Cairo VI, 18, '31; Calhoun VI, 28, '32; Stone Mt. VII, 10, '29.

1971—*H. NITIDULUS* Chd. Neel Gap VI, 25, '31.

2007—*H. SPADICEUS* Dej. Toccoa VI, 16, '29.

2010—*H. DICHIROUS* Dej. Cartersville V, 22, '31; Atlanta VI, 15, '28.

2013—*SELENOPHORUS OPALINUS* Lec. Cartersville V, 22, '31; Albany VI, 16, '29.

2026—*S. ELLIPTICUS* Dej. Jesup V, 5, '30; Toccoa VI, 16, '29.

2030—*S. PALLIATUS* Fabr. Jesup V, 5, '30; Cartersville V, 22, '31; Quitman VI, 17, '31.

- 2039—*S. PEDICULARIUS* Dej. Americus VI, 20, '31.
2045—*S. FATUUS* Lec. Albany VI, 1, '32.
2064—*DISCODERUS PARALLELUS* Hald. Perry IV, 13, '31;
Cleveland V, 4, '28; Atlanta V, 18, 32 (2).
2079—*TRIPLECTRUS DULCICOLLIS* Laf. Atlanta V, 23 to XI,
18 (7); Rome V, 26, '31.
2088—*ANISODACTYLUS NIGERRIMUS* Dej. Blue Ridge V,
14, '31.
2108—*A. LAETUS* Dej. Baxley V, 5, '30; Atlanta VI, 12,
'29.
2135—*ANISOTARSUS AGILIS* Dej. Baxley V, 5, '30; Quitman
VI, 17, '31.
2139—*A. TERMINATUS* Say. Blairsville V, 14, '31.
2218—*STENOLOPHUS OCHROPEZUS* Say. Cartersville V, 22,
'31; Cornelia VI, 16, '29; Atlanta VII, 7, '31.
2246—*TACHISTODES TESTACEUS* Dej. Atlanta VI, 10, '27.
2251—*AGONODERUS LINEOLA* Fab. Cornelia VI, 16, '29.
2254—*A. INFUSCATUS* Dej. Perry IV, 13, '31.
2256—*A. PALLIPES* Fab. Cleveland V, 4, '28; Cairo VI, 18,
'31; Atlanta VI, 19, '33 (2), VII, 7, '31 (4); Douglasville VII,
15, '27.

***Pogocolon gaurae* Breeding in Missouri (Lepid.:
Sphingidae).**

The finding of a last stage larva of *Pogocolon gaurae* Ab. & Sm. at Allenton, Missouri, Aug. 13, 1933, by Miss Anne A. Jones, of Webster Groves, Missouri, was an event sufficiently out of the ordinary to merit its being put on record. It was feeding on evening primrose, *Oenothera biennis*, and pupated a few days after it was found. The pupa was kept indoors all winter; a male moth emerged June 1, 1934.

According to Holland (Moth Book, p. 73), the larva feeds on various species of *Gaura*, and the range of the species is from Georgia to Texas and as far north as southern Kansas. It does not appear to be a regular inhabitant of the region near St. Louis, since it is not represented in any collection of Lepidoptera from this locality known to the writer. This occurrence of the larva in this region is of unusual interest because it indicates a long flight from the proper range of the species by a female moth, which oviposited after the flight. The successful attainment of maturity by the caterpillar followed

HAROLD O'BYRNE, Webster Groves, Missouri.

Notes and Descriptions of West American Cerambycidae (Coleoptera).—II.*

By E. GORTON LINSLEY, University of California.

PRIONUS LECONTEI Lameere.

P. lecontei is not a variety or synonym of *P. californicus* as it has been placed by recent writers, but is a very distinct species. It differs markedly from *californicus* in having thirteen-segmented rather than twelve-segmented antennae, with the external processes of segments four to eleven very strongly produced and longer than the segments to which they are attached (in *californicus* the processes are shorter than the segments on which they occur). In addition, the lobes of the third tarsal segment in *lecontei* are obtuse, not acute as in *californicus* and its allies. These characters give *lecontei* a facies quite distinct from that of any other North American species. It appears to be quite rare in collections and I have seen it only from northern California (Mendocino County).
PRIONUS HORNII Lameere.

I have a number of *Prionus* from southern Arizona which agree with Lameere's description of *P. horni*. These differ from *californicus* only in their slightly smaller average size and in having the twelfth segment of the antennae appendiculate and longer than the penultimate segment. It seems probable that these are no more than a subspecies of *P. californicus*.

XYLOTRECHUS NUNENMACHERI Van Dyke. (Figs. 1, 1a).

In 1920, Dr. E. C. Van Dyke, basing his description on the male, described *nunenmacheri* as a subspecies of *X. insignis* Lec. (Figs. 2, 2a). Mr. G. R. Hopping, in his revision of the Clytini,¹ treats *nunenmacheri* somewhat questionably as a distinct species, stating that "its true status cannot be determined until the female is found." Through the kindness of Mr. W. J. Buckhorn, I have recently had the opportunity of examining a female of this species which was captured by him at Wapinita, Oregon, on May 23, 1934. Mr. Buckhorn took both sexes of *nunenmacheri* from pupal cells in willow, *Salix* sp.

* No. I was published in ENTOM. NEWS, 1934, 65: 161-165, 181-185.

¹ Hopping, G. R. 1932, Ann. Ent. Soc. Amer. 25:542.

Since the female has never been described it seems worthwhile to append the following diagnosis:

♀. Black, elytra with three narrow yellow fasciae. Head moderately closely, rugosely punctured; frontal carina not prominent; antennae piceous. Pronotum moderately closely, rugosely punctured; disk without fasciae; apex feebly margined with yellow. Scutellum slightly transverse, black. Elytra

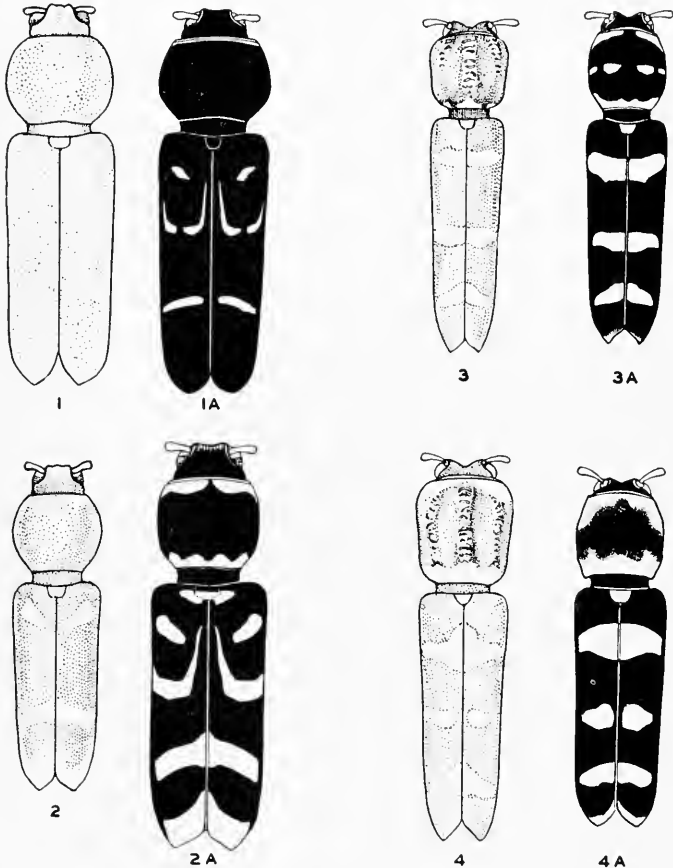


Fig. 1. *Xylotrichus nunenmacheri* Van Dyke, male, 1A, female. Fig. 2. *Xylotrichus insignis* LeConte, male, 2A, female. Fig. 3. *Neoclytus balteatus* LeConte, male, 3A, female. Fig. 4. *Neoclytus resplendens* Linsley, male, 4A, female.

parallel-sided, with a small, acute, ante-median fascia, a broken U-shaped median fascia, and a narrow, transverse, post-median band; apices broadly rounded. Legs piceous. Underside black; apex of abdominal segments narrowly margined with yellow.

The female of *nuncnuncheri* differs from the same sex of *insignis* in the more coarsely and rugosely punctured head and pronotum; black, rather than rufous or yellowish, antennae; pronotum feebly margined with yellow at apex (as compared to the broad apical and basal margins in *insignis*), elytra without a yellow circumscutellar patch, elytral fasciae much more narrow and inconspicuous, and elytral apices more broadly rounded. In addition, the pro-, meso-, and metasterna are without any dense patches of yellow pubescence, and the abdominal segments are only feebly margined with yellow, not entirely yellow as in *insignis*. Mr. G. R. Hopping separates *nuncnuncheri* from *insignis* on the basis of the elytral apices. However, in the series of *insignis* at hand (over one hundred examples of each sex) there is considerable variation in this character. About all one can safely say is that in general the elytral apices are more obtuse in *nuncnuncheri*.

NEOCLYTUS ACUMINATUS Fab.

In eastern North America, this species is typically reddish brown with the outer segments of the antennae, apical three-fourths of the elytra, and underside of the body piceous. In western North America there occurs a subspecies in which the body is uniformly reddish brown without any trace of piceous on the antennae, elytra, or underside. This form I would designate as **Neoclytus acuminatus hesperus** new subspecies.

Holotype male (No. 3940 California Academy of Sciences, Ent.), North Cheyenne Canyon, COLORADO, June 24, 1915, reared from *Quercus* sp.

Neoclytus resplendens new species. (Figs. 4, 4a.)

♂. Elongate, reddish brown, densely clothed with recumbent, white pubescence; elytra with three transverse yellow fasciae. Head sparsely clothed with white pubescence, sulcate between the antennae; eyes small, finely granulated; antennae reaching slightly beyond the humeri, basal segments slender, reddish brown, outer segments swollen, piceous. Pronotum distinctly

longer than broad, wider at apex than at base; disk with three longitudinal rows of transverse rugae; pubescence moderately dense, white, anterior and basal margins with a broad band of dense yellow pile. Scutellum transverse, obtusely pointed behind, densely clothed with yellow pubescence. Elytra parallel-sided, finely punctured; ante-median yellow fascia dilated at suture, median band straight, post-median fascia acute; apices obliquely truncate. Legs slender, sparsely clothed with white hairs; femora unarmed at apex. Under surface densely clothed with white pubescence which is condensed into very dense patches on the anterior margin of the metasternum, the episterna of the meso- and metathorax, and the sides of the abdomen. Length 12-17 mm.

♀. Black; legs, basal one-half of the antennae, and anterior margin of the elytra reddish brown. Pronotum broadly margined at base and apex with yellow pubescence. Elytra with three transverse bands of yellow pubescence much as in the male; apices obtusely rounded. Episterna of meso- and metathorax and abdominal segments densely clothed with yellow pubescence. Length 14-18 mm.

Holotype male (No. 3941 California Academy of Sciences, Ent.), taken in Sequoia National Park, in July, 1931, F. T. Scott collector, allotype female (No. 3942 California Academy of Sciences, Ent.), from Carmel, Monterey County, August 1, 1908, L. S. Stevin collector, and paratypes in the collection of the writer as follows: one male and one female from Kelseyville, July, 1933, two males, Sequoia National Park, July, 1931, and one female, Yosemite National Park, August 9, 1933, all in CALIFORNIA.

This species is one of the most beautiful of our North American *Neoclytus*. Since it is probably most closely related to *N. balteatus* LeConte, some of the more important differences are summarized below:

Neoclytus resplendens Male.

Body clothed with dense, white pubescence which is very conspicuous on the underside.

Pronotum broadly margined with yellow at base and apex; ante-median elytral fascia dilated at the suture.

Neoclytus balteatus Male.

Body sparsely pubescent, the pubescence dominantly brownish, inconspicuous on the under side.

Pronotum not margined apically, basal margin narrow, incomplete, dilated at middle; ante-median elytral fascia straight.

Pronotum distinctly longer than broad, wider at apex than at base; punctures and rugae coarser.

Scutellum obtusely pointed behind.

Female.

Disk of pronotum without yellow fasciae.

Elytral apices obtusely rounded.

Pronotum subquadrate, slightly transverse, apex and base subequal in width; punctures and rugae less coarse.

Scutellum subquadrate, truncate behind.

Female.

Disk of pronotum with two transverse yellow fasciae.

Elytral apices obliquely truncate.

The average size of both sexes of *resplendens* is noticeably greater than that of *baltcatus*. In addition, all of the examples of *baltcatus* that I have seen are from northern California, Oregon, or British Columbia, where it occurs on manzanita, *Arctostaphylos* sp., whereas *resplendens* is found in central and southern California on various species of oaks.

Stenosphenus arizonicus new species.

Rufous; antennae, tibiae, and tarsi black, abdomen piceous. Head short, broad, coarsely and closely punctured; vertex distinctly sulcate between the antennae; antennae one and one-half times as long as the body (♂), finely, closely punctured, segments three to seven spinose at apex, carinate. Pronotum slightly narrowed at the apex, sides feebly rounded; surface smooth, with only scattered, fine punctures; pubescence fine, sparse, suberect. Scutellum finely, closely punctured, densely pubescent. Elytra nearly three times as long as broad, finely, evenly punctured, pubescence suberect, pale, not dense; apices emarginate, the angles spiniform. Legs slender; femora piceous at apex, punctures sparse, pubescence fine, sparse, suberect; tibiae carinate, more closely punctured and pubescent. Prosternum (♂) with a large, depressed, coarsely and cribrately punctured area on each side of a medium polished elevation. Episterna of meso- and metathorax, coxae, and abdomen at sides, finely, closely punctured, densely clothed with recumbent, white pubescence; metasternum and abdomen at middle sparsely punctured, clothed with scattered, suberect, pale hairs. Length 12.5 mm.; breadth 3 mm.

Holotype male (No. 3943, California Academy of Sciences, Ent.) from Globe, ARIZONA, August, 1930, collected by Mr. D. K. Duncan.

This species will run to *S. novatus* in Horn's² table of

² Horn, G. H., 1885. Trans. Amer. Ent. Soc., 12: 172.

Stenosphenus, but it differs from that species in the shape of the pronotum which is only slightly wider at base than at apex, the very short, broad head, and the fine punctures of the pronotum and elytra. In *S. novatus* Horn, the head is elongated and narrowed, the antennal tubercles scarcely elevated, the pronotum strongly narrowed anteriorly, and the pronotum and elytra coarsely, sparsely punctured.

***Stenosphenus aridus* new species.**

Black; prothorax and femora rufous. Head very coarsely punctured; vertex distinctly sulcate between the antennae; antennae slender, slightly longer than the body (δ), moderately coarsely, closely punctured, ciliate on the inner side, segments three to seven spinose at apex, segments three to nine carinate. Pronotum transverse, as wide at apex as at base, clouded with piceous at the sides and apex; punctuation coarse, irregular, except for the smooth median vitta; coarse and fine punctures intermixed. Scutellum closely, finely punctured and pubescent. Elytra about three times as long as broad; punctures moderately coarse, regular; pubescence long, pale, suberect; apices emarginate, not spinose, the outer angles dentiform. Legs slender, clothed with suberect, pale hairs; femora clouded with piceous at apex, tibiae carinate, first segment of the posterior tarsus slightly longer than the second and third segments together. Prosternum (δ) coarsely punctured and depressed on each side of the median smooth carina. Episterna of meso- and metathorax, and abdomen at the sides, closely, finely punctured, densely clothed with short, white pubescence; metasternum and abdomen at middle, almost glabrous, shining. Length 10 mm.; breadth 2.5 mm.

Holotype male (No. 3944 California Academy of Sciences, Ent.) and one paratype male (in the collection of the writer), from Zion National Park, UTAH, May 16-21, 1934, collected by Dr. Donald DeLeon. The specimens were reared from small branches of *Populus fremontii*.

S. aridus is black with the prothorax and femora rufous. The femora at apex and the pronotum at the sides and apex are clouded with piceous. The species appears to be related to the preceding but, in addition to the difference in color, may be distinguished by the more rounded and coarsely punctured pronotum with coarse and fine punctures intermixed, the more coarsely punctured elytra, the unarmed elytral apices, and the denser elytral pubescence.

A New "Nomenclator Zoologicus"

For several years past the work of systematists has been seriously impeded by the lack of a complete list of the generic names used in Zoology. The new genera that have appeared in the "Zoological Record" have not been collected together since the last volume of Waterhouse's "Index Zoologicus," which covered the period 1901-1910. The "Nomenclator Animalium Generum et Subgenerum," which has been in course of publication since 1926 by the Prussian Academy of Science, although it contains much valuable information, only includes the literature up to 1921, and only about three-fourths of it has yet appeared.

The Council of the Zoological Society of London has therefore approved a scheme for the preparation of as complete a list as possible of all the generic names that have been used in Zoology from the 10th edition of Linnaeus up to and including the literature for 1935. It is anticipated that this may involve some 190,000 names, but it is hoped that it will be found possible to publish it, at a moderate price, about the end of 1937.

All systematists and others throughout the world interested in the production of such a work are invited to report any names of genera or subgenera (with a reference to the original place of publication) that appear to have been omitted from existing records or catalogues. These should be sent as soon as possible to

DR. S. A. NEAVE, O.B.E., F.Z.S.,

Imperial Institute of Entomology,

41, Queen's Gate, London, S.W.7,

England,

who is supervising the production of the work on behalf of the Society.

P. CHALMERS MITCHELL, *Secretary*,

Zoological Society of London.

International Biological Congresses of 1935.

Messrs. L. H. Weld and J. C. Bradley for the Entomological Society of America, P. W. Claassen for the American Association of Economic Entomologists and J. C. Bradley for Section F, American Association for the Advancement of Science, announce co-operative tours in connection with International Congresses to be held this summer: Second Neurological, London, July 29-Aug. 2; Fifteenth Physiological, Leningrad and Moscow, Aug. 8-18; Sixth Botanical, Amsterdam, Sept. 2-7; Sixth Entomological, Madrid, Sept. 6-12; Twelfth Zoological, Lisbon, Sept. 14-21. For information address Prof. J. C. Bradley, 322 E. State St., Ithaca, New York.

ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., JUNE, 1935.

We believe that there are many entomologists who, like the writer, unconnected with Biological Abstracts, have heard with dismay of the reported decision of the Rockefeller Foundation to discontinue its support of that journal. Through a period of more than eight years we have become accustomed not only to lean heavily upon the Abstracts for information in our own fields of research, but also to use it for the revision and strengthening of our lecture notes in fields more remote. In the preparation of the latter we have become acquainted with many books and articles of which we would otherwise have remained totally ignorant. The titles of many biological publications are woefully inadequate in giving a true idea of their contents and he who depends upon titles misses many sources of pertinent knowledge. The reading of the best abstract, to be sure, falls short of the gain acquired by reading the article or book abstracted, but an abstract is better than complete ignorance of the publication concerned. Time in which to read all the originals is lacking with most teachers who strive also to investigate. The cessation of the Abstracts would, therefore, mean loss to institutions and to their staffs in the value of both instruction given and research accomplished. We believe that the use of the Abstracts has brought home to us a realization that each volume, with all the advantages just hinted at, is really of much greater value to each of us, as individual *teachers and investigators*, than the nine dollars we have been paying for it each year. From the combined teacher-investigator standpoint, we, therefore, should look on the abandonment of the Abstracts as a distinctly backward step in Biology. The wider view and the co-ordination of the various fields of Biology which the Abstracts have made possible *are* indispensable.

We trust that every effort will be made to secure adequate support for its continuance. We suggest that those who share our thoughts will, each, as far as his individual means allow, establish his own higher rate of subscription, thus showing, at the same time, his appreciation of the benefits which the Abstracts confers upon him. The Abstracts exists primarily for biologists, and it is the biologists who must largely determine whether it is to be continued or not.

P. P. CALVERT

**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.
4. Canadian Entomologist. London, Canada.
5. Psyche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Entomologische Zeitschrift. . Frankfurt a. M., Germany.
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'Agricoltura 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. Bollettino 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.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janeiro. 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 chilena 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.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
74. Sbornik entomolog. národního musea v Praze. Prague, Czechoslovakia.
75. Annals and Magazine of Natural History. London.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
80. Lepidopterologische Rundschau, hrsg. Adolf Hoffmann. Wien.
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.
87. Archiv für Entwicklungsmechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
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 Científica Argentina, Buenos Aires.
107. Stylops: a Journal of Taxonomic Entomology, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten über morphologische und taxonomische entomologie aus Berlin-Dahlem.
110. Arbeiten ueber physiologische und angewandte entomologie aus Berlin-Dahlem.
111. Memórias do Instituto Oswaldo Cruz. Rio de Janeiro.
112. Anales del Instituto de Biología Mexico.
113. Entomologische Beihefte aus Berlin Dahlem.
114. Occasional Papers of the Museum of Zoology, University of Michigan.
115. Memórias de la Sociedad Cubana de Historia Natural. Havana, Cuba.
116. Parasitology. Ed. Keilin and Hindle. London.

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, left, &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.—Gibson, A.—Co-operation between the United States and Canada in Entomological problems. [12] 28: 123-130. Harkness, W. J. K.—The role of insect life in Ontario streams and lakes. [4] 67: 43-46. Lal, K. B.—Insect parasites of Psyllidae. [116] 26: 325-334, ill. Michalk, O.—Ueber rationalität im sammeln. [Ent. Jahrbuch] 1935: 57-60. Morofsky, W. F.—A preliminary survey of the insect fauna of some typical Michigan trout streams. [12] 28: 82-86, ill. Phillips, E. F.—The increasing complexities of economic entomology. [12] 28: 32-46. Putman, W. L.—Notes on the native hosts of some oriental fruit moth parasites. [4] 67: 46-49. Schmith, K.—Vogel-schutz und insekten. [Ent. Jahrbuch] 1935: 47-51. Spacek, C.—Vie des éminents connaisseurs des longicornes. De l'activite scientifique du Prof. N. Plavilstshikov. [Folia Zool. et Hydrob., Riga] 6: 24-29. Strong, L. A.—International entomological problems. [12] 28: 139-142.

ANATOMY, PHYSIOLOGY, ETC.—Aschner, M.—Studies on the symbiosis of the body louse. [116] 26: 309-314, ill. Berland, L.—Premiers résultats de mes recherches en avion sur la faune et la flore atmosphériques. [24] 104: 73-96, ill. Blood, R.—The anatomy of *Pyrota mylabrina*. [6] 43: 1-16. Collins & Machado. Comments upon phototropism in the codling moth with reference to the physiol-

ogy of the compound eyes. [12] 28: 103-106, ill. **Cott, H. B.**—Warning colours and mimicry: a reply to Dr. McAtee. [Pro. R. Ent. Soc. London] 9: 109-119, ill. **Debaisieux, P.**—Organes scolopidiaux des pattes de lepidopteres. [An. Soc. Sci. Bruxel.] B 55: 66-69. **Dodson, M. E.**—Development of the female genital ducts in Trichoptera. [53] 77: 383-403, ill. **Doner, M. H.**—The anatomy of the reproductive system of *Coleophora pruniella*. [4] 67: 52-55, ill. **Evans, A. C.**—Some notes on the biology and physiology of the sheep blowfly, *Lucilia sericata*. [22] 26: 115-122, ill. **Fernando, W.**—The early embryology of a viviparous psocid. [53] 77: 109-119, ill. **Friedl, A.**—Beitrag zur morphologie von *Caliroa annulipes*. [56] 14: 27-41, ill. **Graham-Smith, G. S.**—The alimentary canal of *Calliphora erythrocephala*. [116] 26: 176-248, ill. **Gresson, R. A. R.**—The cytology of the mid-gut and hepatic caeca of *Periplaneta orientalis*. [53] 77: 317-334, ill. **L'Heritier et Teissier.**—Recherches sur la concurrence Vitale. Etude de populations de *Drosophila*. [77] 118: 1396-1398. **Hingston, R. W. G.**—The meaning of animal coloration. ["Scientia"] 57: 130-138. **Hodge, C.**—Growth and nutrition of *Melanoplus differentialis* (Acrididae). I. [Physiol. Zool.] 6: 306-328. **Holway, R. T.**—Preliminary note on the structure of the pretarsus and its possible phylogenetic significance. [5] 42: 1-24, ill. **Ide, F. P.**—Post embryological development of Ephemeroptera (Mayflies). External characters only. [Can. Jour. Res.] 12: 433-478, ill. **Janisch, E.**—Ueber die vermehrung der bettwanze *Cimex lectularis* in verschiedenen temperaturen. [Zeit. f. Parasitenk.] 7: 408-439. **Kaestner, A.**—Die funktion der sogenannten sympathischen ganglien und die exkretion bei den Phalangiiden. [34] 109: 273-288, ill. **Komaroff & Alpatov.**—Contribution to the study of the variation of honey bees. [Russian, English summary.] [Rev. Zool. Russe] 12, 4: 87-95, ill. **Larsen, R. S.**—Der flug der insekten. [Norsk Ent. Tidsskrift] 3: 306-315, ill. **MacLeod, J.**—*Ixodes ricinus* in relation to its physical environment. [116] 27: 123-144. **Madwar, S.**—The biology and morphology of the immature stages of *Macrocera anglica*. [5] 42: 25-34, ill. **Mansour, K.**—On the so-called symbiotic relationship between coleopterous insects and intra cellular micro-organisms. [53] 77: 255-271, ill. **Manunta, C.**—Ricerche biochimiche su du lepidotteri la tignuola degli alveari "*Galleria mellonella*" e li bombice del gelso "*Bombyx mori*." [Mem. Sci. Fis. Ac. Naz. Lincei.]

(6) 6: 75-160. **Mellanby, K.**—A comparison of the physiology of the two sps. of bed-bug which attack man. [116] 27: 111-122. **Murray & Tiegs.**—The metamorphosis of *Calandra oryzae*. [53] 77: 405-495, ill. **Orosi-Pal, Z.**—Die altersimmunität der honigbiene gegen die milbe *Acarapis woodi*. [Zeit. f. Parasitenk.] 7: 401-407, ill. **Otter, G. W.**—On the early stages of *Lestodiplosis alvei* (Diptera) especially in relation to the larval head capsule. [116] 26: 582-593, ill. **Rodhain et Brutsaert.**—L'évolution des *Trypanosoma* . . . chez *Melophagus ovinus*. [77] 118: 1228-1231. **Tischler, N.**—Studies on how Derris kills insects. [12] 28: 215-220, ill. **Watson, J. R.**—Effect of a freeze on some Citrus insects. [39] 18: 54. **Whittington, F. B.**—The alimentary canal of *Harpalus pennsylvanicus* (Coleoptera). [43] 35: 131-135, ill. **Wigglesworth, V. B.**—The physiology of ecdysis in *Rhodnius prolixus* (Hemiptera). [53] 77: 191-222, ill. **Young, R. T.**—"Sleep" aggregation in the beetle, *Altica bimarginata*. [68] 81: 435-439.

ARACHNIDA AND MYRIOPODA.—**Beier, M.**—Four new tropical Pseudoscorpionidea. [75] 15: 484-489, ill. **Bishop & Crosby.**—American Erigoneae: the spider genera *Pelecopsidis* and *Floricomus*. [6] 43: 31-44, ill. (*). **Chamberlin, J. C.**—A n. sp. of false scorpion (*Hesperochernes*) from a bird's nest in Montana. (Chelonethida). [55] 11: 37-39, ill. **Jacot, A. P.**—The species of *Zetes* (Oribatoidea-Acarina) of the northeastern United States. [6] 43: 51-94, ill. (*). **Mello-Leitao.**—Dois novos generos de Gonylepididae. Dois generos equatro especies de Pachylinae. [An. Ac. Brasil. Sci.] 7: 1-3, 5-8, ill. **Ries, D. T.**—A new mite (*Neotetranychus buxi*) on boxwood. [12] 28: 55-62, ill. **Sharif, H.**—Historical review and relationship of the genera of the family Ixodidae. [116] 26: 49-56.

THE SMALLER ORDERS OF INSECTS.—**Banks, N.**—A few new North American Neuroptera. [5] 42: 53-57. **Brues, C. T.**—Varietal forms of *Peripatus* in Haiti. [5] 42: 58-62. (*). **Esben-Petersen, P.**—Neuropterous insects from Galapagos Isl. [Mag. Naturvid. Oslo] 74: 291-294. (*). **Geist, R. M.**—Notes on the infestation of wild birds by Mallophaga. [43] 35: 93-100. **Light, S. F.**—The Templeton Crocker Exped. of the Cal. Acad. of Sci. 1932. No. 20. The termites. (S*). [61] 21: 233-258, ill. **Linn, M. G.**—Contribucion al conocimiento de los piojos de los animales de Mexico. [112] 6: 53-62, ill. **Peters, H. S.**—A new chicken louse from the Canal Zone. (Mallophaga: Philopteridae.)

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No. 7

Habits of *Megathymus stephensi* Skin. and Notes on other *Megathymus* (Lepid.: Hesperidae).

By CURTIS BROWN and JAMES CREELMAN, San Diego, California.

In a recent Bulletin of the Southern California Academy of Sciences (May-August, 1934), John Adams Comstock and Commander Charles M. Dammers published a very excellent account of the life history of *Megathymus stephensi*. The present paper is intended to add a few facts about the habits of *stephensi* and to present a brief discussion of other *Megathymus* skippers.

As Comstock and Dammers have shown, *stephensi* larvae are agave (*Agave deserti*) feeders. *Stephensi*, like all other *Megathymis*, is an exceedingly fast flyer. This adds greatly to the difficulty of capture. Fortunately, *stephensi* has several unusual habits which makes it possible to obtain good specimens without the necessity of rearing them.

During the day time *stephensi* occasionally stops and rests upon its beloved agave. At this time it can be netted. However as soon as it is netted, the rapid motion of its wings causes the scales and body hairs to be rubbed off. Exceedingly poor specimens result. The junior author caught 74 specimens in this way (Box Canyon, Sept. 28 and 29, 1933). Out of the lot only one or two were in fair condition.

A peculiar and unusual habit of the male of this skipper is that it drinks water at a definite time of the day. About sundown it travels to the nearest water and drinks from the moist sand. Just as the shadows cover the water, the skipper flies back to the hills to its roosting place. On Sept. 29, 1934, the authors spent a day at San Felipe Creek. During the day only one *stephensi* appeared for water. Just before sundown they began to come to the water by the hundreds. They were lighting on our pants, nets and jars. They were tame and bold. The mad scramble for water lasted about 45 minutes. They disappeared even quicker than they came. I paused for a few

moments to empty my jar; and when I looked for more, they were gone. Not a single *stephensi* was in sight where just a few moments before there were hundreds. It was a butterfly collector's dream—a rare butterfly just waiting to be caught!

Where did they go after they left the water? Did they roost in the nearby trees or did they go back and sleep on the agave? No *stephensi* were located on the bushes (cats-claw, bean mesquite, etc.) that were next to the creek. They must have gone back to the hills among the agave. Two hours of night searching at Box Canyon (about three to four miles from the water) disclosed that *stephensi* was not to be found on agave. They could not disappear; they had to be somewhere—but where? Accidentally it was solved. In going back to the car, the shortest, easiest way led along the bottom of the dry wash in Box Canyon. Just after reaching the bottom of the canyon the junior author found one perched on the limb of a bean mesquite. The specimen was sound asleep and never moved. This was an ideal way of collecting them; they did not move or flutter while being killed.

Later exploring showed: (1) *Stephensi* sleeps on the common bushes of the region and very occasionally on buckwheat, etc.; (2) it very much prefers a bush at the bottom of a canyon to one on the side of a hill; (3) it does not sleep on agave, its food plant; (4) it always sleeps on the outside of the bush; (5) it may be on any side or any height on the bush. So far no females have been taken in this way.

At Box Canyon (Sept. 29, 1934) two hours of night work yielded us about 20 perfect specimens. Either Box Canyon itself or any of the side canyons leading into it contained specimens. Admittedly it was hard work. However, it is the only way in which good specimens can be caught. At the water we were able to catch them direct into a cyanide jar. However, the fluttering of their wings caused a little damage to their delicate wing scales.

At sundown a week later (Oct. 6, 1934) *stephensi* were not nearly as abundant at San Felipe Creek as they were the previous week. Two weeks later only one specimen showed up for water. Each time when checking at Box Canyon it was found that *stephensi* was just as abundant as ever. The authors have

come to the conclusion that male *stephensi* only goes for water very shortly after it emerges.

As yet no method of obtaining perfect females (outside of raising them) has been found by the authors. In the day time the females fly close to the ground and flutter around the agave. Whenever they are sighted they are easier to capture than the males. However, the net causes damage to their wings. The authors believe that perfect females can be obtained by a careful search at night time.

A reared specimen is always more perfect than one caught. Comstock, Danmers, the authors and others have succeeded in breeding and raising this species. The specimens caught at night time compare fairly closely in perfection with those raised.

Apparently others when collecting *Mcgathymis* specimens have had similar troubles in obtaining good specimens. Mr. Bell, of Flushing, New York, kindly informed me that Jacob Doll, who collected the type of *Mcg. neumogeni*, also found difficulty in obtaining good specimens. He likewise collected his specimens direct into a cyanide jar.

Mr. Leussler, in describing the difficulty of capturing *M. leussleri*, states, "*M. leussleri* is a powerful flier, particularly the males, and when alarmed by the approach of a collector, makes a bee line for the next county with the speed of an express train. They are so active that after a few days on the wing they are wrecks with torn wings, fringes gone, and scales more or less rubbed off. The thing to do is to be on the ground when they first make their appearance; and that is hard to do because the season is earlier in some years than in others."

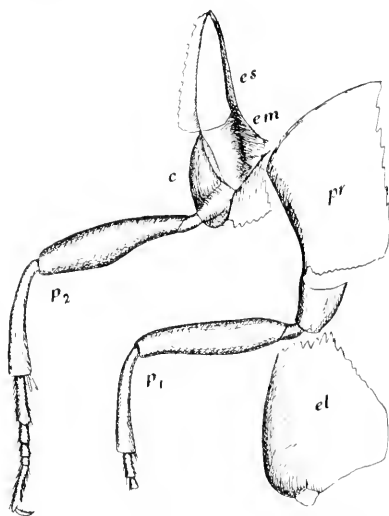
Fortunately Comstock and Danmers have now worked out the life history of *Mcg. yucca navajo* (Bull. Southern Calif. Academy of Sciences, May-Aug., 1934). It is now possible to rear this species which was previously very difficult to obtain. The authors have collected several *navajo* larvae on *Yucca mohavensis* Sarg. shoots located in San Felipe Valley (San Diego County). We hope to be on the ground at the time they are supposed to emerge (March) and determine whether they also go for water at dusk. Since *navajo* only attacks yucca shoots, it will never be found in great numbers at any one locality.

The Type Specimen of *Rhipiphorus stylopidus* (Coleop.: Rhipiphoridae).

By E. RIVNAY, Ph.D., Rehoboth, Palestine.

In the several collections of Rhipiphorids which I examined during my revision of this family for North and Central America,* various species were labeled "stylopidus" and from the short original description it was hard to identify the real species. Therefore, I postponed its re-description until after I had examined the type specimen. At that time I was uncertain as to where the type was and whether it still existed—hence the statement "Type unknown." Recently, while traveling through some parts of Europe, I searched for it and found its remains in the British Museum. I thought it worth while to draw whatever organs there existed and reproduce them in a journal which is more available to the American student, who is no doubt more interested in this species than are others.

The following is the original description by Newman in the *Entomological Magazine* V, p. 376:



Explanation of Text Figure. *Rhipiphorus stylopidus*, Newman, c = coxa; el = elytron; em = epimeron; es = episternum; p₁ = anterior right leg; p₂ = middle right leg; pr = pronotum.

* Mem. 6. Am. Ent. Soc., 1929.

"*Myodites stylopides*—Nigra, scabra, parce pilosa; os ferrugineum; elytrorum spices albidi; metaloe hyalinae iridescentes; costa fusca.

"Corp. .125 unc.; lat. .05 unc.

"Inhabits North America; Mr. Doubleday took a single specimen at Alton." (No doubt Alton, Illinois.)

Rhipiphorus walshi Lec. fits in very well with this description and I hoped the type specimen of *Rh. stylopides* would reveal some characteristics by which the two would be distinguished from one another or else made synonyms of each other. It is most regrettable, however, that those organs bearing the identification characters such as the head, antennae, hind legs, wings, etc., are missing. Of the entire specimen only the following organs are left: right foreleg (last three tarsal segments missing); right half of the pronotum; right middle leg attached to epimeron and episternum of the mesothorax; and right elytron with apex broken off. The color of these is dark brown; there is no locality label.

It is difficult to establish an identity of a species belonging to the genus *Rhipiphorus* on these organs alone. However, it is certain from both the original description and from the remains of the type specimen that *Rh. stylopides* Newman is very closely allied to *Rh. walshi* Lec., if not identical with it.

Cecropia Feeding on a Peony (Lepid.: Saturniidae).

In August, 1928, I noticed that one of my Chinese peonies (*P. albiflora* var.) was almost defoliated, and on investigating found a large *Cecropia* larva on it. About a week later the larva disappeared, and though there was an apple tree quite near and a lilac hedge still nearer, I could not find the cocoon on either of them, and it was certainly not on the stems of the peony plant. I do not know whether a record of this species feeding on one of the Ranunculaceae is new, but it seemed interesting in view of the notorious fastidiousness of caterpillars in their choice of food plants that this one should depart from the tradition of his race.

I have been on the watch ever since that time for a reappearance of a *Cecropia* on my peonies, but have never found another.

A. P. SAUNDERS, Hamilton College, Clinton, N. Y.

A New Genus and Five New Species of Leafhoppers Related to *Thamnotettix* (Homop.: Cicadellidae).

By DWIGHT M. DELONG, Ohio State University, Columbus, Ohio.

Since 1903 several species of leafhoppers (Homoptera, Cicadellidae) which live upon cane (*Arundinaria tecta*) have been described as belonging to the genus *Thamnotettix*. As these are very similar in their generic characters but differ decidedly from the members of the genus *Thamnotettix*, a new genus is erected at this time to include six species previously described and five species which have not previously been described or named.

Genus **ARUNDANUS** nov.

Vertex produced and bluntly angled, flat, margin rather thick but distinct, not rounding to front. Venation strong, central anteapical cell greatly elongated constricted and divided by a cross vein at center. Outer anteapical cell usually elongated but narrow. Inner anteapical cell short and rather broad. Type of genus *arundineus* DeLong.

The first of this group of species was described in 1903 by Dr. Ball as *Thamnotettix shermani* (1) and was collected in North Carolina. In 1915 Crumb described *nacrcosus* (2) from Tennessee and placed it in *Chlorotettix*. The other four species which have previously been named were described by the author. *Flavotinctus* and *crumbi* (3) were described in 1916 and placed in *Thamnotettix*; *proprius* was described as a member of *Thamnotettix* in 1918 (4) and *arundineus* (5) as belonging to the same genus in 1926. All four of these were described from material collected in Tennessee. Five undescribed forms are treated in the following pages.

On the basis of form and structure the members of this genus seem to be divided into small groups of closely related species. The largest of these comprises *crumbi*, *flavotinctus*, *arundineus* and *proprius*. Two closely related species of another type, *carolinus* and *latidens*, seem to be most closely related to this group. *Shermani* and *marginellus* form another group differing considerably from the previous forms in having a much blunter and broader head. *Rubralineus* seems to fit most closely with this later type. *Nacrcosus* which has a sexually dimorphic color condition (white female, and orange male)

is most closely related to *carolinus* and *latidens* but is rather distinct while *parvulus* a very small pointed headed species, probably is most closely related to the *carolinus* type.

Arundanus marginellus n. sp.

In form and appearance resembling *shermani* but with distinct genitalia. Length 5-5.5 mm.

Vertex flat a little more than half as long at middle as width between eyes, bluntly angled.

Color: Tawny to gray, tinged with orange, a brownish waved line just above margin and a fainter one just below; margin between these two lines conspicuously white. Face dark tawny. Pronotum marked with four conspicuous longitudinal orange stripes. Elytra tawny to brownish with pale veins.

Genitalia: Female last ventral segment long with prominent lateral angles, posterior margin indented either side of a broad median rounded tooth which is produced as far as the lateral angles and is bifid at apex. Male valve broad, obtusely angled. Plates long gradually tapering to narrow acute tips.

Described from a large series of male and female specimens collected from cane *Arundinaria tecta* at Covington, Clarksville and Nashville, TENNESSEE, during June, July and August, 1915 and 1917. *Holotype* female, *allotype* male and male and female *paratypes* in author's collection.

Arundanus rubralineus n. sp.

Resembling *shermani* and *marginellus* more than the others in the group but differing in color and genitalia. Length 5 mm.

Vertex a little broader than long, bluntly and broadly angled.

Color: Vertex creamy white without black marginal lines on margin. Two broad bright orange red stripes arise either side of vertex and extend across pronotum and basal angles of scutellum, and a short pair behind eyes on either side crossing pronotum. Elytra bright tawny, veins conspicuously white, apices smoky, veins bordered with fuscous.

Genitalia: Female last ventral segment with prominent lateral angles between which the posterior margin is sinuately, shallowly, concavely rounded at the center of which is a deep, narrow incision extending two-thirds the distance to the base.

Described from a single female specimen collected at Florence, SOUTH CAROLINA, June 19, 1930, by O. L. Cartwright. *Holotype* female in author's collection.

Arundanus carolinus n. sp.

In coloration and appearance most closely resembling *flavotinctus* but smaller, more distinctly marked and with distinct genitalia. Length 5 mm.

Vertex bluntly angled, about one-fifth wider between eyes than length at middle, pronotum a little longer than vertex.

Color orange yellow, vertex with a heavy wavy line just below and a paler wavy line just above margin. Veins pale, not conspicuous.

Genitalia: Female last ventral segment with broadly rounded lateral angles, posterior margin broadly shallowly concavely rounded. Male valve bluntly triangular; plates long and narrow, gradually tapered to long acute apical portions which are exceeded by the pygofers.

Described from a series of five female and two male specimens collected by the author at Chadburn, NORTH CAROLINA, June 26, 1928. *Holotype* female, *allotype* male and male and female *paratypes* in author's collection.

Arundanus latidens n. sp.

In coloration and general appearance resembling *carolinus* but with distinct female genitalia. Length 5 mm.

Vertex as in *carolinus*, bluntly angled and a little wider between eyes than length at middle.

Color orange yellow, a black line just above and a wavy black line below margin of vertex.

Genitalia: Female last ventral segment with prominent lateral angles, posterior margin concavely, broadly rounded. What appears to be a preceding segment arises at about half the length of the last ventral segment and is strongly produced to form a broad rounded median tooth one-third the width of the segment, which is produced beyond the lateral angles of the last ventral segment and covering its concavity. Male valve obtusely angled, plates long and narrow, gradually tapered to long acutely pointed apices.

Described from a series of eight female and four male specimens collected by the author at Chadburn and Carolina Beach, NORTH CAROLINA, June 22 and 24, 1928. *Holotype* female, *allotype* male and male and female *paratypes* in author's collection.

Arundanus parvulus n. sp.

Resembling *carolinus* in general appearance but smaller with more pointed vertex and with distinct genitalia. Length 4.2 mm.

Vertex more sharply angled than in *carolinus* almost as long on middle as width between the eyes, almost as long as pronotum.

Color: Yellow tinged with orange, a brownish wavy line just below margin of vertex and a broken line, usually composed of four rather prominent linear spots just above margin.

Veins of elytra usually paler, faintly margined with fuscous.

Genitalia: Female last ventral segment with prominent rounded lateral angles, posterior margin concavely rounded. What appears to be a preceding segment arises near the base of the last ventral segment and is produced over it, being convexly rounded so that the central half extends over the concavity of the last ventral segment. The apex of this convex portion is broad and truncate or sinuate, sometimes appearing as three indistinct lobes.

Described from a series of sixteen female specimens, one collected at Florence, SOUTH CAROLINA, June 29, 1930, by O. L. Carwright and the others collected at Carolina Beach, NORTH CAROLINA, June 24, 1928, by the author from *Arundinaria tecta*. *Holotype* female and female *paratypes* in author's collection.

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2. CRUMB, S. E. Anns. Ent. Soc. Amer. 8: 196, 1915.
3. DELONG, D. M. Tenn. St. Bd. Ent. Bul. 17: 82, 1916.
4. DELONG, D. M. Ohio Jour. Sci. 13: 338, 1918.
5. DELONG, D. M. Trans. Amer. Ent. Soc. 52: 91, 1926.

A new record for *Archilestes grandis* (Odonata: Agrionidae sensu Selys).

Specimens of *Archilestes grandis* were collected by the writer along Long Run, a small spring-fed stream which empties into the Youghiogheny River between the towns of McKeesport and Versailles, Pennsylvania. A total of twenty-four pairs was taken on the 7, 15, 22, and 23 of September, 1934. In the majority of cases the pairs were easily netted in tandem while ovipositing in the live stems of elderberry (*Sambucus canadensis*) and willow (*Salix* sp.) which overhung the stream. The insects were numerous during the warm hours of mid-day, but disappeared early in the afternoon; the males were more numerous than the females.

This Southwestern genus has already been recorded from at least three states which are without the normal range, besides this Pennsylvania record: C. H. Kennedy informed me that *grandis* was taken at Manhattan, Kansas, by Roger C. Smith in 1920; E. B. Williamson collected it at Oxford, Ohio, in 1927; H. Garman captured twenty-eight specimens near Lexington, Kentucky, in 1929.

The insects collected for this record were identified by both Curator Kahl of the Carnegie Museum of Pittsburgh, Pennsylvania, and Dr. C. H. Kennedy of the Ohio State University of Columbus, Ohio.—CARSTEN AHRENS, McKeesport High School, McKeesport, Pennsylvania.

Notes on the Group Gomphoceri and a Key to its Genera, including one New Genus (Orthoptera, Acrididae, Acridinae).

By MORGAN HEBARD, Philadelphia, Penna.

Knowing that several Old World species which had long been placed in *Gomphocerus* have in recent years been generically separated, we have felt for some time that the relationships of the New World *Gomphocerus clavatus* Thomas should be investigated. With material of the genotypic species of all the genera concerned except *Dasyhippus*, we are now able to state that it belongs to a new genus, nearest the Old World *Aeropus*.

Examination of the only other New World species which has been referred to that genus, shows that the absence of antennae in the unique type misled its author and that it must be recognized as *Scyllinops meridionalis* (Bruner).¹ That genus, described by Rehn in 1927, has nothing to do with the present group but belongs to the Group Scyllinae.

The first species of the Gomphoceri was described in 1758 and the first genus, *Gomphocerus*, in 1815. Additional genera were proposed by Bolivar in a very brief key,² those later described³ or resurrected⁴ by Uvarov having been much more satisfactorily treated.

The Gomphoceri are distinguished by the following characters. Lateral foveolae of vertex elongate, visible from above. Face in profile moderately convex, weakly to more strongly retreating, never vertical. Antennae clubbed distad. Pronotal disk with lateral carinae distinct, percurrent or incomplete, more separated caudad than cephalad; its caudal margin obtuse-angulate produced or truncate. Internal spurs of caudal tibiae not or only moderately unequal in length.

The following key separates the genera which are members of this group.⁵

1. Lateral foveolae of vertex strongly impressed. Pronotal disk with lateral carinae moderately to strongly constricted; its caudal margin weakly to moderately obtuse-angulate produced.

¹This female, from Cuernavaca, Morelos, Mexico, taken January 4, 1899, by C. C. Deam, is in the author's collection.

²Trab. Mus. Nac. Cienc. Nat., Ser. Zool., No. 20, p. 61, (1914).

³*Dasyhippus*. Eos, VI, p. 357, (1930).

⁴*Aeropus*. Eos, VII, p. 85, (1931).

Organs of flight fully developed to decidedly reduced but overlapping and with dorsal and lateral fields defined. 2.

Lateral foveolae of vertex very weakly defined. Pronotal disk with lateral carinae straight or showing very weak arcuate convergence. Organs of flight represented by ovate pads (attendant in males, separated in females; their costal margin slightly more strongly convex mesad than elsewhere, their venation forming a quite evenly spaced network. All pronotal carinae coarse, the medio-longitudinal cut caudad of a median point by the weak principal sulcus.⁵ *Gomphoceridius* Bolivar, 1914. (Genotype, by original designation, *Acridium brevipenne* Brisout, 1848.)

2. Tegmina with costal margin straight; of males showing no fenestration. Size very small. (Organs of flight slightly reduced [usual] to fully caudate. Pronotal carinae fine, the lateral strongly constricted on prozona and often obsolete at point of nearest approach, the medio-longitudinal cut by the principal sulcus slightly cephalad of a median point.)⁶ *Myrmeleotettix* Bolivar, 1914.

(Genotype, by monotypy, *Gomphocerus maculatus* Thunberg, 1815.)

Tegmina with costal margin moderately to decidedly lobate just beyond base; of males beyond showing fenestration between mediastine (which is there marginal) and humeral veins. Size larger. 3.

3. Tegmina with costal margin moderately lobate just beyond base; of males showing weak (narrow) fenestration beyond. (Neither pronotum nor cephalic tibiae ever inflated.) 4.

Tegmina with costal margin strongly lobate just beyond base; of males showing strong fenestration beyond. (Prosterum with tubercle varying from prominent to obsolete.) 5.

4. Cephalic tibiae of male normal. Prosternum not tuberculate. (Pronotal lateral carinae moderately constricted, the medio-longitudinal carina cut by the principal sulcus at or near [rarely well caudad of] a median point. Surface, particularly

⁵ The antennae are very short, scarcely longer than the combined length of the head and pronotum in males, shorter in females, but in at least one species of the group we know the antennae to vary from elongate in material from temperate areas to very short in material from boreal areas. Added difficulty in properly distinguishing genera based on brachypterous species lies in the fact that reduction in the organs of flight is usually accompanied by reduction in the degree of production of the pronotal disk even in individuals of the same species.

⁶ The ovipositor in this genus, as in *Doclostaurus*, is normally carried retracted to the point that only the apices of the dorsal valves are visible. Though used by Bolivar, we do not think it should be given as diagnostic, as the individual is able to protrude the ovipositor and many dried specimens before us, particularly those which have been stuffed, have the ovipositor projecting quite as much as in those of the related genera.

ventrad, more than normally hirsute.) *Gomphocerus* Thunberg, 1815.

(Genotype, indicated by Samouelle, 1819, confirmed by Kirby 1910, *Gryllus Locusta rufus* Linnaeus, 1758.)

Cephalic tibiae of male very slightly incrassate, with long dense hairs on the ventral surface. Prosternum tuberculate (Pronotal lateral carinae moderately constricted, the medio-longitudinal carina cut by the principal sulcus well caudad of a median point.) *Dasyhippus* Uvarov, 1930.

(Genotype, by original designation, *Gomphocerus escalerae* Bolivar, 1899.)

5. Fenestration of male tegmina between mediastine (marginal) and humeral veins very strong, that space much wider than that between any others of the longitudinal veins. Cephalic tibiae of male usually normal, locally faintly to strongly inflated. Prozona of male not to distinctly inflated. (Tegmina [normally] slightly reduced to caudate in males, [normally] decidedly more reduced in females except in *variegatus arcticus*.) *Acropedellus*, new genus. (Genotype, *Acropedellus clavatus* (Thomas), originally referred to *Gomphocerus*.)

Fenestration of male tegmina between mediastine (marginal) and humeral veins very strong but no wider than and in most of the forms much narrower than the conspicuously defined and fenestrate intercalated area (which lacks an intercalated vein and is crossed by numerous regular and evenly spaced cross-veinlets). Cephalic tibiae of male very strongly to strongly inflated, pear-shaped. Prozona of male very strongly to decidedly inflated. (Tegmina [normally] slightly reduced to caudate in males and showing very slightly greater reduction in females.) *Acropus* Gistel, 1848.

(Genotype, by monotypy, *Gryllus Locusta sibiricus* Linnaeus, 1767.)

The group divides naturally into three sections. The first of these includes *Myrmecotettix*; the second *Gomphocerus* and *Dasyhippus* (which without material appears to us to be very closely related); the third (probably) *Gomphoceridius*, (possibly) *Eclipophleps*, *Acropedellus* and *Acropus*.

Of these latter *Gomphoceridius* is known to include a single brachypterous species which is consequently more difficult to associate, as the form and venation of the tegmina are very important in distinguishing the genera of the group.

The position of *Eclipophleps* Tarbinsky 1927⁷ is so uncertain that without material we have considered it best to omit the genus from the above key. The unique female type of *E. bogdanovi* Tarbinsky 1927, from Kobdo, northwestern Mongolia, has the head short and inflated, the eyes very broad, the

pronotum broad with rather strongly convergent lateral carinae, the tegmina represented by pads with rounded apex dorsal, the cephalic limbs thick and short. It is unfortunate that the male is unknown. Nearest this genus may be *Acropedellus*.

Comparison of the new genus *Acropedellus* with *Acropus* shows the latter to represent only a decidedly more specialized development of the same branch, the very unusual features so highly developed in the male sex giving a very different facies, but these same features developed much more weakly locally in males of the species of the former. The very conspicuously fenestrate intercalated area of the male tegmina is, however, a striking feature peculiar to *Acropus*.

To *Gomphoceridius* has been referred only *Acridium brevipenne* Brisout, 1848.

To *Myrmecotettix* was referred *Gomphocerus maculatus* Thunberg, 1815, by Bolivar in 1914; *Chorthippus antennatus* Fieber, 1853, by Tarbinsky in 1925;⁸ *Gomphocerus pallidus* Brunner, 1882, and *Gomphocerus palpalis* Zubovsky, 1900, by Uvarov, Bei-Bienko and Tarbinsky in 1925.

In *Gomphocerus* remain *Gryllus Locusta rufus* Linnaeus, 1758, and *Gomphocerus dispar* Fischer, 1846.

To *Dasyhippus* Uvarov originally (1930) referred *Gomphocerus escalerae* Bolivar, 1899, *Gomphocerus przewalskii* Zubovsky, 1896, *Chorthippus kozhevnikovi* Turbinsky, 1925 and *Chorthippus volgensis* Predtechensky (Zool. Record 1928) and in 1931 Bei-Bienko described *Dasyhippus pygmaeus* and referred to this genus *Chorthippus kozhevnikovi arcnosus* Bei-Bienko, 1930.

To *Acropedellus* we assign *clavatus* (Thomas), 1873 (Synonyms of which are *Gomphocerus carpenterii* Thomas, 1874, and *Gomphocerus clepsydra* Scudder, 1875), *variegatus variegatus* (Fischer), 1846 (synonyms of which are *Gomphocerus reuteri* Miram, 1907 (here assigned) and *Gomphocerus similimus* Ikonnikov, 1911) and *variegatus arcticus* here described.⁹

Uvarov assigned to *Acropus* in 1931 *kudia* (Caudell), 1927, *sibiricus sibiricus* (Linnaeus), 1767, and *sibiricus caucasicus*

⁷ Ann. Mag. Nat. Hist., XX, p. 495, figs. A to C.

⁸ If a member of this genus, a decidedly aberrant one in the more graceful form, very strongly knobbed antennae in males, less convergent pronotal lateral carinae, caudate organs of flight and decidedly more hirsute surface.

⁹ The species *variegatus* and *clavatus* may eventually prove to be Old and New World races of a single holarctic species. The condition with inflated male cephalic tibiae has been named *reuteri* for the former and *carpenterii* for the latter. Appearing locally and not occurring over extensive areas inhabited by these insects, this condition, the cause of which is unknown, we believe is a physiological peculiarity which should not be given nominal recognition.

(Motschulsky), 1840, and described *sibiricus graecus*, *sibiricus hispanicus*, *sibiricus pyrenaeus*, *sibiricus helveticus* and *armenicus*.

The species *Gomphocerus (Stenobothrus) evanescens* Stål, 1860, described from Hong Kong, and *Gomphocerus semicolor* Burmeister, 1838, from Altona, Brazil, are almost certainly not members of the Group Gomphoceri.

(To be continued)

Additional Trypoxylon Names in "Jungle Bees and Wasps of Barro Colorado Island" (Hymen.: Sphecidae).

Significant changes and revisions have lately been made in the genus *Trypoxylon* which will make necessary certain changes of specific names in Chapter V of my "Jungle Bees and Wasps of Barro Colorado Island." Through the work of Richards,* three new species, *Trypoxylon busckii*, *T. atkinsoni* and *T. vagulum*, are added to the list of wasp fauna of the Island.

I sincerely thank Miss Grace Sandhouse for checking and rechecking the *Trypoxylon* material and supplying me with information necessary to make the following additions and corrections.

Pages 151-155. The wasp whose life history is given under the name *Trypoxylon rugifrons*, has been re-identified as *T. fabricator* Sm. [Sandhouse].

Page 156. The name *T. nivcitarse* should be changed to *T. atkinsoni* Richards. The name of *T. cinereum* should be changed to *T. fusipenne* Fab. [Sandhouse], but to make the list complete a paragraph should also be added to the chapter stating that two specimens of *T. cinereum* were taken on the Island in August.

Page 157. The name *T. leucotrichum* Rohwer, is according to Richards, a synonym of *T. palliditarse* Saussure.

Page 158. The *Trypoxylon* wasp referred to under number 7829 is now known as *T. busckii* Richards and No. 7373 is a female of the same species. The wasp referred to as No. 7637 is now known as *T. cornigerum* Cameron [Sandhouse].

Page. 169. The wasp *T.* sp. near *astecum* proved to be new to science and is now known as *T. vagulum* Richards.

PHIL RAU, Kirkwood, Missouri.

* The American species of the genus *Trypoxylon*, Trans. Ent. Soc., London 82: 172-362, 1934.

New Coleoptera (Cebrionidae, Buprestidae and Cerambycidae).

By JOSEF N. KNULL, Ohio State University, Columbus, Ohio.

Cebrion convexifrons n. sp. (Cebrionidae).

Dark, brown, resembling *C. mandibularis* Lec. in form, only shorter, moderately pubescent.

Head with front convex, densely punctured, punctures large but not deep; labrum emarginate; mandibles prominent, when closed they leave an open space between them; antennae extending two joints beyond base of pronotum when laid alongside margin, scape stout, second joint about as long as broad, third joint slightly more than half the length of fourth, joints four to ten inclusive gradually decreasing in length, last joint constricted, considerably longer than teeth, joints three to eleven serrate.

Pronotum slightly wider than long, convex; sides broadly rounded in front, then parallel and divergent at base; disk convex, a depression on each side near front margin, lateral margin evident on basal third; surface densely punctured. Scutellum small.

Elytra wider than pronotum, about two and one-half times as long as broad; sides parallel, constricted in middle, apices acutely rounded; surface rugose, with striae rather feebly impressed, punctures of striae and intervals difficult to distinguish.

Abdomen densely punctured, last ventral broadly rounded. Intercostal process of prosternum very narrow.

Length 13 mm.; width 4 mm.

Male *type* labeled Cleo Springs, OKLAHOMA, July 7, 1934, J. Stankavich, collector, in collection of the writer. *Paratypes* of the same locality, also Cherokee, July 3, and Vinson, Oklahoma, July 7, 1934, J. Stankavitch, collector. These are distributed in the collections of Oklahoma Agricultural and Mechanical College, Ohio State University, Prof. H. C. Fall, and the writer.

This species runs close to *C. separatus* Fall. Prof. Fall kindly compared this species with his type and states that it differs by the strongly roughened and dull surface of the elytra. In *C. separatus* Fall the elytra intervals are thickly punctate, but the punctures are simple and the surface not rugose. The punctuation of both head and thorax is much finer and closer. The front is not so strongly inflexed over the clypeus as it is in *C. convexifrons* Knull.

Agrilus parkeri n. sp. (Buprestidae).

Form robust, cupreous above and beneath, front viridescent.

Head convex, slight indication of a median depression on

vertex; surface finely granulose becoming strigate on vertex; front densely pubescent; antennae short, reaching to about middle of pronotum when laid along lateral margin, serrate from the fifth joint.

Pronotum wider than long, widest in middle, slightly wider at base than at apex; sides arcuately rounded in front, sinuate at base, when viewed from the side, marginal and submarginal carinae joined near base, disk flat in middle, a lateral depression on each side, prehumeral carinae strongly elevated; surface coarsely transversely rugose. Scutellum transversely carinate.

Elytra wider than pronotum at base; sides constricted near middle, expanded posteriorly, tips separately rounded, finely serrulate, disk with sutural margins strongly elevated posteriorly; surface imbricately punctate, recumbent pubescence short, forming an indistinct spot on basal and apical third of each elytron.

Abdomen beneath finely punctate, clothed with moderately long pubescence; first segment slightly concave, granulose, second segment somewhat flattened, a line of longer pubescence extending from prosternum to middle of second abdominal segment. Prosternal lobe broadly rounded. Hind coxae with posterior margin distinctly sinuate and with the outer posterior angle more or less acute and somewhat prolonged. Anterior and middle tibiae mucronate on inner margin at apex. Tarsal claws somewhat similar on all feet, cleft, the outer tooth long, the inner one broad and much shorter, not turned inward.

The female allotype differs from the male in having the front of the head cupreous, anterior and middle tibiae unarmed at apex, median line of long pubescence on ventral surface lacking, first two ventrals not modified.

Length 6.3 mm.; width 1.8 mm.

Described from several specimens labeled Chiricahua Mountains, ARIZONA, July 23, 1933, F. H. Parker collector. Male *holotype* in writer's collection, *paratype* in collection of Mr. Parker.

According to Fisher's¹ key this species would run to *A. imbellis* Cr. However, the flattened pronotum will separate these two species. The male genitalia somewhat resemble those figured by Fisher for *A. fallax* Say.

***Agrilus neabditus* n. sp. (Buprestidae).**

Form robust, cupreous above and beneath.

Head convex, median depression extending from epistoma to vertex; surface strigate, lower portion of front clothed with recumbent white pubescence; antennae short, reaching to about

¹W. S. Fisher, U. S. National Museum Bull. 145, pp. 1-347, 1928.

middle of pronotum when laid along lateral margin, serrate from the fifth joint.

Pronotum convex, longer than wide, widest in front of middle; sides broadly arcuate in front, sinuate near base; when viewed from the side the marginal and submarginal carinae joined near basal fourth; disk convex, a lateral depression on each side, prehumeral carinae moderately elevated; surface coarsely transversely strigate. Scutellum transversely carinate.

Elytra wider than base of pronotum; sides constricted near middle, broadly expanded back of middle, tips separately rounded, serrulate; disk with sutural margins strongly elevated posteriorly; surface imbricately punctate, clothed with short, recumbent pubescence.

Abdomen beneath finely punctate, clothed with short pubescence, first and second segments slightly flattened; a median line of longer pubescence from prosternum to second abdominal segment. Hind coxa with posterior margin arcuately emarginate, outer posterior angle somewhat acute and prolonged. Prosternal lobe broadly rounded. Anterior and middle tibiae mucronate on inner margins at apex. Tarsal claws somewhat similar on all feet, cleft, the outer tooth slightly longer than the inner one; points not turned inward.

The female differs from the male by having the first two abdominals normal, by lacking the median ventral line of longer pubescence and by having the anterior and median tibiae unarmed at apex.

Length 5.7 mm.; width 1.5 mm.

Described from several specimens labeled Base of Pinal Mountains, ARIZONA, July 4, D. K. Duncan, collector. Male *holotype* in writer's collection, *paratype* in collection of Mr. D. K. Duncan.

According to Fisher's¹ key, this species would run to *A. abditus* Horn. However, the genitalia, which somewhat resemble those of *A. egcniformis* Champ. & Knull in outline, will at once separate the two species.

Leptura splendens n. sp. (Cerambycidae).

Resembling *Leptura gigas* Lec. in size and color; piccous, elytra velvety Indian red.

Head densely finely punctured; antennae short, five joints extending beyond base of elytra when they are laid back over dorsal surface, scape stout, second joint wider than long, third joint longer than fourth, fifth joint longer than fourth, joints five to ten inclusive gradually decreasing in length, eleventh joint constricted, slightly longer than tenth, joints five to ten inclusive serrate; surface of antennae clothed with semi-erect

piceous pubescence which is longer and stouter on the first four joints.

Pronotum widest at base, considerably constricted at apex; sides rounded anteriorly to middle, then subparallel to hind angles which are acute; disk with a transverse depression at base and apex, two slight lateral depressions on each side of raised median line; surface densely finely punctured, clothed with piceous pubescence. Scutellum triangular, central part same color as elytra, edges piceous.

Elytra about two and one-half times as long as wide; sides subparallel, broadly rounded posteriorly, apices emarginately truncate; disk convex, each elytron bearing five indistinct costae; surface densely finely punctured, each puncture bearing a semi-erect hair the same color as background.

Ventral surface closely punctured, last dorsal broadly rounded, carinate, last ventral truncate.

Length 22 mm.; width 9 mm.

Type a female labeled Globe, ARIZONA, D. K. Duncan, collector, in writer's collection.

This species resembles *Leptura gigas* Lec. to some extent and should be placed next to it according to the key erected by Swaine and Hopping.² However it differs from this species by being less cuneiform; the elytra are more shining, lacking the strongly emarginate apices. The antennae are much shorter and the joints are proportionately shorter. The last dorsal segment lacks the emargination present in the females of *L. gigas* Lec. at hand.

Euderces balli n. sp. (Cerambycidae).

Form, size and color of *Euderces pini* Oliv.; two transverse ivory fasciae in the middle of each elytron. Brunneous, eyes, apical half of elytra and abdomen piceous, posterior legs darkened.

Head rugose; eyes divided, upper lobe much smaller than lower one; antennae reaching the apical fourth of elytra when laid over the dorsal surface, scape stout, second joint slightly longer than wide, third joint nearly as long as fourth and fifth joints united, fourth joint shorter than fifth, joints five to ten inclusive gradually decreasing in length, eleventh joint slightly longer than tenth, inner apical angles of joints three, four and five containing small spines, spines decreasing in length in the order mentioned; head and antennae containing long flying hairs.

²J. M. Swaine and Ralph Hopping. Bull. 52, Biological Series, No. 14, National Museum Canada, pp. 1-97, 1928.

Pronotum longer than wide, widest in middle, base constricted more than apex; sides broadly arcuate; disk convex; surface strigate, becoming rugose in center toward base, striae absent along sides and replaced by asperities, smooth area bordering anterior margin, line of dense white semi-erect pubescence bordering the basal margin, long flying hairs covering the entire surface. Scutellum triangular, clothed with dense white pubescence.

Elytra about four times as long as broad, sides parallel on basal half, expanded and broadly rounded posteriorly, apices truncate, bispinose; disk convex, each elytron containing a tuberculiform elevation near suture at base and two transverse sinuate parallel raised white lines, one at middle and the other just in front, white lines not extending to suture or side margins; surface densely coarsely punctured on basal two-thirds, apical third somewhat smoother, a line of short white pubescence on apical third of each elytron extending diagonally from suture to side margin, long flying hairs numerous.

Abdomen moderately punctured, a line of dense white pubescence on each side of first abdominal segment. Femora clavate, legs with scattered flying hairs.

Length 5.8 mm.; width 1.8 mm.

Described from a specimen labeled Baboquivora Mountains, ARIZONA, July 26, E. D. Ball collector. *Holotype* in the collection of the writer.

Some Biological Notes on *Sarcophaga bullata* Park. (Diptera: Sarcophagidae).

By S. GRAENICHER, South Miami, Florida.

In a previous paper the present writer¹ pointed to *Sarcophaga bullata* Park. as the most common and most important scavenger among the Sarcophaginae of the Miami region. It had appeared in breedings from 28 dead animals and human excrement oftener than the remaining 10 species of Sarcophaginae dealt with in that paper taken together. Since that time the following six species: *S. bishoppi* Aldr., *deceptiva* Aldr., *assidua* Wlk., *quadrisctosa* Coq., *johnsoni* Aldr., *hillifera* Aldr. have been added to the Miami list, none of which had figured in the experiments referred to above.

Competition. A considerable number of insects depend on decaying animal matter as food during the larval stage, and as a result of the severe competition the food supply is occasion-

¹ S. Graenicher. Some observations on the biology of Sarcophaginae. ENT. NEWS 42, 227-230 (1931).

ally exhausted before all of the occupants have reached their full development. Unless such underfed larvae happen to strike another food supply, which is usually not the case, they either perish or develop into small-sized adults. In *S. bullata*, for example, the length ranges according to Aldrich² from 7½ mm. to 15 mm. There are 2 species of flies in our region, *Lucilia sericata* Meig. and *Cochliomyia macellaria* Fab. (Screw-worm fly) which are scavengers of first importance. Much information on the habits and life history of both has been furnished by Bishopp.³ Of *L. sericata* he states that "as soon as an animal is skinned they begin feasting on the blood and fresh carcass." The writer had a similar experience with *Cochliomyia macellaria*, the second species named above. A dead rat, still in fresh condition, was exposed at 9 A. M. after its abdomen had been cut wide open. Several specimens of *Cochliomyia* appeared without delay. Both of the species have been bred repeatedly together with *Sarcophaga bullata* from dead rats, snakes, fish, pieces of beef, etc. Two bluejays exposed within 24 hours of each other under the same conditions brought rather one-sided results:

Bluejay No. 1, exposed Sept. 30 (killed Sept. 29).

Oct. 2. Full of larvae. Placed in a closed can with moist soil on the bottom. From the puparia numerous ♂ and ♀ *Lucilia sericata* made their appearance from Oct. 9 to Oct. 12. No other species was represented.

Bluejay No. 2, exposed Oct. 1 (killed Sept. 30).

Oct. 4. Larvae larger but not as numerous as those in bluejay No. 1. Oct. 11. One ♂ *L. sericata* (the only one) appeared. From Oct. 16 to 18 a total of 194 *Sarcophaga bullata* (101 ♂, 93 ♀) were obtained.

Attraction to certain chemical substances. In an article dealing with the attraction of Diptera to ammonia Richardson⁴ cites Howlett as having "induced a species of *Sarcophaga* to deposit larvae in a flask containing a solution of skatol, a compound present in the feces of many animals." The results obtained from the following exposures add some information on the subject.

² J. M. Aldrich. *Sarcophaga and Allies in North America*, p. 234.

³ F. C. Bishopp. Insect control about abattoirs and packing houses. Journ. Econ. Ent. 10, 269 (1917).

⁴ C. H. Richardson. The attraction of Diptera to ammonia. Ann. Ent. Soc. Ac. 9, 408-413 (1916).

Oct. 2. Two fruit jars (quart size) with glass covers over the top were exposed in the open between fruit trees about 100 ft. apart. The covers prevented flies from entering but gave primary larvae free access through the very narrow space between the cover and the rim of the jar. A portion of a dead snake at the bottom of each jar served as bait.

Oct. 3. A number of larvae inside of each jar. A ♀ *Sarcophaga bullata* was observed depositing larvae on the outside of one of the jars near the top, as also 1 to 1½ inches below the top. In the evening the contents of both jars were brought together in a closed can with moist earth covering the bottom. From Oct. 16-20 145 *S. bullata* (64 ♂, 81 ♀ and 1 ♂ *S. bishoppi*) made their appearance.

From a third jar of the same kind exposed Oct. 4 in the same surroundings 39 *S. bullata* (10 ♂, 29 ♀) were obtained. It will be noted that of all the species of *Sarcophaga* on the wing at that time of the year *S. bullata* stands foremost in depositing the larvae under such conditions. *S. bishoppi*, of which 1 specimen figured in the results, is a much rarer species in this region than *S. bullata*.

Kennedy⁵ states that "in the sense of smell many insects are superior to vertebrates," and in this connection he mentions the fact that some of the moths smell their mates from a distance of a mile. The results obtained with the fruit jars, as described above, lead to the conclusion that the larvipositing females of *S. bullata* are guided by an acute olfactory sense which enables them to detect the presence of decaying animal matter inside of a jar, the cover of which permits only a limited amount of the putrid odor to escape.

The flowers of certain plants are foul-scented and for this reason attractive to flies of the scavenger type. Such flowers have been called sapromyiophilous flowers. The papaw of the southern states (*Isiminea triloba* Dunal) extends its range into southern Illinois where Robertson⁶ found nine species of flies visiting the flowers, seven of which were flies usually attracted by decaying substances. In the surroundings of Milwaukee, Wisconsin, the writer's former residence, three species of

⁵C. H. Kennedy. Some non-nervous factors that condition the sensitivity of insects to moisture, temperature, light and odors. Ann. Ent. Soc. Am. 20, 87-106 (1927).

⁶Chas. Robertson. Flowers and insects. Trans. Acad. Sc. St. Louis 7, 154-155.

Smilax are of common occurrence. The small greenish flowers of all three agree in size and structure, they differ however in the odor. One of them, *S. hispida* Muhl., is sweet-scented, while the other two are sapromyophilous and in the vernacular are known as carrion-flowers. The writer⁷ captured 53 insects at the flowers of *S. ecirrhata* S. Wats., one of the carrion-flowers, 35 of which (66%) were flies of scavenger habits. For *S. herbacea* L., the other carrion-flower, 28 (53.8%) out of a total of 52 visitors were flies of scavenger habits. On the other hand *S. hispida* with the sweet-scented flowers had only 14 (35%) out of 40 visitors that were flies of scavenger habits.

Resistance to low temperatures. The temperatures prevailing in this part of southern Florida make it possible for the flies under consideration to carry on their activities throughout the year with only an occasional interference by a drop in the temperature which is usually of short duration. On one such occasion the writer witnessed the effects of the lowered temperature on larvae and adults, an account of which is given in the following notes.

Sarcophaga No. 61, April 5, 1931, 9:30 A. M. Numerous larvae feeding on a dead snake exposed on a table inside of a slat house. April 7. Slow development on account of cool weather; the night before last the temperature went down to 50° F., last night to 46° F. April 8, 6 A. M. Temperature 46° F., sunrise at 6:05. Larvae very sluggish, not feeding, some of them crawling on the outside of the snake. At 7:30 A. M. temperature up to 52° F. Two adults of *Sarcophaga* sp. and 2 of *Lucilia sericata* flying nearby. At 9 A. M. temperature up to 58° F.; the following flies had been caught up to this time: several *Lucilia sericata*, 2 ♂ *Sarcophaga singularis*, 3 ♂, 1 ♀ *S. floridensis*, 1 ♀ *S. bullata* (containing primary larvae). Around 11 A. M. 2 ♂, 1 ♀ *S. bullata*, 1 ♂ *S. floridensis*, 1 ♂ *S. bishoppi* were taken. Temperature at noon 78° F. April 9, 6 P. M. Larvae well developed, placed in moist earth. From these 83 puparia were obtained; from the latter 77 adult *S. bullata* (43 ♂, 34 ♀) came forth April 30, May 1 and 2.

Neither the adults on the wing at 52° F. nor the larvae which had been exposed to low temperatures (down to 46° F.) during 3 successive nights showed any serious consequences. The larvae were somewhat retarded in their development, the adults produced from them, however, were normal both in size and the characteristic structures of the species.

⁷ S. Graenicher. Flowers adapted to flesh-flies. Bull. Wis. Nat. Hist. Soc. 2, 29-38 (1902).

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, left, &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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SPECIAL NOTICES.—**The Fauna of Elateridae in the Japanese Empire.** By Y. Miwa. [Rept. 65, Dept. Agric. Gov. Res. Inst. Formosa.] A monographic treatment of 289 pp. and 9 pls., several colored, which may prove interesting to students of this family of coleoptera.

Rocky Mountain Conference of Entomologists.

The twelfth annual Rocky Mountain Conference of Entomologists will be held at the Colorado State College Forestry Lodge, Pingree Park, Colorado, August 18 to 23 inclusive. A principal topic for discussion will be "Diseases of plants and animals transmitted by insects (including ticks) and the insect vectors." Arrangements will be such that members of the family may enjoy a mountain outing during the Conference. Reservations should be made in advance. Further details can be secured by writing the Secretary, George M. List, Agricultural Experiment Station, Fort Collins, Colo.

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.

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.

Wanted—Names and addresses of those desiring Cocoon of *Actias luna* and *Automeris io*. Exchange considered. Eggs in season. Virginia Weaver, 822 S. College Ave., Tulsa, Okla.

Literature Wanted—Barnes & McDunnough's "Contributions," Henry Edward's "Pacific Coast Lepidoptera" and other publications relative to North American Lepidoptera. C. F. dos Passos, Mendham, New Jersey.

Geometers Wanted from all parts of United States, for cash or exchange. Edward Guedet, P. O. Box 305, Napa, California.

Wanted—Tabanidae (Horseflies and Deerflies). Exchange, purchase, or for determination. G. B. Fairchild, P. O. Box 272, Monticello, Fla.

Exchange.—Lepidoptera of the Western United States for rare American or tropical specimens. C. W. Herr, Woodburn, Ore. R-3.

Wanted—Insects in exchange for Japanese insects or to buy. Tell me your wishes. Hiromu Yamamoto, Matsuo-Kozan. Iwategun Iwateken, Japan.

Would like to exchange Southern California insects for any North American Mutillidae (wingless wasps or velvety ants). Curtis Brown, 2950 G St., San Diego, California.

Wanted.—To get in touch with Specialists who will make determinations for a share of our duplicates. We have many undetermined specimens from all parts of Iowa.—H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Wanted.—Communication with anyone who has or is collecting Lepidoptera in Burlington County, New Jersey. Also anyone having a microscope for sale.—E. P. Darlington, New Lisbon, N. J.

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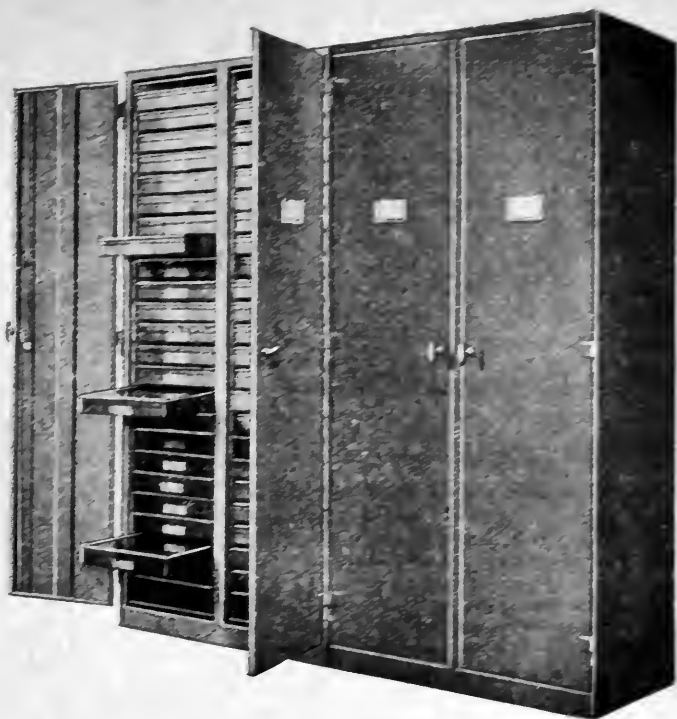
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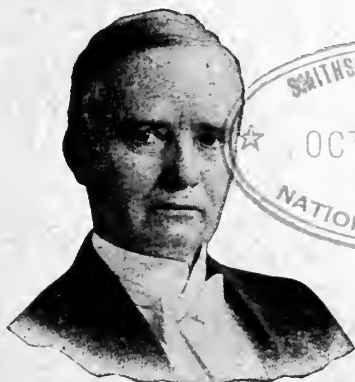
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ENTOMOLOGICAL NEWS

OCTOBER, 1935

Vol. XLVI

No. 8



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1866-1934.

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1935, on the fourth Thursday of each month excepting June, July, August, November and December, and on the third Thursday of November and December.

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

The printer of the "News" will furnish reprints of articles without covers over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 35 cents; three or four pages, twenty-five copies, 70 cents; five to eight pages, twenty-five copies, \$1.40; nine to twelve pages, twenty-five copies, \$2.00; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be at the corresponding multiples of these rates. Printed covers for 50 copies, \$4.00 or more, according to number of pages bound.



PAUL C STOCKHAUSEN

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No. 8

Paul C. Stockhausen

(Portrait, Plate II.)

PAUL C. STOCKHAUSEN printed ENTOMOLOGICAL NEWS, Volumes I-IX (1890-1898), XI, No. 2-XXX (Feb. 1900-1919), XXXII-XLVI, No. 7 (1921-1935), or the greater part of forty-six years, and Volumes XIII-XXXIX (1886-1912), LIV-LV (1928-29), or twenty-nine years, of the Transactions of the American Entomological Society, including the supplementary volume, the Synopsis of the Families and Genera of the Hymenoptera of America north of Mexico, by E. T. Cresson. In 1912 it was considered desirable to alter the composition of the Transactions to monotype, hence the change to another printer in the following year.

The fact that the NEWS has been able to continue during recent years has been largely due to Mr. Stockhausen's ability to produce it at a low cost. Now that he has passed away, on July 5, 1935, the Editors of this journal desire to place on record this fact and also their appreciation of what he made possible and their sorrow that he is no longer here to help us. His genial personality, his willingness to take time and pains to carry out the Editors' desires are things on which to look back with pleasure and satisfaction, as well as with the keen regret that severance of old ties brings to all.

Mr. Stockhausen was born in Schoharie, New York, November 24, 1857, and therefore was well on in his seventy-eighth year. He attended the Schoharie Academy and learned the printing business in Albany. In 1873 he moved to Philadelphia and found employment in the printing and publishing house of J. B. Lippincott & Company, then located at 715-717 Market Street. The American Entomological Society had been printing its Transactions first at its own hall at 518 South 13th Street (1867-1876), then at the Academy of Natural Sciences, 1900 Race Street, by the labors of its own members, particu-

larly E. T. Cresson and Charles A. Blake. In January, 1884, its presses and type were loaned to George B. Cresson, who installed them at 55 North 7th Street. Paul C. Stockhausen took over the equipment and work in 1886 and subsequently added a floor in the adjoining property, No. 53. Thus in these premises entomological printing has been carried on for fifty-one years, and in them the Estate of Paul C. Stockhausen continues the production of ENTOMOLOGICAL NEWS.

On December 9, 1891, Mr. Stockhausen married Regina C. Smith. They had one daughter, Regina Emma, a student of plant pathology, who, on December 26, 1923, became the wife of Albert Joyce Riker, at present Professor of Plant Pathology in the University of Wisconsin at Madison.

Mr. Stockhausen was a member of Joppa Council No. 46 Royal and Select Masons, St. John's Commandery, Elkins Lodge No. 646, Free and Accepted Masons, Keystone R. A. Chapter No. 175, and Sioux Tribe No. 87, Improved Order of Red Men.

We are indebted for much of the personal information to Mrs. Paul C. Stockhausen, to whom and to her family we tender our sincere sympathy.

PHILIP P. CALVERT,
EZRA T. CRESSON, JR.

Notes on the Group Gomphoceri and a Key to its Genera, including one New Genus (Orthoptera, Acrididae, Acridinae).

By MORGAN HEBARD, Philadelphia, Penna.

(Continued from page 188.)

AEROPEDELLUS CLAVATUS CLAVATUS (Thomas).

1873. *G[omphocerus] clavatus* Thomas, in Hayden, Rept. U. S. Geol. Surv. Terr., V, p. 96. [♂, Kansas¹⁰.]

Compared with *A. variegatus variegatus* (Fischer)¹¹ (described in 1846 from Verkni-Udinsky, Transbaikalia and from the Caucasus Mountains) the present insect is seen to be very closely related, possibly no more than a geographic race, though

¹⁰ In error, probably actually from the mountains of Colorado. See Hebard, Proc. Acad. Nat. Sci. Philadelphia, LXXXIII, p. 143, (1931).

¹¹ A series of six males and four females from the Altai Mountains, Transbaikalia and the vicinity of Yakutsk, is in the author's collection.

that we consider improbable. In general form our series of *clarvatus* averages more graceful (but this is negligible in material from localities of more boreal character where individuals often average more robust with shorter antennae and limbs), the male antennae are more definitely and abruptly clubbed at their apices (very feebly broadened over a distinctly greater distance in our males of *variegatus*), the males have the pronotal disk averaging more elongate with constriction usually very evenly concave and rarely weakly angulate (weakly to strongly angulate in our males of *variegatus* and also shorter except in the two from the Altai Mountains), the vertex averages more produced in both sexes and the female tegmina are normally much more reduced, shorter instead of distinctly longer than the combined length of head and pronotum (reaching to just beyond a median point on the abdomen in our females of *variegatus*).

In *clarvatus* males usually have the tegmina reaching to above the supra-anal plate, but a few before us are fully caudate. The degree of brachypterism in females is very constant and among two hundred and eighty of that sex before us only one, from the Big Horn Mountains of Wyoming, shows more than very slight divergence from the normal. That female, however, has the tegmina reaching almost to the apices of the caudal femora.

In females of these species the pronotum is shorter, the pronotal disk less elongate and the constriction of the lateral carinae is often more decided and more angulate.

Inflation of the male cephalic tibiae occurs locally in both. In nine of ten males from Alaska¹² it is very faintly suggested and it is obsolete in males from most of the other series before us, including a considerable number from above timber line on Pike's Peak, Colorado, in which it would certainly have appeared if it were a constant response to an unusually rigorous environment. A male from the Thomas Collection taken in the Alpine Zone of Colorado and twenty males (all of the series)

¹² The following interesting material from Alaska has just been received for study through the kindness of the authorities of the National Museum. Near Seward, Kenai Peninsula, VII, 1900, (W. J. Peters), 1 ♂. McKinley Park, (F. Morand), 7 ♂, 4 ♀. Cape Denbigh, Norton Sound, IX, 16, 1929, (H. B. Collins), 2 ♂, 1 ♀.

These specimens are of medium size and average slightly more robust than material from more temperate environment. The males have the cephalic tibiae feebly inflated, this scarcely appreciable only in the individual from near Seward.

from Bullion Peak, Park County, Colorado, at 12000 to 14000 feet, belonging to the author, are remarkably uniform in having the cephalic femora conspicuously inflated, ranging in width from slightly less to slightly more than the width of the stout cephalic femur. The reason for this very remarkable development in the species of this genus and *Acropus* is unknown, but we do not feel that nominal recognition is warranted. Such material furnished the basis for the synonym *Gomphocerus carpenterii* (Thomas), 1874, from near the Mountain of the Holy Cross, Colorado, while the synonym *Gomphocerus clepsydra* Scudder, 1875, was based on a condition approaching the optimum developed on the Great Plains.¹³

The distribution of *clavatus* is now known to extend northeast to Hamline, Detroit and Crookston, Minnesota: north to Aweme, Manitoba; Prince Albert and northwestern Saskatchewan;¹⁴ the Peace River Block, British Columbia, and McKinley Park and Cape Denbigh, Alaska: west to Cape Denbigh and near Seward, Alaska; the Peace River Block and the East Kootenay Valley, British Columbia; Lake View and Missoula, Montana; Salmon City¹⁵ and the road pass summit between the Big Lost River and the Salmon River at 7190 to 7300 feet in Custer County,¹⁵ Idaho: Levan¹⁵ and Bryce Canyon on the Paunsagunt Plateau,¹⁵ Utah; Bright Angel Point on the Kaibab Plateau¹⁵ and the San Francisco Peaks,¹⁵ Arizona: south to the latter; Cloudcroft in the Sacramento Mountains at 8700 feet, New Mexico; Glen and West Point, Nebraska, and Jefferson, Iowa,¹⁵ while the Minnesota and Iowa records are eastern limits as well.

As we stated in 1931, this species probably does not occur in Kansas and, except in extreme northwestern Nebraska, it is probably very local and scarce in that State as well as in northwestern Iowa. In those regions, however, the optimum individual development is attained.

¹³ See Caudell, Proc. U. S. Nat. Mus., XXVI, p. 783, (1903); Rehn and Hebard, Proc. Acad. Nat. Sci. Philadelphia, 1906, p. 370, (1906), and Hebard, *ibid.*, LXXX, p. 229, (1928).

¹⁴ A very small but slender female in the author's collection.

¹⁵ Material in the author's collection.

***Aeropedellus variegatus arcticus* new subspecies.**

1915. *Gomphocerus clavatus* Candell (not of Thomas, 1873), Canadian Ent., XLVII, p. 160. [The material here discussed.¹⁶]

This race is based on material taken in northeastern Alaska one hundred and eighty-five miles north of the Arctic Circle. It shows nearest agreement with some of the specimens before us of *variegatus variegatus* (Fischer) from near Yakutsk, Siberia, being similar in having the apices of the male antennae very weakly thickened for some distance, the short pronotal disk with constriction of the lateral carinae decided (but averaging more concave and not as angulate), and the male tegmina subcaudate, but it differs in its definitely more robust form and less reduced organs of flight in females, which latter almost reach the base of the supra-anal plate.

Compared with *clavatus* (Thomas) that insect is found to differ in the distinctly (in boreal regions) to decidedly (in more temperate areas) more slender form, shorter and (usually) decidedly more heavily clubbed apices of the male antennae, moderately retreating face, much more elongate and less constricted (except in rare females) pronotal disk and (except in extremely rare aberrant cases) the very much more reduced organs of flight in females.

Type: ♀; latitude 69° 20' North, longitude 141° West, Malcolm River, International Boundary, ALASKA. August 8, 1912. (J. M. Jessup.) [U. S. National Museum.]

Size medium, form robust. Antennae slightly enlarged and flattened for some distance at apex. Face weakly retreating. Lateral foveolae deep and elongate. Vertex broad and short, broader than long, its lateral margins meeting to form a rectangle. Pronotum comparatively short, the strong median carina cut by the principal sulcus just caudad of a median point; lateral carinae weaker, rather strongly concave constricted, this greatest just caudad of a median point on prozona, diverging caudad with faint convexity indicated. Organs of flight somewhat reduced, reaching to base of supra-anal plate. Ovipositor valves short with apices quite strongly curved.

¹⁶This record has been repeated by E. M. Walker in 1920, Ramme in 1928 and Miram in 1931.

Allotype: ♂; same data as type. [U. S. National Museum.]

Very similar to female in form and proportions of vertex and pronotum. Antennae with apices similarly and only very slightly more strongly clubbed. Organs of flight subcaudate, reaching nearly to base of genicular portions of caudal femora. Supra-anal plate with lateral margins rounding suddenly into the transverse caudal margin from which projects mesad a prominent slender straight spike.

Specimens somewhat discolored. Light brown with apices of antennae dark. Male otherwise immaculate except that the supra-anal plate is margined with black. Female maculate with dark brown much as in typical *variegatus* and *clavatus*, the tegmina with some dark rounded spots in one, a very few of these in the other.

A single paratype female bearing the same data is in the author's collection, its measurements being given last. Length of body ♂ 15.7, ♀ 18.3 and 17.8; (estimated) length of antenna ♂ 7.4, ♀ 7.2 and 7.2; length of pronotum ♂ 3.3, ♀ 3.6 and 3.8; caudal width of pronotal disk ♂ 2.7, ♀ 3. and 3.; length of tegmen ♂ 10.8, ♀ 9.6 and 8.8; length of caudal femur ♂ 10., ♀ 10.8 and 10.8 mm.

Tegminal reduction is often found the most pronounced in material from the most rigorous portions of the range of a species of grasshopper. The reverse is true in the present case.

A New Species of Ant from Tennessee (Hymen.: Formicidae).

BY LAURENCE GODDARD WESSON, Haverford College,
Haverford, Penna.

In my material from Nashville, Tennessee, Dr. W. M. Wheeler, of Harvard University, pointed out a form which proves to be a new species of *Dichothorax* and is of special interest as it belongs to a small and little known group. I take pleasure in naming it after Dr. W. M. Mann from whom I have received many kind favors.

***Leptothorax (Dichothorax) manni* sp. nov.**

Worker: length 2.75-3.5 mm. Mandibles rather long, triangular, the terminal tooth prominent. Clypeus moderately

convex, broadly rounded in front, with the median carina very distinct on the anterior portion. Eyes distinctly oval. Head nearly square, the posterior margin flattened. Antennae twelve-jointed, the scape extending beyond the posterior angle of the head a distance equal to three times its breadth. First funicular joint as long as the three succeeding joints together; joints three to eight subequal; club three-jointed, prominent, the two basal joints subequal, together shorter than the terminal joint.

Thorax long and robust, somewhat wider in front than behind, without abrupt declivity at juncture of neck and pronotum. Pro- and mesonotum convex; mesoepinotal constriction abrupt, very deep and broad; epinotum as seen from the side not lying in the plane drawn from the top of the mesonotum to the base of the spines, but lying below it. Epinotal spines small, shorter than broad at base, directed divergently upward.

Petiole from above three times as long as the greatest width. The node from the side is low and rounded above, the anterior slope long, the posterior slope shorter and flattened; as seen from behind the node is rather wide and distinctly concave. Ventral surface of the peduncle with a long, rather prominent tooth. Postpetiole half again as broad as petiole, a little broader than long, its anterior angles prominent, its dorsal surface convex. Gaster rather large, the usual shape. Sting large. Legs robust.

Mandibles longitudinally striated. Clypeus smooth, more so behind, the sides longitudinally rugose; clypeal sutures deep. Head smooth and shining, irregularly and delicately reticulate. Neck opaque and delicately rugose; pro- and mesonotum shining, finely and widely reticulate; pleurae, epinotum and mesoepinotal constriction subopaque, coarsely reticulate rugose. Declivous surface of epinotum smooth and shining. Petiole and postpetiole shining, finely reticulate above, reticulate-rugose on the sides. Gaster shining, widely and faintly reticulate.

Hairs long, white and abundant, erect on the trunk, shorter and suberect on the legs and antennae.

Shining jet black; mandibles, antennae except the club which is dark, peduncle, tarsi and joints yellowish. In most specimens the antennae are considerably infuscated while in some the usually yellow portions may be almost entirely black.

♀ : length 4.25-5.25 mm. Apart from the usual sexual characters, differs from the worker in having the yellow portions darker, the head slightly broader. The sculpture is more uniform. Wings milky-hyaline; veins and stigma colorless. Concavity at summit of the petiolar node very distinct.

♂ : length 2.5-2.75 mm. Head a little longer than broad; eyes and ocelli large and prominent. Mandibles four-toothed. Clypeus convex. Antennae thirteen-jointed; scape about as long as the five succeeding joints, club four-jointed, as long as the seven preceding joints. Mesonotum rounded, projecting forward, concealing the head from above. Epinotum with two small tubercles in place of spines. Petiole slender, shorter and straighter than in the worker and with a lower node which is quite concave as seen from behind; the node is the highest point in the middle of the petiole. Post-petiole square from above. Gaster and legs of the usual shape.

Clypeus smooth, shining, with a few irregular wrinkles. Antennal foveae with parallel rugae. Head closely and rather coarsely reticulate; a smooth spot with a few shallow foveolae in front of ocelli. Pronotum opaque, closely reticulate; mesonotum smooth, shining, finely reticulate; scutellum opaque, reticulate-rugose, the rugae with a longitudinal trend. Epinotum and plurae coarsely reticulate. Petiole and postpetiole opaque, rugose.

Hairs long, white, sparse, slightly reclinate on the legs, shorter and more reclinate on the antennae.

Black. Mandibles, antennae and legs pale except the teeth and tip of the mandibles, tip of the terminal joint of the club, basal two-thirds of the coxae, middle of the femora and tibiae, and the last joint of the tarsi, which are infuscated. Wings milky-hyaline, quite hairy, with colorless veins and stigma.

Type locality: Nashville, TENNESSEE. Described from numerous workers, females and males taken from several colonies. The type specimens are deposited in the U. S. National Museum, Washington.

Close to *D. pergandei*, but differs from it, in the worker, in the longer antennal scapes, triangular mandibles with longer terminal tooth, proportionately longer eyes, more distinct median carina, deeper clypeal sutures, more prominent antennal club, deeper mesoepinotal constriction, more nearly square head, more truncate posterior margin, larger size, and in having the color invariably jet black with the exceptions noted above.

The colonies are found in clayey, sunbaked, sparsely vegetated soil. They are not common, but may usually be found wherever the conditions are right. The nests are shallow, seldom more than four inches in depth, and contain from 75 to 250 workers which may be seen running swiftly about during the hottest part of the day.

**Catocala coelebs in New Hampshire (Lepid.:
Noctuidae).**

By MARGARET M. CARY (Mrs. C. Reed Cary), Westhill,
New London, New Hampshire.

In 1934 two *Catocala coelebs* found their way into the light-trap which hangs from the roof of our low white cottage near New London, New Hampshire. Since we had caught on sugar a rubbed specimen, we decided to hunt for a probable breeding place. Not far away we found a swamp with a sphagnum base in which grow wild cranberries, spiraea and quantities of *Myrica gale*. In as much as the closely related *C. antinympha*, *C. badia* and *C. muliercula* feed on shrubs of this *Myrica* family, we thought this a likely place to start sugaring. For three weeks we baited the trees and telegraph poles near this swamp, and succeeded in taking eight males and one much rubbed female. Those which came to light were flying on August 12 and 13, and we caught them at bait from Aug. 20-Sept. 10. They came to bait between 8.45 and 9.45 Daylight Saving Time, and preferred warm, muggy, foggy, or slightly rainy nights. This June, 1935, about the 17th, when we came up to open our cottage, we took a sheet to the swamp, wrapping it round the bases of the *Myrica gale* bushes and beat the bushes. We finally succeeded in getting one *Catocala* larva about an inch long, which I took back to Germantown with a great deal of *Myrica gale*. The larva was black, sparsely covered with hairs, had a pointed head with a few vertical whitish stripes, and was slightly larger on the abdominal segments. The venter was white with a faint red stripe in the center. It moulted June 23 and came out a dark reddish brown ground color, its head brown with longitudinal white stripes, but without the stripe running round the head as shown in the illustrations of larva of *muliercula*, *antinympha* and *badia* in Barnes and McDunnough. The spiracles were brown, edged with black. There were six white-topped tubercles on the front edge of each segment and four on the hind edge. There were brownish black spots all over the ground color and a black hair out of each tubercle. The tubercles on claspers and two

anal segments were slightly more swollen than the other tubercles. The prolegs and legs were clear red-brown. The venter was white with an interrupted brown line enlarging into three mesial brown spots, and there was a line of small brown spots on either side of the white venter. After feeding for three days the ground color of larva changed to gray brown. On June 29 when the larva measured nearly two inches, it drew together some leaves to make a thin cocoon, turning into a frosted gray-brown chrysalis three days later. This lively chrysalis hatched into a beautiful male *coelebs* on July 24. Sugaring in the meadow is again in full swing and an attempt will be made to get eggs from any female caught at bait.

Further Records of Beetles Associated with Ants (Coleop., Hymen.).

By ORLANDO PARK, Northwestern University.

The following data are of two kinds. The majority represent the more interesting of those records taken personally in the last few years, but upon which insufficient ecological observations did not warrant extensive treatment; no name follows these records by myself. I have also recorded additional captures made by others, who have been kind enough to share this interesting material with me.

All of the host ants have been identified by Dr. M. R. Smith, and this opportunity is taken to thank him again for his expert aid. The beetles listed belong to seven families, abbreviated as follows: Carabidae (C), Scydmaenidae (Sc), Staphylinidae (St), Pselaphidae (Ps), Ptiliidae (Pt), Histeridae (H) and Anthicidae (A). For convenience in handling, the guests found with an ant are listed under the latter, with full data. In this respect it is of interest to note the apparent importance of two ants (*Aphaenogaster tenuisecensis* and *Lasius aphidicola*) in the role of hosts.

1. LASIUS UMBRATUS MIXTUS APHIDICOLA Walsh.

Eucomus (Scopophus) cavipennis Casey (Sc). Peoria, Illinois, May 28, 1933.

Batrissodes monstrosus (Lec.) (Ps). Peoria, Illinois, May 27, 1933.

- B. scabriceps* (Lec.) (Ps). White Heath, Illinois, October 8, 1933.
- B. schaumii* (Aube) (Ps). Palos Park, Illinois, August 1, 1934.
- Cedius spinosus* (Lec.) (Ps). Palos Park, Illinois, August 1, 1934.
- Ceophyllus monilis* (Lec.) (Ps). Madison, Wisconsin, May 26, 1929; Dr. J. P. E. Morrison, Peoria, Illinois, October 8, 1933. White Heath, Illinois, October 8, 1933. Palos Park, Illinois, August 1, 1934. Elizabethtown, Kentucky, September 3, 1934. Crothersville, Indiana, September 4, 1934.
- Adranes lecontei* Brendel (Ps). Elizabethtown, Kentucky, September 3, 1934.
- Limulodes paradoxus* Matthews (Pt). Peoria, Illinois, May 28, 1933. Elizabethtown, Kentucky, September 3, 1934.
- Tomoderus constrictus* (Say) (A). Peoria, Illinois, May 27, 1933.
2. *LASIUS NIGER AMERICANUS* Emery.
Pycnophus rarus (Lec.) (Sc). Spring Valley, Illinois, May 7, 1933; Otto Sejba. Palos Park, Illinois, August 30, 1933. Greenwood, Indiana, August 30, 1934.
Batrissodes globosus (Lec.) (Ps). Peoria, Illinois, September 7, 1931.
Ceophyllus monilis (Lec.) (Ps). Spring Valley, Illinois, May 7, 1933; Otto Sejba.
Adranes coccus (Lec.) (Ps). Springfield, Illinois, April 25, 1926.
3. *LASIUS NIGER NEONIGER* Emery.
Adranes coccus (Lec.) (Ps). Michigan City, Indiana, May 5, 1934; C. H. Seevers.
4. *LASIUS FLAVUS NEARCTICUS* Wheeler.
Ceophyllus monilis (Lec.) (Ps). Pittsburgh, Pennsylvania, May 15, 1925; Alfred Emerson.
5. *LASIUS* (A.) *CLAVIGER* Roger.
Batrissodes globosus (Lec.) (Ps). Greenwood, Indiana, August 30, 1934.
6. *CAMPONOTUS HERCULEANUS LIGNIPERDUS NOVEBORACENSIS* Fitch.
Tachyura incurva (Say) (C). Morocco, Indiana, October 25, 1931; J. P. E. Morrison and J. F. Schuett.
Xenodusa cava (Lec.) (St). Morocco, Indiana, October 25, 1931; J. P. E. Morrison and J. F. Schuett. The

host colony was very extensive in a fallen log, and housed a myriad of the beetles. Dr. Morrison informs me that the final count ran well over 200 of the beetles, which makes this the largest record of a single capture of this species as far as I have been able to ascertain. Over 100 of the guests were given to me in alcohol, but as the animals were killed shortly after their capture no ecological study could be made of this adequate material.

7. *CAMPONOTUS CARYAE SUBBARBATUS* Emery.
Batrisesodes globosus (Lec.) (Ps). White Heath, Illinois, October 8, 1933.
8. *FORMICA FUSCA* Linn. var.
Hetaerius brunneipennis Rand. (H). Mt. Vernon, Wisconsin, May 1, 1930; J. P. E. Morrison.
9. *TAPINOMA SESSILE* Say.
Myrmedonia (Nototaphra) lauta Casey (St). Dyer, Indiana, April 27, 1933. M. Talbot. This is a particularly valuable record as it gives a host ant for one of our most interesting staphylinids. Dr. Talbot in her notes informs me that the colony was an extensive one beneath a sheet of cardboard in a roadside ditch, and that the beetles were running about with the host workers, apparently wholly unmolested. Unfortunately the material came to me preserved, so that no ecological observations could be made.
10. *APHAENOGASTER TENNESSEENSIS* Mayr.
Scydmaenus (Scydmaenus) badius Casey (Sc). Palos Park, Illinois, August 30, 1933.
Eumicrus motschulskii (Lec.) (Sc). Lecompton, Kansas, October 10, 1933; C. H. Seevers.
Acholerops zimmermanni (Schaum) (Sc). Lakeside, Michigan, June 21, 1933. Smith, Indiana, August 18 and 27, 1934. On the latter date a pair of the scydmaenids were taken in copulation in a large gallery of the host nest. On both dates the beetles were numerous, and quite unmolested by the ants.
Batrisesodes schaumii (Aube) (Ps). Palos Park, Illinois, September 1, 1933.
B. riparius (Say) (Ps). Palos Park, Illinois, August 30, 1933.
B. virginiae Casey (Ps). Lakeside, Michigan, June 21, 1933.
Cedius spinosus (Lec.) (Ps). Smith, Indiana, August 18, 1934.

Tmesiphorus carinatus (Say) (Ps). Palos Park, Illinois, August 30, 1933.

Cercocerus butrisoides (Lec.) (Ps). Topeka, Kansas, September 12, 1933; C. H. Seevers. Smith, Indiana, August 18, 1934.

11. APHAENOGASTER FULVA Roger.

Adrans lecontei Brendel (Ps). Michigan City, Indiana, May 15, 1926.

12. APHAENOGASTER FULVA AQUILA Buckley.

Adrans coccus Lec. (Ps). Michigan City, Indiana, May 5, 1934; C. H. Seevers.

Limulodes paradoxus Matthews (Pt). Champaign, Illinois, May 22, 1933. Peoria, Illinois. October 1, 1933.

13. CREMASTOGASTER LEVIUSCULA Mayr.

Fustiger fuchsi Brendel (Ps). Adaton, Mississippi, April, 1931; M. R. Smith.

Identification of Venezuelan Insects Desired.

Two students of entomology in Caracas, Venezuela, have written the Pan American Union expressing their desire to correspond with someone in the United States to whom they might send insects for classification. They suggest that the specimens would remain at the disposal of the correspondent here. They are especially interested in Coleoptera, Hemiptera, Diptera and Hymenoptera. I shall be very glad to hear as to the possibilities.—CONCHA ROMERO JAMES, Chief, Division of Intellectual Cooperation, Pan American Union, Washington, D. C.

Pygocalcager gen. nov. (Dipt.: Tachinidae).

By CHARLES H. T. TOWNSEND, Itaquaquecetuba, Brazil.

Erected for *Calcager humeratum* Hutton, from New Zealand, which is very distinct from *Calcager* Hutton (genotype, *C. apertum* Hutton, desig. TT., 1916).

Runs out with *Uclesiopsis* TT., differing by parafacialia wider than clypeus, no proclinate fronto-orbitals in male, apical cell very narrowly open to closed not far before wing tip, no median marginals on first two abdominal segments, male ninth tergite subconic and anal forceps with basal pair of long narrow lamelliform processes. Differs from *Erythronychia* BB. by 3 ST and the venational and abdominal characters given above.

Entomological Literature

COMPILED BY LAURA S. MACKAY 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.

New Titles of Periodicals and Serials Referred to.

3. Annales Sci. Naturelles, Zoologie, Paris.
69. Physis. Revista Soc. Argentina Cien. Nat., Buenos Aires.
15. Annales Academia Brasileira de Ciencias. Rio de Janeiro.

GENERAL.—Arrow, G. J.—The undesirability of establishing genera based on characters not common to both sexes and of the naming of subgenera. [Pro. R. Ent. Soc. London] 10: 33-34. **Brause, H.**—Die technik mikroskopisch-entomologischer untersuchungen. [17] 52: 183-188, cont. **Calman, W. T.**—The meaning of biological classification. [31] 136: 9-10. **Carpenter, F. M.**—The lower permian insects of Kansas. VII. [Proc. Am. Ac. A & S] 70: 103-146, ill. (*). **Daviault, L.**—Contribution a l'etude des insectes du Bouleau (Canada). [98] 62: 201-214, ill., cont. **Eggleton, F. E.**—A comparative study of the Benthic fauna of four northern Michigan lakes. [Pap. Michigan Acad. Sci. Arts & Letters] 20: 609-644, ill. **Eidmann, H.**—Zur kenntnis der insektenfauna von Südlabrador. [110] 2: 81-105. **Friedman, R.**—Thomas Moffet. The tercentenary of his contribution to scabies. [Med. Life, N. Y.] 1934: 620-633, ill. **Gallardo, A.**—La obra entomologica del Doctor Angel Gallardo. By C. Bruch. [104] 6: 235-242, ill. **Grueneberg, H.**—The causes of asymmetries in animals. [90] 69: 323-343. **Heikertinger, F.**—Wie liest man eine korrektur? [79] 21: 113-122. **Lameere, A.**—Precis de Zoologie, Tome IV: les Myriopodes, les Insectes. [Recu. Ins. Zool. Torley-

Rousseau] 5, Suppl. 1-260, ill. **Lloyd, L.**—The bacteria beds of sewage works as an environment for insects. [Pro. R. Ent. Soc. London] 10: 34-39, ill. **Melzer, J.**—Obituary by E. G. Linsley. [55] 11: 81. **Myers, J. G.**—Nesting associations of birds with social insects. [36] 83: 11-22, ill. **Rippon, C.**—Photographing insects in proportionate size. [Pro. R. Ent. Soc. London] 10: 28. **Roepke, W.**—Die Leica-photographie im dienste des entomologen. [17] 52: 137-141, ill. **Tremoleras, J.**—Obituary. [104] 6: 284-286, ill. **Welch & Eggleton.**—Additional data on submerged depression individuality in Douglas Lake, Michigan [Pap. Michigan Acad. Sci. Arts & Let.] 20: 737-750.

ANATOMY, PHYSIOLOGY, ETC.—**Akkerman, K.**—Researches on the behavior of some pathogenic organisms in the intestinal canal of *Periplaneta americana*. [Acta Leidensia] 8: 80-120. **Barendrecht, G.**—Die corpora pedunculata bei den gattungen *Bombus* und *Psithyrus*. [Acta Zool., Stockholm] 12: 153-204, ill. **Brittain, W. H.**—Studies in bee activity during apple bloom. [12] 28: 553-559, ill. **Chickering & Hood.**—Notes on the spermatogenesis of spiders. [Pap. Michigan Acad. Sci. Arts & Letters] 20: 589-595, ill. **Dustan, G. G.**—The influence of unfavourable feeding conditions on the survival and fecundity of oriental fruit moths. [4] 67: 89-90. **Frohawk, F. W.**—Feeding butterflies in captivity. [9] 68: 164. **Godgluck, U.**—Die kalaleptischen erscheinungen bei den hemipteren. [94] 146: 678-721, ill. **Jackson, D. J.**—Giant cells in insects parasitised by hymenopterous larvae. [31] 135: 1040-1041. **James, Hager & Carman.**—Preliminary studies on starvation and drowning of the chinch bug, *Blissus leucopterus*. [12] 28: 638-646, ill. **Laing, J.**—On the ptilinum of the blow-fly (*Calliphora erythrocephala*). [53] 77: 497-521, ill. **Latter & Eltringham.**—The epigamic behavior of *Euplaea core asela* (Lep: Danainae) with a description of the structure of the scent organs. The telegamic flight of the male. [Proc. R. Soc. Lond.] B 117: 470-482, ill. **Machura, L.**—Oekologische studien im Salzlackengebiet des Neusiedlersees, mit besonderer berucksichtigung der halophilen Coleopteren- und Rhynchotenarten. [94] 146: 555-590, ill. **Marshall, W. S.**—The sense organs upon the dorsal surface of the female black scale, *Saissetia oleae* (Coccidae). [7] 28: 217-228, ill. **Metcalf, M. E.**—The germ-cell cycle in *Phytophaga* destructor. [53] 77: 586-604, ill. **Needham, J. G.**—Some basic principles of insect wing venation. [6] 43: 113-129. **Roonwal, M. L.**—On the post-embryonic development of the respiratory system of *Dialeurodes dissimilis*. [53] 77:

605-622, ill. **Rueschkamp, P. F.**—Der Flugapparat der Käfer. [Zoologica, Stuttgart] 28, hft. 75: 88 pp., ill. **Snodgrass, R. E.**—The history of an insect's stomach. [Rept. Smiths. Inst.] 1934: 363-387, ill. **Tauber & Yeager.**—On total hemolymph (blood) cell counts of insects. [7] 28: 229-240. **Tulloch, G. S.**—Morphological studies of the thorax of the ant. [70] 15: 93-130, ill. **van der Horst, C. J.**—The optics of the insect eye. [Acta Zool., Stockholm] 14: 101-109. **Van Thiel, P. H.**—Investigations on the range and differentiation of *Anopheles maculipennis* races—in Italy. [Acta Leidensia] 9: 232-273; 289-293, ill. Zuechtungsversuche in Zusammenhang mit dem Rassenproblem bei *Anopheles maculipennis*. [Acta Leidensia] 8: 242-266. **Weber, H.**—Skelett, Muskulatur u. Darm der schwarzen Blattlaus. [Zoologica] 28, hft. 76: 120 pp., ill. **Wolf, H.**—Das larvale und imaginale Tracheensystem der Odonaten und seine Metamorphose. [94] 146: 591-620, ill. **Woodrow, A. W.**—Some effects of relative humidity on the length of life and food consumption of honeybees. [12] 28: 565-568, ill. **Yeager, Hager & Straley.**—Some physiological effects of certain aliphatic thiocyanates on the isolated heart preparation from the roach, *Blatta orientalis*. [7] 28: 256-264.

ARACHNIDA AND MYRIOPODA.—**Bishop & Crosby.**—Studies in American spiders: miscellaneous genera of *Erigoneae*. [6] 43: 217-241, ill. (*). **Bishopp, F. C.**—Ticks and the role they play in the transmission of diseases. [Rept. Smiths. Inst.] 1934: 389-406, ill. **Chamberlin & Ivie.**—Nearctic spiders of the family *Urocteidae*. [7] 28: 265-279, ill. (*). **Chickering, A. M.**—Further additions to the list of *Araneae* from Michigan. [Pap. Mich. Ac. Sci.] 20: 583-587. **Gertsch, W. J.**—New American spiders with notes on other sps. [40] 805: 24 pp. **Gilliatt, F. C.**—The European red mite, *Paratetranychus pilosus* in Nova Scotia. [Can. Jour. Res.] 13, D: 1-17, ill. **Hermes, Bailey & McIvor.**—The black widow spider. [Univ. Cal. Ag. Exp. Sta.] Bul. 591: 30 pp., ill. **Herrick, C. A.**—The tick, *Ornithodoros talaje* in Wisconsin homes. [Jour. Parasitology] 21: 216-217. **Mello-Leitao.**—Novo escorpião Brasileiro do gen. *Urophonius*. *Especies Brasileiras do gen. Loxosceles*. A proposito de um novo vejoivida do Brasil. [15] 6: 13-15; 69-73, ill; 75-82, ill. **Mello-Leitao et Arle.**—De l'importance des exuvies dans l'étude de la biologie et de la systematiques des araignees. [15] 6: 125-127, ill.

THE SMALLER ORDERS OF INSECTS.—**Hood, J. D.**—Some new or little-known *Thysanoptera* of the family *Phlaeothripidae*. [105] 5: 159-199, ill. **Hood, J. D.**—

Eleven new Thripidae (Thysanoptera) from Panama. [6] 43: 143-168, ill. **Hood, J. D.**—Five new Thysanoptera of the genus *Aeolothrips* (Aeolothripidae). [1] 61: 103-110, ill. **Ide, F. P.**—Life history notes on *Ephoron*, *Potamanthus*, *Leptophlebia* and *Blasturus* with descriptions. [4] 67: 113-125, ill. (*). **McDunnough, J.**—Notes on western species of Ephemeroptera. [4] 67: 95-104, ill. (*). **Navas, R. P. L.**—Decadas de insectos nuevos. [Broteria] 31: 97-107, ill. (S). **Nitzsch, G. H.**—Contribucion al conocimiento de los piojos de los animales de Mexico. [An. Inst. Biol. Mex.] 6: 119-128, ill. **Thompson, G. B.**—New gen. of Mallophaga. I. [116] 27: 281-287, ill. **Werneck, F. L.**—*Microthoracius minor* e demais especies do mesmo genero (Anoplura, Haematopinidae). [105] 5: 107-116, ill.

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SPECIAL NOTICES.—**Ouchi, Y.**—Bibliographical introduction to the study of Chinese insects. Ent. Rept. No. 1, Jour. Shanghai Sci. Inst. Sect. 3, Vol. 2, 533 pp. This should be a useful work to students of Chinese insects. **Popenoe Club News Letter.**—This active entomological club at Kansas State College, Manhattan, issues another news letter containing much of interest for active entomologists.

INSECTS OF SAMOA, AND OTHER SAMOAN TERRESTRIAL ARTHROPODA, Part IX, SUMMARY. By P. A. BUXTON, British Museum. June 1935.—During the last nine years, the British Museum has been publishing a series of papers on Samoan insects, written by various entomologists. Professor Buxton now sums up the general results in a work of 72 pages, which does not include his "Description of the Environment," published in 1930. No less than 80 new genera and 669 new species have been described in the work, not including some from other islands, introduced for purposes of comparison, or the one new genus and 15 new species of arthropods other than insects. The apparently endemic species constitute 49 per cent of the fauna. The Plecoptera, Embioptera and Mecoptera appear to be totally lacking; the first and last of these are also apparently absent from the Hawaiian fauna. No sawflies or Chrysididae were found. The non-parasitic Hymenoptera are said to show only 26 per cent of endemics, but the percentage is actually somewhat greater, three species having been omitted. There is hardly any affinity with the Hawaiian fauna; the

Samoa insects are essentially of Indo-Malayan type, but it is considered that the islands are oceanic, and have never been connected with any continent. In contrast with the condition in the Hawaiian islands, the species do not show much differentiation on the different islands, but so far as this has occurred, there is usually one race or species in Upolu and Savaii, and a representative one in Tutuila.

Dr. P. Marshall (1912) concluded that bathymetrical, structural and petrographical characteristics supported the idea that the ancient boundary of the southwest Pacific passed through New Zealand, Tonga, Fiji and the New Hebrides, thence on to the Solomons and beyond. This would leave Samoa as oceanic, although the islands are the eastern end of a relatively shallow area extending nearly to the northern end of the New Hebrides.

It seems significant that the ground-nesting Halictine bees are absent from the Hawaiian Islands, but have endemic species in New Zealand (3), New Caledonia (3), Solomon Islands (3), New Hebrides (2), Guam (1), Tonga Islands (1), Fiji Islands (3) and Samoan Islands (11, of which two are considered subspecies of an endemic species). Also, the Samoan Halictines have produced an endemic genus, with three species. If these insects arrived by a land route, it is not necessary to suppose that it was continuous from a continental area at any one time. It is noted that the regular trade wind in Samoa is south-easterly, and the surface drift of the ocean is from the same quarter. Hence it would appear that the Halictine bees had little chance to arrive by other than a land route. But Buxton quotes A. Thomson (1925) to the effect that the trade winds do not extend more than a few miles up, and above them are the anti-trades, in the opposite direction, and generally with a greater velocity. There are also the hurricanes. The recent surprising discoveries of small insects caught by aviators high up in the air, up to 14,000 ft., clearly indicate a means of transportation not hitherto sufficiently appreciated, and make it possible or even probable that the Halictines, at very rare intervals, reached Samoa through the air. Buxton gives a table showing the distribution of the subgenera of mosquitoes in the Pacific islands, the number regularly decreasing eastward. Thus the Fiji Islands have eight subgenera, but Samoa and Tonga only four (the same four) each.

There is much else in this interesting report which deserves comment, and it may well be said that the subject has by no means been exhausted, but rather has been presented in such a way as to arouse the enthusiasm of any broad-minded entomologist and make him long to go to Samoa and continue the investigations.

T. D. A. COCKERELL.

COLONY-FOUNDING AMONG ANTS with an account of some primitive Australian species. By WILLIAM MORTON WHEELER. Cambridge, Massachusetts. Harvard University Press, 1933. 12 mo., pp. x, 179. 29 figs.—The contents of this book are largely based on the author's observations in Australia in 1914 and 1931. Colony-founding among ants has, during the last thirty years, been found to be much more diverse than the early writers had suspected. "It is customary to distinguish an independent and a dependent type . . . according as the young queen establishes her colony and brings up her first brood of workers entirely by herself, or behaves as a parasite and is therefore compelled to resort to the workers of an alien colony and species capable of acting as a host for aid in accomplishing her task. . . . In a third type, that of swarming, or 'hesmiosis,' as it may be called, a portion of the worker population emigrates with one or more fertile females to form a new colony." Seven variations in the independent type are summarized on pages 10-14. Special attention is devoted to nest-founding in the Australian bull dog ants (*Myrmecia*) and other genera of the subfamily Ponerinae, accompanied by technical descriptions of a number of the species (pp. 16-101). The remainder of the volume is devoted to general considerations. "Morphologically *Myrmecia* and *Amblyopone* are so primitive that they have always been assigned to the lowest taxonomic rank among existing Formicidae. It is reasonable therefore to regard their colony-founding behavior as equally primitive or archaic," and this is that form of the independent type in which the fertilized females are capable of foraging for themselves and for their first brood. This method strikingly resembles that of the colony-founding Vespine wasps. The variations in this behavior in different groups of Hymenoptera are discussed and followed into the ramifications of parthenogenesis, matriarchy, brood-egotism (intolerant behavior of social female Aculeates toward other females of the same species) and origin and social behavior of the worker caste. A synopsis of formicid methods of founding colonies is presented on pp. 154-157, a bibliography on pp. 161-170 and an index on pp. 173-179.—P. P. CALVERT.

INSECTS AS MATERIAL FOR STUDY. Two Inaugural Lectures delivered on 17 & 24 November, 1933, by G. D. HALE CARPENTER, D. M., Hope Professor of Zoology (Entomology). Oxford at the Clarendon Press. 1934. 38 pp. 1 plate (frontispiece). \$1.00.—The first lecture reviews various relations of insects to other insects and to animals in general, especially in the production of diseased conditions and in parasitism, and

as exemplified in courtship, such as that of Empid flies, some of which, with their silken balloons offered by males to females, are figured in the frontispiece. Finally relations between flowers and insects are briefly touched on. The second lecture (pp. 20-38) is one of the latest expositions of the theory of mimicry. It concludes as follows: "The study of the coloration of Insects, and especially the phenomena of Mimicry, has provided, under the leadership of my distinguished predecessor, to whom I owe so much, what is widely recognized to be some of the strongest evidence that there is in support of Natural Selection. It is strange to reflect that the first Hope Professor [J. O. Westwood] solemnly warned the young man who was eventually to be the second Professor [E. B. Poulton] against the dangers of Darwinism, and that that young man made the subject his life's work and became the leading exponent in this country of the Darwin-Wallace contribution to the study of Evolution! The vast mass of material which has been added to Hope and Westwood's collections during the forty years in which Professor Poulton controlled the department is by no means worked out yet, and fresh acquisitions are constantly being given, and sought. It will be my endeavor that the reputation which the University now possesses as a centre for the study of adaptation and thus of Evolution, among Insects, shall not be diminished, and that research into this and other aspects of Insect life shall be continued, to the increase of scientific knowledge, as a result of the benefactions of the founders of the Hope Professorship of Zoology."—P. P. CALVERT.

ENTOMA. A Directory of Insect Pest Control. Edited by C. C. HAMILTON. 1935. Published by the Eastern Branch of the American Association of Economic Entomologists. Svo, 2-102 pp. 50 cents.—"This directory has been prepared to assist entomologists and others interested in insect control in obtaining certain kinds of information which have heretofore been somewhat difficult of access." The first 34 pages contain advertisements of all those articles enumerated in the following lines; they are indexed on page 102. Pages 36-67 list alphabetically insecticides and materials used in insecticides with names and addresses of those who will furnish each substance. Similar lists are those of entomological supplies and equipments (pp. 68-71), insecticide machinery and supplies (pp. 71-74), pest-exterminating companies (pp. 74-78) and commercial companies caring for trees (pp. 78-80). There are briefer lists of publishers of entomological books (*not* entomological journals), biological testing laboratories, consulting entomologists and of an insectary which furnishes parasitic insects for

biological control (pp. 80-81). The remainder of this pamphlet comprises "Information on Insecticides, . . . not a learned dissertation for the professional entomologist, but . . . pointing out briefly some of the fundamental facts." Suggestions for the improvement of Entoma are requested by its editor at the Dept. of Entomology, Rutgers University, New Brunswick, New Jersey, from whom doubtless copies can be obtained.—P. P. CALVERT.

PRINCIPLES OF INSECT MORPHOLOGY by R. E. SNODGRASS, U. S. Dept. of Agriculture, Bureau of Entomology and Plant Quarantine. McGraw-Hill Book Co., Inc. New York and London, 1935. Pp. ix, 667, 319 text-figs. \$6.00.—In the years 1927-1933, Mr. Snodgrass published five major articles on insect morphology in the Smithsonian Miscellaneous Collections, volumes 80, 81, 82, 85 and 89. These total 649 pages and contain 249 text-figures, without making any deduction for duplication. Three of these articles have been noticed in the NEWS (xxxviii: 256, xli: 343, 344). On taking up the new volume on "Principles," one acquainted with its five predecessors is naturally interested to learn how far its text reproduces theirs. He soon finds that they are very different for the most part; that even when similar, as for example in discussing the antennal muscles (Principles, page 132, Smiths. Misc. Coll. 81, p. 58), the later text is not identical with the earlier. So also with the numerous text-figures—and figure *x* often includes several distinct drawings—many, but not all, of those in the Smithsonian papers are reprinted in the *Principles* and the latter introduces many new ones. The upshot of the matter is that neither the series of 1927-33 nor the new book contains all that is in the other, both must still be consulted by the morphologist. Though the author does not say so, it is likely that a remark made in the introduction to his *Morphology and Evolution of the Insect Head* of 1928 applies to the *Principles* also: "The reader, therefore, should not take it amiss if he finds certain conclusions drawn in this [book] that do not fit with former statements by the writer."

The Introduction of the *Principles* is concerned with the distinctive structural features of the Annelids, the Onychophora and the major groups of the Arthropods. These last are the Trilobita, the Chelicerata and the Mandibulata. The Mandibulata comprise the Crustacea, Myriapoda and Hexapoda. The second chapter (34 pages) sketches the embryonic development of insects; the third to the twelfth deal with external morphology and feeding mechanisms, the thirteenth to the nineteenth with the organ systems. The list of references, pp. 625-646, "is by no means a bibliography of the subjects included in

the text. It contains the works cited and a few others of general importance." The titles in other languages much exceed those in English. A special feature of the book is the glossaries of relevant terms at the end of many of the chapters, often with foreign equivalents of the English terms. The index occupies more than twenty pages of small type.

It is out of the question, in this review, to mention even a few of the morphological conclusions here presented. Probably each reader will find one or more which demolish some generalization he has picked up, he knows not where, as for example: "We cannot, therefore, attribute the characteristic structure of the pterygote pleuron to the development of the wings," because "the basic features of the pterygote pleuron are the same in the wingless prothorax as in the alate mesothorax and metathorax" (p. 166). The emphasis on the musculature as a clue to morphology of the skeleton, so evident in the Smithsonian papers, is here also. The two trochanters of the parasitic Hymenoptera are, one might say, classic, but consider the following: "In the Odonata, both nymphs and adults, there are two trochanteral segments, but they are not movable on each other; the second contains the reductor muscle of the femur. The usual single trochanteral segment of insects, therefore, probably represents the two trochanters of other arthropods fused into one apparent segment, since it is not likely that the primary coxotrochanteral hinge has been lost from the leg. In some of the Hymenoptera, a basal subdivision of the femur simulates a second trochanter, but the insertion of the reductor muscle on its base attests that it belongs to the femoral segment, since as shown in the Odonate leg, the reductor has its origin in the true second trochanter" (p. 197). (The same view was expressed in Snodgrass's paper of 1927, p. 79.)

We must register a regret that the legends of many of the text figures do not explain *all* of the reference letters or groups of letters, necessitating, in consequence, a study of the text to find their meaning. Sometimes the same muscles are designated by groups of letters (fig. 117), sometimes by numbers (fig. 116). Is not the term *alinotum* (pp. 174, 190) a case similar to one to which Mr. Snodgrass once applied the expression "a happy, though mismated union of linguistic elements," in spite of the precedent set by alisphenoid?

Of all the entomological text-books in English, produced on either side of the Atlantic, the one to which these *Principles* is most like in scope and treatment is Packard's *Textbook* of 1898 of 746 pages and 654 text-figures. The chief difference between them is the more extended treatment of embryology (nearly 200 pages) in the older book. After all the discussions of the intervening thirty-seven years, Snodgrass would seem

(figs. 54, 245) to incline to the view that the insect head is composed of a union of a prostomium and five somites, not essentially different from that held by Packard (p. 54). Packard's Textbook has been of immense value as a work of reference to entomologists and others and is still useful. Its successor, the new Snodgrass, is likewise destined to a similar long life.—P. P. CALVERT.

ANIMALIUM CAVERNARUM CATALOGUS. Under this title there is appearing a work of unquestionable value, compiled by Dr. BENNI WOLF and published by W. Junk. This catalogue of the faunae of the caves of the World is appearing in parts and of a typography similar to that of the well known Coleopterorum Catalogus and Lepidopterorum Catalogus by the same publisher. The whole work will be in three parts: I. Bibliography, II. Faunistic, III. Systematic. The Bibliography lists the authors alphabetically, and under each, their works chronologically. In the faunistic part the caves are listed under their respective localities; and under each cave, references to the literature, by authors, and a list of the species recorded from the same. The systematic part has the species listed systematically and under each, the references to the literature, by authors. As many insects are cave dwellers, this catalogue should be of considerable value to entomologists interested in these insects.

The price averages about 10 cents per page, which, of course, is rather high, but such a price would not be objected to were the matter more condensed. There is too much wasted space between subjects and in the wide margins. A different arrangement of the matter would overcome this fault without impeding the elucidation of the contents. Four parts, or fascicles, have been issued to March, 1935, totalling 500 pages. Subscription to this work may be secured through W. Junk, Scheveningscheweg 74, Den Haag, Holland.

E. T. CRESSON, JR.

A new species of *Micropeza* from Colorado (Diptera : Micropezidae).

By EZRA T. CRESSON, JR.

Micropeza jamesi new species.

Related to *M. ambigua* Cresson, 1908, differing in the deep black, clearly marked mesonotal stripes; pectus and posterior surface of hind femora of the male with black pile and bristles which are straight, not curly; first posterior cell open. It is not to be confused with the smaller *M. texana* Cresson, which has the femora annulated, and has different claspers, and the first posterior cell closed.

♂ : Yellow, with black to brown as follows: upper occiput including ocellar tumor, a broad upper postorbital stripe including both vertical bristles; antennae, arista, upper part of foveae, anterior projection of frons, palpi; median stripe on mesonotum dilating anteriorly and extending posteriorly onto scutellum, rarely showing a median yellow line anteriorly; a lateral stripe abbreviated anteriorly, narrowing posteriorly, not attaining posterior margin; a poorly defined mesopleural, and sharply marked sternopleural stripes and lateral margins of scutellum; tergites except lateral margins and apices of second to fifth, two basal spots and sublateral margins of sixth, some spots on genitalia; apices of tibiae and all tarsi. Apices of femora and bases of tibiae more or less brown. Thorax and abdomen rather thickly pollinose, niveous on the dark mesonotal stripes.

Structurally similar to *M. turcana* Townsend, but head very elongate, twice as long as high, the postorbital length about one-half diameter of eye. Eyes distinctly horizontal. Pectus and hind coxae with black bristles and hair, not pale pile; hind femora pilose on posterior surface basally. Forceps similar to those of *turcana* but the terminal finger is bent about 90 degrees with the main axis; first posterior cell distinctly open.

♀ : Similar to *turcana* but tergites scarcely more yellowish than the proximal ones; ovipositor dark, more than one-half as long as abdomen; marginal setae of sternites short, sparse.

Length, 7 mm.

Type.—♂ : Roggen, COLORADO, May 19, 1934. (M. T. James). [A.N.S.P., no. 6518]. Paratypes.—4 ♂, 3 ♀; data as of type. 1 ♀; same data but collected by T. D. A. Cockerell. Distribution of paratypes: 3 ♂, 2 ♀ in collection of the Colorado Agricultural College.

The occurrence of *Gibbium psylloides* Czemp. in Philadelphia (Coleoptera: Ptinidae)

Several specimens of this species were brought to me for identification by Mr. John T. Kavanaugh of the Vogel-Ritt, Inc., Scientific Exterminators, in Philadelphia. They were reported to be very numerous in the nail holes in the floor of a church in this city, especially along the edge of the carpet, and that they annoyed the people during the services. Smith, in his list of the insects of New Jersey, 1910 edition, mentions this species being found in the New York Produce Exchange and in store houses in New Jersey. Fall in his treatise on the Ptinidae* recorded the species from Georgia to California. Leng, in his Catalogue, gives the most northern records as Virginia. I do not know of any other records of this species occurring this far north.—E. T. CRESSON, Jr.

* Trans. Am. Ent. Soc., XXXI p. 102, (1905).

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.

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.

Wanted—Names and addresses of those desiring Cocoons of *Actias luna* and *Automeris io*. Exchange considered. Eggs in season. Virginia Weaver, 822 S. College Ave., Tulsa, Okla.

Literature Wanted—Barnes & McDunnough's "Contributions," Henry Edward's "Pacific Coast Lepidoptera" and other publications relative to North American Lepidoptera. C. F. dos Passos, Mendham, New Jersey.

Geometers Wanted from all parts of United States, for cash or exchange. Edward Guedet, P. O. Box 305, Napa, California.

Wanted—Tabanidae (Horseflies and Deerflies). Exchange, purchase, or for determination. G. B. Fairchild, P. O. Box 272, Monticello, Fla.

Exchange.—Lepidoptera of the Western United States for rare American or tropical specimens. C. W. Herr, Woodburn, Ore. R-3.

Wanted—Insects in exchange for Japanese insects or to buy. Tell me your wishes. Hiromu Yamamoto, Matsuo-Kozan. Iwategun Iwateken, Japan.

Would like to exchange Southern California insects for any North American Mutillidae (wingless wasps or velvety ants). Curtis Brown, 2950 G St., San Diego, California.

Wanted.—To get in touch with Specialists who will make determinations for a share of our duplicates. We have many undetermined specimens from all parts of Iowa.—H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Wanted.—Communication with anyone who has or is collecting Lepidoptera in Burlington County, New Jersey. Also anyone having a microscope for sale.—E. P. Darlington, New Lisbon, N. J.

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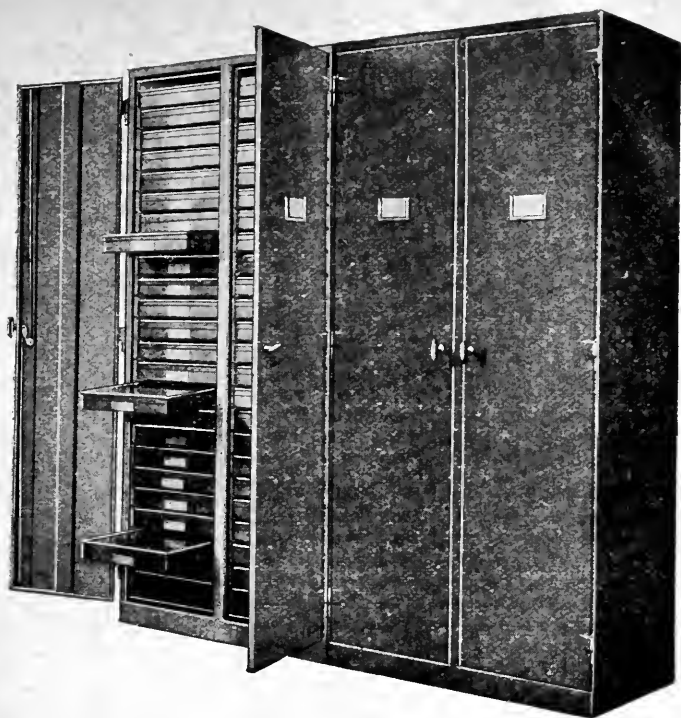
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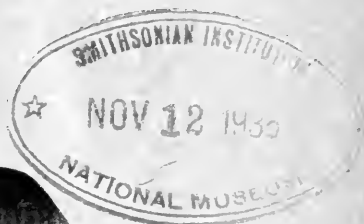
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NOVEMBER, 1935

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

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Notes on *Acrydium* and the Actual Status of Three Supposedly American Species (Orthoptera, Acrididae, Acrydiinae).

By MORGAN HEBARD, Philadelphia, Pennsylvania.

In 1909 J. L. Hancock described three species and two varieties of the Acrydiinae from North America,¹ the first species of which he noted as "Amer. b.", the material being from the Saunders Collection, presented to the University Museum, Oxford, by Mrs. F. W. Hope. Part of this series is now in the author's collection and the carelessly written labels have been deciphered as all "Amur 1." Further study proves beyond question that a painful mistake was made, the series not coming from North America but from eastern Asia.

Comparison with our series of Asiatic Acrydiinae shows that, in consequence, nothing but synonyms were erected.

Hancock's *T[etrix] americana* (page 414) was based on two females and his *T[etrix] americana dimorpha*² (page 415) on four examples, one of these paratypes, a male, being in the author's collection. This male agrees completely with a male in the same collection, collected at Khabarowka on the Amur in May by Parashine. We have also a female (likewise abbreviate) bearing the same data; a male (abbreviate) from Chilok, Transbaikalia; a male (abbreviate) labelled "Siberia" received in exchange from the Geneva Museum determined as, and probably from the same series as the type of, *Tetrix sibiricus* Bolivar, 1887, and three females (abbreviate) from near Kartun in the District of Vladivostok. These names of Hancock's are synonyms of *Acrydium sibiricum* (Bolivar). His description of *americanum* is vague and misleading, evidently based

¹ Trans. Ent. Soc. London, 1909, pp. 414 to 417.

² Admittedly merely the abbreviate condition of the same species.

on more than one specimen, though the contrary was stated. The vertex is not at all like that of *A. granulatum* (= *subulatum*), as it is not triangularly produced and has the median carina briefly projecting, the frontal costa is not at all, or scarcely, excavate between the eyes in lateral profile and projects just sufficiently to be visible for some distance when the insect is examined from directly above.

Hancock's *Nomotettix validus* (page 415) was based on two females, the paratype being in the author's collection. Compared with a large European series of *Tettix kraussi* Sauley, 1888, it shows no difference suggesting even racial separation and we therefore place that name as a synonym of *Acrydium kraussi* (Sauley).³

Hancock's *N[omotettix] arcticus*, based on two females of which the paratype is in the author's collection and *N[omotettix] arcticus obtusus*,⁴ based on a single male, are found from comparison with a large European series to be referable to *G[ryllus] [Bulla] bipunctatus* Linnaeus, 1758. These names, therefore, fall in synonymy under *Acrydium bipunctatum* (Linnaeus). Not only are the antennal joints more elongate than in *kraussi*, but the pronotum has its cephalic margin less produced (transverse to weakly obtuse-angulate) and the form is usually (but not always) less robust. The caudate female has the pronotal keel very high for this insect, but the vertical distance from the shoulder to its summit is considerably less than the depth of a lateral lobe.

In working out the above synonymy we had supposed that Bei-Bienko's "Notes on the Siberian Representatives of the Genus *Acrydium*"⁵ would be of great value. Unfortunately that study proves to be superficial and unsatisfactory. The first species considered is, from material before us, clearly a member of the genus *Paratettix*. The first section of the key,

³ Racial status under *bipunctatum* was suggested by Hebard in 1925 (Trans. Amer. Ent. Soc., LI, p. 37), but intergradation is not indicated in any of the one hundred and nine specimens now in the Philadelphia collections.

⁴ Also merely the abbreviate condition of the same species.

⁵ Eos, V, pp. 365 to 373, (1929).

whether the pronotum is abbreviate or caudate (accompanied by a corresponding development of the wings) is well known to occur very frequently in the Acrydiinae and is a feature of mere individual variation of no specific or racial importance whatever. The repeated use of "f. *macroptera*" is contrary to the generally accepted rules of nomenclature and to the International Code.

The treatment of the few specimens he had from eastern Siberia is particularly faulty. The assumption of racial status for a single female of *sibiricum* from the Vladivostok District, named *sibiricum ussurianum*, is unjustified, the differences noted being very probably wholly attributable to individual variation, which we believe will be conclusively demonstrated by series from that region.

His description of *Acrydium simulans* (page 366, fig. 1) and *Acrydium amurensis* (page 368, figs. 3 and 4) shows little knowledge of the genus, for both are probably synonyms of *Acrydium tartarum* (Bolivar), 1887, such differences as are noted being probably again attributable to individual variation. The following material of *tartarum* (a species never mentioned by Bei-Bienko) in the author's collection has been carefully compared with these descriptions. Sarafshan, Turkestan, 1 ♂ (abbreviate), originally labelled *tartarum* by Saussure as was the type described by Bolivar, received in exchange from the Geneva Museum. Tashkent, Turkestan, 1 ♂, 2 ♀, (abbreviate). Kokand, Turkestan, 3 ♂, 1 ♀ (male caudate, the others abbreviate). In addition there is an abbreviate male from eastern Siberia, received as a gift from Saussure by the Academy of Natural Sciences.

In these specimens the frontal costa is not visible from above in all but the last specimen (in which it can be seen from that angle as in the type of *amurensis*, but the head is slightly up-tilted in the former as is probably the case with the latter specimen). The pronotum has its cephalic margin strongly angulate produced, its longitudinal keel very high and nearly or quite equal to the depth of a lateral lobe, the lateral lobes have the lower sinus rectangulate to slightly obtuse-angulate, the median femora have their margins weakly undulate and the caudal metatarsus has the first pulvillus the shortest.

Finally we believe that his assertion that *Acrydium bipunctatum* (Linnaeus) may not occur in eastern Siberia is unwarranted.

Comparison of the species of the New and Old Worlds has produced some other surprising and interesting results.

The most astonishing of these is the fact that the widespread boreal North American insect, known as *Acrydium granulatum* Kirby since its description in 1937, proves to be the identical species as *Acrydium subulatum* (Linnaeus) described in 1761 and heretofore supposed to be a widespread boreal species confined to the Old World.

The New World boreal *Acrydium acadicum brunneri* (Bolivar) shows nearest affinity to that species followed by the New World boreal *Acrydium acadicum acadicum* (Scudder). In the Old World almost corresponding positions in that fauna are taken by *Acrydium kraussi* (Sauley), *Acrydium bipunctatum* (Linnaeus) and its very close relative *Acrydium sibiricum* (Bolivar). The less boreal North American *Acrydium ornatum* Say finds its corresponding Old World relative in the less boreal *Acrydium ceperoi* (Bolivar).

Of the remaining Old World species the less boreal European *Acrydium turki* (Krauss), the closely related eastern Asiatic *Acrydium japonicum* (Bolivar), both of which apparently belong to a branch from the *bipunctatum* stem, and the very distinctive European and western Asiatic *Acrydium depressum* (Brisout) have no counterpart in the New World, but in eastern Asia *Acrydium tartarum* (Bolivar) apparently takes the place of the New World genus *Nomotettix*.

All of these species are represented in the Philadelphia collections. Without material it appears probable that *Acrydium kiefferi* (Sauley) is a response to certain conditions of local environment developed either in *bipunctatum* or *kraussi*, or is intermediate and based on material indicating that the latter is a geographic race of the former.

It is almost certain that *Acrydium bolivari* (Azam) 1901 is a synonym of *subulatum*, based on individuals which have the vertex least projecting. Both Sauley and Azam ignored the

fact that caudate, abbreviate and all intermediate conditions of pronotal and wing development are a matter of mere individual variation frequently occurring in many species of the Acrydiinae. The past literature is unfortunately filled with names improperly proposed for such individual variations having no racial or specific significance whatever, as well as for color phases which in the Acrydiinae have been proven to be nothing more than Mendelian factors.

In considering these species one is struck by the number from the Old World in which the vertex is less and the frontal costa is more projecting, so that the latter is visible in direct dorsal aspect, a feature not shown by any of those from the New World.

A List of the Ants of Oklahoma (Hymen.: Formicidae).

By M. R. SMITH, Department of Entomology, Mississippi
State College, State College, Miss.

Although the ant fauna of Texas, New Mexico, and Arizona seems to be rather well known, that of Oklahoma, unfortunately, has been neglected by myrmecologists. The following list has, therefore, been prepared by the writer with the idea of filling as much as possible this gap in our knowledge of North American ants. The state should be an unusually interesting collecting ground for myrmecologists, because it is here that many of the eastern and western ants meet. In addition, the various topographical regions should contain very characteristic species. So far as the writer is aware, only two ants have been described from Oklahoma, and these only within the last year. The two species referred to are *Aphaenogaster trecatae* subsp. *pluteicornis* and its variety *oklahomensis*.

According to H. H. Lane, in the Naturalist's Guide to the Americas, the state is considered largely an oak grove savannah. It contains four mountainous uplifts as follows: the Ozarks, the Arbuckles, the Ouachita and Wichita mountains. The re-

mainder of the state is rolling country with the following distinguishable topographical regions: the Lower Arkansas River Valley, the Prairie Plains, the Sandstone Hills, the Redbeds Plains, the Gypsum Hills, the Sand Desert, and the High Plains.

Most of the records given in this list are based on collections made in the southern part of the state, but particularly the southwestern (the Wichita Mountains and Wichita National Park). The northern half of the state is scarcely represented at all. The collections have been made principally by the Department of Zoology of the University of Oklahoma, the Department of Entomology of the Oklahoma Agricultural College, T. F. McGehee of the U. S. Bureau of Entomology in the Argentine ant scouting work, and the Department of Biology of the Oklahoma College for Women, as well as a small amount of collecting done by private individuals.

For the sake of brevity, only the collectors' initials will be given following the various locality records. The collectors responsible for this list are L. Barnard, R. D. and Lois Bird, W. J. Brown, A. C. Burrill, J. R. Carpenter, O. K. Chandler, J. Costner, W. D. Davis, C. C. Deonier, Wilton Fisher, H. M. Hefley, A. E. Hixson, E. E. Ivy, W. E. Jackson, C. R. Jones, T. F. McGehee, J. R. McInnis, J. D. Mitchell, A. E. Pritchard, P. D. Sanders, Martha Shackelford, Vera G. Smith, C. A. Sooter, O. Sundoz, G. C. and E. W. Wheeler, and P. Zeigler.

Subfamily *Ponerinae*.

STIGMATOMMA PALLIPES (Haldeman). This ant should be found in Oklahoma as it occurs in several of the adjoining states.

PROCERATIUM CROCEUM (Roger). Since this species has been recorded from Kansas and Texas it undoubtedly must occur in Oklahoma.

1. *PONERA TRIGONA* var. *OPACIOR* Forel. Wichita National Forest (W. F.); Beckham and Comanche counties (W. F.).

P. COARCTATA subsp. *PENNSYLVANICA* Buckley. This

species should be found in the more northern section of the state.

P. OPACICEPS Mayr. This ant should be found in the southern part of the state.

Subfamily *Dorylinae*.

ECITON (L.) *COECUM* (Latreille). This species may range into the extreme southern part of the state.

2. *E. (A.) OPACITHORAX* Emery. Payne county (E. II.).
3. *E. (A.) SCHMITTI* Emery. Wichita National Forest (W. F.); Norman (W. F.). This is probably the most common legionary ant in Oklahoma.
4. *E. (A.) PILOSUS* F. Smith. Latimer county (W. F.).
E. (A.) NIGRESCENS (Cresson). This species is recorded from Kansas and Texas and therefore one should expect to find it in Oklahoma.
5. *E. (A.) COMMUTATUM* Emery. Wichita National Forest (W. F.).
6. *E. (A.) MELSHEIMERI* (Haldemann). Latimer county (W. F.).

Subfamily *Myrmicinae*.

7. *MOXOMORIUM MINIMUM* Buckley. Chickasha (V. G. S.); McAlester, Clinton, Altus, Lawton, Ardmore, Hugo, Idabel (T. F. McG.); Wichita National Forest, Norman (W. F.); Cherokee (R. D. B.); Latimer, Beckham, Cotton, Harmon, Jackson, Cleveland, Washita counties (W. F.). The tiny black ant is a common house-infesting form.
- M. PHARAONIS* (Linnaeus). Pharaoh's ant should occur in the larger towns in the state. It is especially troublesome in cafes, hotels, warehouses, groceries and apartment houses.
8. *SOLENOPSIS MOLESTA* (Say). Chickasha (M. W. S.); Latimer county (W. F.). The tiny thief ant is an important house-infesting ant also.
- S. TEXANA* Emery. This species no doubt occurs in Oklahoma as it has been found in Kansas and Texas.

9. *S. XYLONI* McCook. Lindsay, Chickasha, Anadarko, Clinton, Hobart, Frederick, Snyder, Ardmore, Madill, Durant, Hugo, Valliant, Idabel (T. F. McG.); Wichita National Forest (W. F.); Cotton, Washita, Johnston, Tillman, Jackson, Comanche and Latimer counties (W. F.). The fire ant is a very serious pest wherever it occurs.
10. *PHEIDOLE VINELANDICA* Forel. Chickasha (V. G. S.); Madill (T. F. McG.); Wichita National Forest (W. F.).
11. *PIL. DENTATA* Mayr. McAlester, Mangum, Lawton (T. F. McG.); Cherokee (R. D. B.); Wichita National Forest (W. F.); Latimer county (W. F.); Major and Woods counties (R. D. B.).
- PIL. DENTATA* var. *COMMUTATA* Mayr. This variety of *dentata* should occur in the State.
- PIL. PILIFERA* (Roger). This ant undoubtedly occurs in the State.
12. *PIL. HYATTI* Emery. Chickasha, Altus, Snyder, Lawton, Ardmore (T. F. McG.); Wichita National Forest (W. F.); Cotton county (W. F.).
13. *PIL. COCKERELLI* Wheeler. Beckham county (W. F.).
14. *PIL. SITARCHES* subsp. *RUFESCENS* Wheeler. Wichita National Forest (W. F.); Beckham, Latimer, and Harmon counties (W. F.).
15. *MYRMECINA GRAMINICOLA* subsp. *AMERICANA* Emery. Latimer county (R. D. B.).
16. *CREMATOGASTER ASHMEADI* Mayr. Latimer and Jackson counties (W. F.).
17. *C. VICTIMA* subsp. *MISSOURIENSIS* Pergande. Chickasha (M. W. S.); Wichita National Forest (W. F.); Latimer county (W. F.); McClain county (J. R. C.).
- C. LAEVIUSCULA* Mayr. Since the variety *clara* of this species is so common in Oklahoma, *laeviuscula* should also be found in the state.
18. *C. LAEVIUSCULA* var. *CLARA* Emery. McAlester, Coalgate, Ada, Pauls Valley, Lawton, Durant, Hugo, Valliant (T. F. McG.); Wichita National Forest (W. F.); Norman

- (R. D. B.); Cleveland county (R. D. B.); Latimer, Greer and Cotton counties (W. F.); Logan and Woods counties (R. D. B.); Payne county (W. J. B.); Stillwater (L. B.).
19. *C. LINEOLATA* (Say). Latimer county (R. D. B.); McClain county (J. R. C.).
20. *C. LINEOLATA* var. *CERASI* Fitch. Major county (R. D. B.).
21. *C. OPACA DEPILIS* var. *PUNCTULATA* Emery. Idabel (T. F. McG.); Chickasha (M. W. S.); Wichita National Forest (W. F.); Beckham, Cotton, Harmon, Logan, Kiowa, Jackson, and Comanche counties (W. F.); Wood county (R. D. B.); McClain county (J. R. C.).
- APIHAENOGASTER FULVA* Roger. This species and its subspecies *aquia* and variety *picca* should be found in Oklahoma.
22. *A. TREATAE* Forel. Latimer county (W. F.); Woods county (R. D. B.); Wichita National Forest (W. F.).
23. *A. TREATAE* subsp. *pluteicornis* G. C. and E. W. Wheeler. Poteau (G. C. and E. W. Wheeler) *type locality*.
24. *A. TREATAE PLUTEICORNIS* var. *OKLAHOMENSIS* G. C. and E. W. Wheeler. Poteau (G. C. and E. W. Wheeler) *type locality*.
25. *A. TENNESSEENSIS* Mayr. Latimer county (W. F.); Caddo county (O. S.).
- A. TEXANA* Emery. This species should be found in Oklahoma.
26. *A. TEXANA* var. *CAROLINENSIS* Wheeler. Latimer county (W. F.).
27. *POGONOMYRMEX BARBATUS* var. *MOLEFACIENS* Emery. Norman (J. R. McL.); Pauls Valley, Anadarko, Snyder (T. F. McG.); Wichita National Forest (W. F.); Beckham, Harmon, Cleveland, Kiowa, and Cotton counties (W. F.); Payne, Latimer, Woods, Jefferson, and Jackson counties (W. D. D.); Stillwater (C. A. S.).
28. *P. OCCIDENTALIS* Cresson. Clinton (T. F. McG.); Cherokee (R. D. B.); Washita, Kiowa and Greer counties (W. F.); Kenton (A. E. P.).

29. *P. DESERTORUM* Wheeler. Cotton county (W. F.).
30. *P. (E.) IMBERBICULUS* Wheeler. Wichita National Forest (W. F.); Harmon county (W. F.).
31. *MYRMICA PUNCTIVENTRIS* subsp. *PINETORUM* Wheeler. Latimer county (R. D. B.).
32. *LEPTOTHORAX TEXANA* Wheeler. Wichita National Forest (W. F.); Harmon and Latimer counties (W. F.).
L. CURVISPINOSUS Mayr. This widely distributed North American ant should occur in Oklahoma.
33. *L. FORTINODIS* Mayr. Jefferson county (W. F.).
34. *L. (D.) PERGANDEI* Emery. Wichita National Forest (W. F.); Chickasha (M. W. S.); McClain county (J. R. C.).
TRACHIHYRMEX SEPTENTRIONALIS subsp. *OBSCURIOR*. Wheeler. This species will very probably be found in the state.
35. *T. SEPTENTRIONALIS OBSCURIOR* var. *SEMINOLE* Wheeler. Wichita National Forest (W. F.); Latimer, Beckham, Cotton, and Harmon counties (W. F.).

Subfamily *Dolichoderinae*.

36. *DOLICHODERUS* (H.) *MARIAE* Forel. Major county (R. D. B.).
37. *D. (H.) PLAGIATUS* subsp. *PUSTULATUS* Mayr. Norman (P. Z.).
38. *DORYMYRMEX PYRAMICUS* (Roger). Clinton, Frederick, Durant (T. F. McG.); Wichita National Forest (W. F.); Beckham, Latimer, Washita, Tillman, Harmon, Kiowa Woods, and Commanche counties (W. F.); McClain county (J. R. C.).
39. *D. PYRAMICUS* var. *FLAVUS* McCook. Lindsay, Chickasha, Clinton, Altus, Madill, Durant, Idabel, (T. F. McG.); Wichita National Forest (W. F.); Beckham, Cleveland, Tillman, Greer, Kiowa, Harmon, Jefferson and Comanche counties (W. F.); Woods county (R. D. B.).
40. *TAPINOMA SESSILE* (Say). Woods county (R. D. B.); Oklahoma county (L. B.); Cleveland county (W. F.).
 The odorous house ant is a pest wherever it occurs.

41. *FORELIUS* sp. McMester, Coalgate, Clinton, Altus, Frederick, Lawton, Ardmore, Madill (T. F. McG.); Wichita National Forest (W. F.); Cotton, Logan, Washita, Cleveland, Harmon, Comanche and Jefferson counties (W. F.).
42. *IRIDOMYRMEX PRUINOSUS* var. Wichita National Forest (W. F.); Beckham, Tillman, Comanche, Washita, Logan Harmon, and Latimer counties (W. F.); Cleveland county (H. M. M.); McClain county (J. R. C.).

(To be continued).

Notes on Utah Scarabaeidae and Chrysomelidae (Coleoptera).¹

By G. F. KNOWLTON and C. F. SMITH.

This report deals with records of Scarabaeidae and Chrysomelidae,² a number of which injure range and cultivated plants. The writers are indebted to Messrs. E. A. Chapin, W. S. Fisher, and H. S. Barber of the U. S. Bureau of Entomology and Plant Quarantine, and L. W. Saylor of the University of California, for identifying the material.

Family SCARABAEIDAE.

CANTHON SIMPLEX Lec. Heber and Daniel Canyons, July 16, 1931; Fruitland, May 29, 1933; Logan (L. Green).

APHODIUS DENTICULATUS Hald. Farmington, June 7, 1933; Jensen; Promontory, April 17, 1931 (Knowlton: M. J. Janes).

A. FIMETARIUS (L.). Kanab, July 9, 1932; Logan, October 11, 1926 (F. Clarke); April 12, 1931 (W. L. Thomas), September 21, 1933 (T. O. Thatcher).

A. GRANARIUS (L.). Blue Creek, June 12 and 28, 1929; Collinston; Richardson, May 15, 1933 (H. B. Stafford).

A. CONSOCIATUS Horn. Strawberry, June 11, 1934 (E. W. Anthon).

A. DISTINCTUS (Mull.). Blue Creek, April 16, 1929; Logan, March 30, 1930; Promontory (Knowlton: Janes); Saratoga.

¹ Contribution from the Department of Entomology, Utah Agricultural Experiment Station. Authorized for publication by Director, May 3, 1935.

² Unless otherwise indicated, localities are in Utah and collections are by G. F. Knowlton.

ODONTAEUS OBESUS Lec. Fort Duchesne, August 6, 1932 (L. Cutler). Also at Lorenzo, Idaho, August 1, 1931 (Thomas); and Lamoille Canyon, Nevada, June 15, 1934 (Stafford).

TROX LECONTEI Harold. Far West, October 26, 1931 (Cutler); Fruitland, May 20, 1933.

DIPLOTAXIS SUBANGULATA CALIFORNICA Schifr. Trout Creek, July 25, 1933 (Stafford).

D. BREVICOLLIS Lec. Cache National Forest, June 15, 1932 (G. Van Buren). Also at Lorenzo, Idaho, June 5, 1931 (Thomas).

PHYLLOPHAGA ANIXIA Lec. Logan, July, 1915 (H. R. Hagan); Springville (Anthon).

POLYPHYLLA DECEMLINEATA (Say). Fort Duchesne, July 27, 1931 (Cutler); Logan (B. G. Whitaker); Springville (Anthon).

P. RUFICOLLIS CASTANEA Csy. Logan, July 21, 1923.

DICHELONYX MORMONA Fall. Logan Park, July 10, 1908 (J. R. Horton); Providence and Provo, June 7, 1933; Sardine Canyon (Thomas).

D. TRUNCATA Lec. Logan, June 28, 1904. Also at Ontario, Oregon, April 21, 1905 (Ball).

HOPLIA LATICOLLIS Lec. Fort Duchesne, July 7, 1931 (R. L. Janes).

COTALPA FLAVIDA Horn. Thompsons, August 9, 1906 (E. G. Titus); West Water.

POCALTA GRANICOLLIS (Hald.). Curlew and Garland, April 1930; Logan (Stoffers, Whitaker); Promontory; Snowville.

SPILOSOTA PALLIDISSIMA Csy. Washington, June 25, 1933.

LIGYRUS GIBBOSUS (DeG.). St. George, July 9, 1934 (Knowlton; C. F. Smith).

EUPHORIA RUFOBRUNNEA Csy. Logan, May 6, 1932 (Whitaker); September 30, 1932 (Thatcher).

CREMASTOCHEILUS PUGETANUS Csy. Bothwell, May 15, 1931.

C. KNOCHI Lec. Hyrum, May 20, 1933 (M. J. Janes); Logan Canyon (Knowlton; Anthon).

Family CHRYSOMELIDAE.

ORSODACNE ATRA (Ahr.). Logan, August 3, 1933 (Thatcher).

LEMA TRILINEATA TRIVITTATA Say. Farmington, July 23, 1930 (Janes); Lewiston; Logan (Thomas); Murray; Sandy; Smithfield.

COSCINOPTERA DOMINICANA (Fab.). Logan.

- C. VITTIGERA Lec. Fort Duchesne, July 20, 1932 (Cutler).
 SAXINIS SAUCIA Lec. Logan, July 5, 1931 (Thomas).
 CHLAMYS MEMNONIA Lac. Fort Duchesne, June 13, 1932 (Stoffers).
 PACHYBRACHYS ANALIS Lec. Kanab, June 26, 1933.
 P. ABDOMINALIS (Say). Moroni, June 28, 1933.
 P. VAU Fall. Stansbury Island, May 31, 1933 (Knowlton:: Authon).
 CHRYPTOCEPHALUS CONFLUENS Say. Marysvale and Mt. Carmel, June 25, 1933.
 C. CONFLUENS var. DEFECTUS Lec. (?). Logan, June 17, 1931 (Thomas).
 C. PINICOLUS Schiff. Farmington, June 24, 1933.
 GLYPTOSCELIS ALTERNATA Cr. Northern Utah.
 CHRYSOCHEILUS COBALTINUS Lec. On sugar-beets, Lehi, July 7, 1927; Ogden, May 12, 1927.
 ZYGOGRAMMA EXCLAMATIONIS (Fab.). Blacksmith Fork Canyon, August 18, 1925.
 Z. CONJUNCTA Rogers. Mills, May 25, 1933; Jensen, on poverty weed, July 12, 1931; St. George; on *Sophia sophia*, Kelton; Fort Duchesne; on *Atriplex*, Promontory.
 CALLIGRAPHIA SIGMOIDEA Lec. Logan, November 8, 1930 (Thomas). Also Wells, Nevada, July 20, 1912 (Ball).
 LINA SCRIPTA (Fab.). Bountiful, June 21, 1929 (Pack); Watson, July 30, 1927 (H. J. Pack).
 TRIHABDA NITIDICOLLIS Lec. Randlett, July 14, 1927.
 T. LEWISI Cr. Clear Creek, July 1, 1926. Also McKimmon, Antelope, and Lyman, Wyoming, August 4, 1932 (Knowlton:: Janes).
 GALERUCELLA NOTULATA (Fab.). Manti, July 26, 1927.
 MONOXIA EROSA Lec. Corinne, April 9, 1930; Granger, July 2, 1930; Hot Springs, September 17, 1930; Ioka (Cutler); Manti; Salt Lake City; on *Cheirina repanda*, Timpie; Weber (Janes); Willow Springs.
 M. DEBILIS Lec. On *Sophia sophia*, Snowville, July 15, 1930.
 DIABROTICA TRICINCTA (Say). Douglas, Arizona, September 20, 1924 (W. W. Henderson).
 SCELOLYPERUS LONGULUS (Lec.). Bountiful, June 10, 1929 (Pack).
 DISONYCHIA PENNSYLVANICA (Ill.). Logan.
 D. UNIGUTTATA (Say). Joseph, September 25, 1929.
 D. LATIFRONS Schiff. Snowville, April 17, 1931.
 D. PLURILIGATA Lec. Orderville, June 27, 1933; Hyrum.
 D. TRIANGULARIS (Say). Honeyville, September 15, 1930;

Logan Canyon (Hagan); on sugar-beets, Monroe, June 30, 1926.

HALTICA BIMARGINATA Say. Logan, April 27, 1929.

CHALCOIDES FULVICORNIS nana Say. On sugar-beets, Ogden, June 9, 1927.

CHAETOCNEMA CONFINIS Cr. On sugar-beets, Cache Junction, August 18, 1927.

SYSTEMA TAENIATA (Say), Elsinore, July 26, 1927; on Russian thistle, Snowville; Stansbury Island (Titus::Hagan::Pack).

S. BITAENIATA (Lec.). Bluff, June 19, 1933; on beets at West Point, Garland, Plain City, and Ogden.

PSYLLIODES PUNCTULATA Melsh. On mustard and Russian thistle, at Cedar Valley, Elsinore, Nephi, and Snowville, July, 1927; on sugar-beets throughout central and northern Utah.

CHELYMORPHA CASSIDEA (Fab.). Bountiful, May 11, 1929 (Pack).

JONTHONOTA NOVEMMACULATA (Mann.). Logan, February 4, 1933 (Thatcher).

CHIRIDA GUTTATA (Oliv.). Logan, July 2, 1930 (Linford).

C. GUTTATA var. *LUCIDULA* (Boh.). Logan, July 2, 1931 (Linford.).

Synonymical Notes on the Fossorial Wasps (Hymenoptera: Sphecidae, Pompilidae and Tiphidae).

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

Several generic names that have apparently been overlooked or misunderstood by Hymenopterists and bibliographers alike have recently been discovered while searching the literature for designations of the genotypes of Sphecoid wasps. Unfortunately, several of those discussed below will invalidate long and well established names if one adheres strictly to the tenets of the International Code of Zoological Nomenclature. Careful study and perusal of the vast accumulation of literature that has appeared since the time of Linnaeus are constantly revealing a large number of disregarded or overlooked names. Adoption of long forgotten names, however, serves no good or useful purpose. It merely emphasizes that taxonomy is one

of the few, if not the sole remaining field of human endeavour wherein a premium is placed upon poor work. It becomes more obvious every day that, if we are ever to achieve anything which resembles stability rather than the state of flux in which we are at present mired, there must be some provision whereby a name, after a certain period of accepted usage, automatically becomes a *nomen conservandum* should there ever be unearthed an earlier name which would invalidate it.

PEMPHILIS Risso 1826.

= *Crabro* Fabricius 1775, nec Geoffroy 1762; = *Thyreopus* Le Peletier & Brullé 1834. Type: *Vespa cribraria* Linnaeus 1758 (by present designation).

In 1826 J. A. Risso published a five volume work entitled: "Histoire naturelle des principales productions de l'Europe méridionale et principalement de celles des environs de Nice et des Alpes maritimes." Pages 187 to 257 of the fifth volume are devoted to a list of the various insects of this region and on page 227, following a list of the species of *Crabro*, occurs the name *Pemphilis* coupled with two species as follows: *Pemphilis palmata* Leach, *Pemphilis patellatus* Fabricius. The first species, *P. palmata* Leach = [*Crabro palmatus* Panzer], is a synonym of *Crabro cribrarius* (L.), the genotype of *Thyreopus* Lepeletier 1834 and *Crabro* Fabricius 1775. I have been unable to discover any species described by Fabricius under the name *patellatus*; it may be that Risso had in mind the *Crabro patellatus* described by Panzer in 1797. This latter is considered a synonym of *Crabro peltarius* Schreber. Consequently in view of the uncertainty of the identity of *Pemphilis patellatus* Fabricius as cited by Risso, I designate *Pemphilis palmata* Leach = [*Crabro palmatus* Panzer = *Vespa cribraria* L.], the type of the genus *Pemphilis* Risso. *Crabro* Fabricius 1775, *Thyreopus* Lepeletier 1834 and *Pemphilis* Risso 1826 are therefore isogenotypic. Should the International Commission on Zoological Nomenclature refuse to validate *Crabro* Fabricius 1775, the name *Pemphilis* will have to be used. Similarly the group of which this is the type genus will have to be known as the

Pemphiliidae or Pemphiliinae, a most unfortunate circumstance inasmuch as it differs in but one letter from a well known group of sawflies, the Pamphiliidae.

EUPLILIS Risso 1826.

= *Rhopalum* Kirby 1829; = *Physoscelus* Le Peletier & Brullé 1834. *Type: Sphex clavipes* L. 1758 (by present designation).

Immediately following *Pemphilis* on page 227, Risso couples the name *Euplilis* with two species as follows: *Euplilis dimidiatus* Leach, *Euplilis rufiventris* Panzer. The first of these is probably the *Crabro dimidiatus* of Fabricius, which Kohl in his revision of *Crabro* doubtfully indicates may be the proper name for *Crabro signatus* Panzer. The second, *Euplilis rufiventris* Panzer, is unquestionably the *Crabro rufiventris* of Panzer. I hereby designate *Euplilis rufiventris* Panzer = [*Crabro rufiventris* Panzer = *Sphex clavipes* Linnaeus] the genotype of *Euplilis* Risso. Inasmuch as Curtis in 1837 designated *Crabro rufiventris* Panzer as the genotype of *Rhopalum*, *Euplilis* Risso 1826 and *Rhopalum* Kirby 1829 are isogenotypic.

MONOMATIUM Shuckard 1840.

= *Larraxena* Smith 1851.

Type: Larraxena princeps Smith 1851 (by present designation).

In the eighth volume of Lardner's Cabinet Encyclopaedia published in 1840, Shuckard described very briefly, without including any species, several genera of Sphecoid wasps. Some of these, *c. g.* *Dicranorhina* and *Conocerus* have been identified by later authors, but one—*Monomatium*, characterized on page 181—has long remained a mystery. After careful study and consideration I feel safe in identifying this genus with *Larraxena* described by Frederick Smith in 1851 (*Ann. & Mag. Nat. Hist.* (2) VII:30), and hereby designate *Larraxena princeps* Smith as the genotype of *Monomatium* Shuckard. *Larraxena* Smith 1851 and *Monomatium* Shuckard 1840 are therefore isogenotypic.

[PRONAEUS Latreille 1809] = AMPULEX Jurine 1807.

Latreille proposed in 1809 (Gen. Crust. Insect. IV:56) the genus *Pronacus*, including in it but one species *Dryinus acutus* Fabricius which in 1810 he designated the type. *Pronacus* has usually been considered to belong to the *Chlorion* complex (s.s.), in fact Kohl (Ann. naturalist. Hofmus. Wien, 1890, V:107) regards *Dryinus acutus* Fabricius, somewhat doubtfully it is true, a synonym of *Chlorion xanthoceros* Illiger. However, Schulz (Berlin. Ent. Zeitschr., 1912, LVII:80) who examined Fabricius' type in the Copenhagen Museum found *Dryinus acutus* Fabricius to be conspecific with *Ampulex dahlbomi* Kohl. *Pronacus* Latreille 1809 must therefore be recorded as a synonym of *Ampulex* Jurine 1807.

CEROPALES Latreille 1796.

= *Ceratopales* Schulz 1906; *Hypsiveraeus* Morice & Durrant 1914.

Type: *Evania maculata* Fabricius (by designation of Latreille, 1810).

Latreille proposed the genus *Ceropales* in 1796 without including any species. The first coupling of any species with this name occurred in 1802. (Hist. Nat. Crust. Insect. III:335 & 340.) Most of the later authors, principally Morice & Durrant (1914), Bradley (1919), and Rohwer (1920) have considered that the only species first placed in the genus were *Mellinus quinquecinctus* Fabricius and *Mellinus campestris* Fabricius. Latreille, however, on page 335 (*op. cit.*), five pages before he formally discusses the genus *Ceropales*, makes the following statement under his discussion of the genus *Pompilus*: ". . . J'avois cru conséquemment devoir placer, dans mon genre *ceropales*, l'évanie tachetée de Fabricius et quelques autres. Je pense aujourd'hui qu'il est plus convenable de mettre ces insectes avec les pompiles . . ." I consider, therefore, that there were three species first coupled with the name *Ceropales* and that Latreille's designation in 1810 of *Evania maculata* Fabricius as the genotype of *Ceropales* is valid and entirely in accord with the provisions of the International Code

of Zoological Nomenclature. The name *Ceropales* must therefore without question be retained for the Pompilid genus, and may not be considered as isogenotypic with the Sphecid genus *Gorytes* Latreille. Although Morice and Durrant and Rohwer made a definite bibliographic citation to Latreille's remark on page 335, in fact the latter author discusses it at some length, both seem to have overlooked the fundamental and essential feature of it. *Hypsicractus* Morice and Durrant 1914 and *Ceratopales* Schulz 1906 are isogenotypic with *Ceropales* Latreille 1796.

✓ GORYTES Latreille 1804.

The genus *Gorytes* was first erected by Latreille in 1804 (Nouv. Dict. Hist. Nat. XXIV: Tabl. meth. p. 180, nr. 434) with but one species—*Mellinus quinquecinctus* Fabricius—included. The genus is therefore monobasic and isogenotypic with *Hoplisis* Lepeletier 1832.

✓ ARPACTUS Jurine 1801.

Type: Sphex mystacca L., 1761 (by designation of Morice & Durrant 1914).

I do not believe, as do some authors, that Latreille by placing *Mellinus quinquecinctus* Fabricius in his new genus *Gorytes* thereby *ipso facto* designated *Mellinus mystaccus* Fabricius [= *Sphex mystacca* L.] the type of *Arpactus* Jurine 1801 (v. Opinion 6, International Commission on Zoological Nomenclature). Latreille's writings give abundant evidence that he never knew Jurine's genera until the publication in 1807 of the latter's *Nouvelle Méthode*. Thus only by a casuistical interpretation of Opinion 6 can the dictum there expressed be made to apply to this case. The first valid designation of a type for *Arpactus* Jurine 1801 therefore apparently did not occur until Morice and Durrant in 1914 selected *Sphex mystacca* L.

[MUTILLONITELA Bridwell 1920] = SALIOSTETHUS
Brauns 1896.

Bridwell proposed the genus *Mutillonitela* in 1920 (Proc.

Hawaii. Ent. Soc. IV:396) for two species of small wasps from South Africa. Recently I have had an opportunity to examine the types of these species in the United States National Museum and to compare them with specimens determined by Brauns as *Saliostethus lentifrons* Brauns, the genotype of *Saliostethus*. The three species are unquestionably congeneric. *Mutillonitela* Bridwell 1920 should therefore be recorded as a synonym of *Saliostethus* Brauns 1896.

[SHESTAKOVIA Gussakovskij 1930] = EREMIASPHECIUM
Kohl 1897.

Gussakovskij proposed the genus *Shestakovia* in 1930 (Eos VI:275) for six species of small wasps from Transcaasia. His excellent descriptions and figures, however, coincide in all respects with specimens that I have before me determined by Kohl as *Eremiasphecium schmiedeknechti* Kohl, the genotype of *Eremiasphecium*. The two are unquestionably, I believe, congeneric. *Shestakovia* Gussakovskij 1930 therefore should be recorded as a synonym of *Eremiasphecium* Kohl 1897.

TANYOPRYMNUS Cameron 1905.

= *Ceratostizus* Rohwer 1921.

Type: *Tanyoprymnus longitarsis* Cameron 1905 [= *Gorytes moneduloides* Packard 1867]. (monobasic).

Cameron in 1905 (Trans. Amer. Ent. Soc. XXXI:375) described the genus *Tanyoprymnus*, from Mexico, including in it but one species—*T. longitarsis* Cameron. Turner in 1912 (Ann. & Mag. Nat. Hist. (8) X:373) who had seen the type in the British Museum, called attention to the fact that this species should be placed in the genus *Ammatomus* A. Costa 1859 and ventured the opinion that *T. longitarsis* Cameron 1905 was the same as *Gorytes moneduloides* Packard 1867. I have compared specimens of *Gorytes moneduloides* with Cameron's description of *Tanyoprymnus longitarsis* and believe that they are unquestionably the same species. Inasmuch as *Gorytes moneduloides* Packard is the genotype of *Ceratostizus* Rohwer 1921, the latter genus must be considered an absolute synonym

(i.e. isogenotypic) of *Tanyoprymnus* Cameron 1905. *Ammatomus* is an old world group; in the New World it is replaced by *Tanyoprymnus*.

EPINYSSON new subgenus.

Type: Nysson basilaris Cresson (present designation).

A. Costa proposed in 1859 (Faun. Regn. Nap. Imen. Niss. p. 24) the genus *Brachystegus* with but one included species—*Nysson Dufouri* Dahlbom 1845 [= *Nysson scalaris* Illiger 1807]. Later authors, through error, have applied Costa's name to all those species of *Nysson* (s.s.) in which the cubitus of the hind wing arises beyond the transverse median nervure. *Brachystegus* Costa, however, is an old world group more closely related to the New World *Zanysson* Rohwer (= *Paranysson* auctt. nec Guerin) than to *Nysson* Latreille. Consequently for those species of *Nysson* Latreille in which the cubitus of the hind wing arises beyond the transverse median nervure, I propose a new subgenus—*Epinysson* [= *Brachystegus* auctt. nec Costa] with *Nysson basilaris* Cresson as type.

PRIONYX van der Linden 1827.

= *Enodia* Dahlbom 1844 nec Hübner 1816; = *Parasphex* Smith 1856.

Type: Ammophila? Kirbii van der Linden. (monobasic).

Dahlbom proposed the genus *Enodia* in 1844 (Hymen. Europ. I:28) for two species: *Sphex albisecta* Le Peletier & Serville [1828] = [*Ammophila? Kirbii* van der Linden 1827] and *Enodia canescens* Dahlbom 1844 [= *Sphex viduata* Christ 1791]. Smith in 1856, aware of the fact that Dahlbom's name was a homonym of Hübner's Satyrid genus proposed *Parasphex* (Catal. Hymen. Brit. Mus. IV:267) in lieu of *Enodia* Dahlbom 1844, placing therein the two species originally cited by Dahlbom and a third—*Parasphex marginata* Smith. Kohl in 1885 (Termész. Füzetek IX:164) designated *Sphex albisecta* Le Peletier & Serville as the type of the genera *Enodia* Dahlbom 1844 and *Parasphex* Smith 1856, thus making the latter an absolute synonym of the former from a nomenclatorial standpoint.

(To be continued)

Entomological Literature

COMPILED BY LAURA S. MACKAY 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, part, &c. the latter within () follows; then the pagination follows the colon :

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

(*) 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.

New Titles of Periodicals and Serials Referred to.

3. Annales Sci. Naturelles, Zoologie, Paris.
69. Physis. Revista Soc. Argentina Cien. Nat., Buenos Aires.
15. Annales Academia Brasileira de Sciencias. Rio de Janeiro.

GENERAL.—Aldrich, J. M.—Obituary by W. R. Walton. [10] 37: 53-59, ill. Alfaro, A.—Insectos dañinos. [Investig. Cientif.] 1935: 173-193. Anon.—Common names of insects approved by the American Association of Economic Entomologists. [12] 28: 726-727. Davis, A. C.—Note upon insects found in mushroom houses. [10] 36: 269. Giliatt, F. C.—Some predators of the European red mite, *Paratetranychus pilosus*, in Nova Scotia. [Can. Jour. Res.] 13: 127-38, ill. Heinrich u. Bandermann u. Nitsch.—Aus der Praxis für die Praxis. Bekämpfung der Anthrenusplage in sammlungen. [18] 29: 225-227; 251-252; 262-263. de Kerville, H. G.—Description et figuration de neuf Arthropodes anomaux. [25] 40: 186-190, ill. Myers, J. G.—Nesting associations of birds with social insects. [36] 83: 11-22, ill. Twinn, C. R.—Records of Mallophaga and other external parasites from birds at Churchhill, Manitoba. [4] 67: 157-159. Van Thiel, P. H.—Insuffisance des caractères de l'oeuf pour la distinction des races trophiques et biologiques de l'*Anopheles maculipennis*? [Acta Leidensia] 9: 289-293. Van Volkenberg, H. L.—Biological control of an insect pest by a toad. [68] 82: 278-279.

ANATOMY, PHYSIOLOGY, ETC.—**Baker, F. C.**—The effect of photoperiodism on resting, treehole, mosquito larvae. [4] 67: 149-153. **Bugnion, E.**—Les organes buccaux des Cerambycides. [Mem. Soc. Vaud. Sc. Nat.] 5: 59-76, ill. **Blaustein, W.**—Histologische untersuchungen ueber die metamorphose der mehlmotte. [46] 30: 333-354, ill. **Bradley, G. H.**—The hatching of eggs of the southern buffalo gnat. [68] 82: 277-278. **Brueckner, W. R.**—Geschlechtsorgane und eibildung des neuropters *Chrysopa vulgaris*. [Jenaische Zeit. Naturw.] 69: 469-506, ill. **Buxton, P. A.**—Changes in the composition of adult *Culex pipiens* during hibernation. [116] 27: 263-265. **Carter & Schmidt.**—Mass action phenomena in mealy-bug wilt. [7] 28: 396-403, ill. **Chopard, L.**—Une idee nouvelle sur le polymorphisme specifique les phases chez les insectes Orthopteres [Rev. Francaise d'Ent.] 2: 57-61. **Cushman, R. A.**—A study of the larva of *Larra analis*. [10] 37: 82-87, ill. **Gossel, P.**—Beiträge zur kenntnis der hautsinnesorgane und hautdrüsen der Cheliceraten und der augen von Ixoden. [46] 30: 177-205, ill. **Grandi, G.**—Morfologia ed etologia comparata di insetti a regime specializzato. [Mem. Ac. Sci. Inst. Bologna] 9: 41-48, ill. L'ipermetabolia nei lepidotteri. [Mem. Ac. Sci. Inst. Bologna] 10: 35-39, ill. **Guarino, L.**—Osservazioni sull'armatura genitale degli Acrididi. [Arch. Zool. Italiano] 21: 427-446, ill. **Hickman, C. P.**—External features of the larva of *Hydromyza confluens* (Diptera). [Proc. Ind. Ac. Sci.] 44: 212-216, ill. **Ide, F. P.**—The effect of temperature on the distribution of the mayfly fauna of a stream. [Univ. Toronto, Biol. Ser.] No. 39: 3-76. **Ilse, D.**—Ueber das sehen der insekten besonders der tagfalter. [Sitz. Ges. Naturf. Fr. Berlin] 1934: 1-18. **Johnson, H. A.**—The effect of high temperatures on the length of life of certain sps. of mosquitoes. [Jour. Ten. Ac. Sci.] 10: 225-227. **Jordan, K. H. C.**—Beitrag zur lebensweise der wanzen auf feuchten böden. [60] 96: 1-26, ill. **Keil, I.**—Ergebnisse aus der kreuzung parthenogenetischer und zweigeschlechtlicher schmetterlinge. II. [Rev. Suisse Zool.] 42: 427-443. **Keilin, Tate & Vincent.**—The perispiracular glands of mosquito larvae. [116] 27: 257-262, ill. **Machotin, A.**—Ueber die morphologische bedeutung der anhänge des IX hinterleibsringes mannlichen Libellen. [Zoologitscheskij Jour.] 13: 639-663, ill. [in Russian with German summary]. **Madsen & Knowlton.**—Mosquito transmission of equine encephalomyelitis. [Jour. Am. Vet. Med. Assoc.] 86: 662-666. **Maloeuf, N. S. R.**—The myogenic

automatism of the contraction of the heart of insects. [7] 28: 332-337, ill. **Marshall, J.**—The location of olfactory receptors in insects: a review of experimental evidence. [36] 83: 49-72. **McIndoo, N. E.**—The relative attractiveness of certain solanaceous plants to the Colorado potato beetle, *Leptinotarsa decemlineata*. [10] 37: 36-42, ill. **Uchida, H.**—Color changes in the eye of a long-horned grasshopper, *Homorocoryphus lineosus* in relation to light. [Jour. Imp. Univ. Tokyo] Zool. 3: 517-525, ill. **Vimmer, A.**—Ueber den mittelzahn der jüngsten dipterenlarven und ueber die nebenstigen der dipterenpuppen aus der gruppe *Brachycera cyclorrhapha*. [Casopis] 31: 77-81. **Weil, E.**—Vergleichend-morphologische untersuchungen am darmkanal einiger Apiden und vespiden. [46] 30: 438-478, ill. **Wigglesworth, V. B.**—Functions of the corpus allatum of insects. [31] 136: 338-339. **Yamada, T.**—Studies on a peculiar oscillatory movement of the larva of the ramie moth, *Arcte coerulea* [Mem. Coll. Sci. Kyoto Imp. Univ.] 9 (B): 1-45, ill. **Ying-Tou Mao.**—Morphology and anatomy of the scarabaeid beetle. [Pekin Nat. Hist. Bull.] 9: 299-323, ill.

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Costa Rica. Part I.—Mantidae. [Pro. Acad. Nat. Sci. Phila.] 87: 167-272, ill. (*). **Snodgrass, R. E.**—The abdominal mechanisms of a grasshopper. [Smith. Misc. Coll.] 94: 89 pp., ill. **Uvarov, B. B.**—The myth of semiaquatic phasmids. [46] 30: 433-437, ill.

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BRIEF DIRECTIONS IN HISTOLOGICAL TECHNIQUE. By ELLERY R. BECKER, Professor, and ROBERT L. ROUDABUSH, Instructor, Dept. of Zoology, Iowa State College. Collegiate Press, Inc., Ames, Iowa. 1935. $8\frac{1}{2} \times 6$ inches. Pp. ix + 80, including 16 blank pages for notes. Price \$1.00. "The simple, essential procedures herein outlined for the inexperienced student are principally in the fields of general histology, general zoology, parasitology, entomology and protozoology. Most of the methods presented have been tried by us, or by persons working in association with us, and found to be readily workable under ordinary conditions." Lists of pertinent literature and of sellers of needful supplies are given in chapter I and on pages 77 and 78. The second and longest chapter (14 pp.) describes "The Zenker-Paraffin-Delafield Method" as one of the most reliable and successful general methods of preparing stained sections of tissue for microscopic study. Some alternative techniques in fixation, dehydrating and clearing, imbedding, staining and mounting occupy chapters III-VII. In chapter VIII, Some Special Methods, pages 66-70 are devoted to insects, giving suggestions for fixing, embedding and sectioning these hard-shelled animals and for making mounts in toto. The book is clearly printed and is bound with wire rings so that it lies perfectly flat wherever it is opened. It should be very useful. There is a 2-page index.

P. P. CALVERT.

A Fifty Year Festschrift.

Festschrift zum 50-jährigen Bestehen des Internationalen Entomologischen Vereins E. V. Frankfurt a. M. 1884-1934. Entomological News congratulates this well known society on its fifty years of activity and wishes it the enjoyment of many years to come, and the continuance of its interesting "Zeitschrift."

The above mentioned publication of 48 pages contains a chronicle of the society with portraits of 36 of its prominent members and contributors to its Zeitschrift; also articles on the Upper Steyerian Lepidoptera by Karl Kusdar; on a new *Dromius* variety by Ernst Buchka; on a northern and alpine butterfly indigenous to Schleswig-Holstein, by G. Wernecke; a contribution to the Lepidoptera of Spain, by W. Marten; and some little "entomological" adventures, by C. Vosbrodt.

—E. T. CRESSON, JR.

OBITUARY

Prof. GEORGE HAZEN FRENCH passed away suddenly on January 1, 1935, at Carbondale, Illinois. He suffered from infirmities of senility and would have been ninety-four on March 19. For thirty-nine years he was a member of the Southern Illinois Teachers' College faculty and was employed as an assistant state entomologist to Cyrus Thomas during 1877-78. He acted as a consulting pathologist and endocrinologist at the Herrin Hospital.

He was born at Meager Hills, near Tully, New York, March 19, 1841. He attended Courtland Academy for two years, received a degree from the State Agricultural College at Irvington, and taught his first school at Christian Hollow. He became principal of schools at Belvidere, Illinois, later taught at Irvington, and finally moved to Carbondale where he was called to teach. In 1872, he married Miss Harriet E. Bingham at Irvington. He leaves two nieces, but no near relatives, having never had children.

He was one of the early naturalists, and his scientific researches have given him a valuable place in many fields of natural science. Most of his time was devoted to the cause of seasickness and epilepsy and to the facts of insect life. He is the author of a textbook, "Butterflies of the Eastern United States," a laboratory manual, "Dissection and Histology," and above 200 shorter publications. He was an active visitor of the Farmer Institutes and a member of the Illinois State Horticultural Society, having served on the studying committee. He was a member of the American Association for the Advancement of Science, Southern Illinois Medical Association, Entomological Societies of New York and London, Academy of Natural Sciences of Philadelphia, Saint Louis Academy of Science, Canadian, French, and Belgian Entomological Societies, and an honorary member of the Lübeck Society of Natural Science.

JOHN K. KARLOVIC.

Biographical Article on Eugene Amandus Schwarz.

The sixteenth volume of the *Dictionary of American Biography*, published by Charles Scribner's Sons, New York, for the American Council of Learned Societies, contains an article by Dr. L. O. Howard on this well-known entomologist (1844-1928) who, it is here stated, would not allow the Editors of *Who's Who in America* or of *American Men of Science* to mention his name.

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.

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.

Wanted—Names and addresses of those desiring Cocoons of *Actias luna* and *Automeris io*. Exchange considered. Eggs in season. Virginia Weaver, 822 S. College Ave., Tulsa, Okla.

Geometers Wanted from all parts of United States, for cash or exchange. Edward Guedet, P. O. Box 305, Napa, California.

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EXCHANGES CONTINUED

Exchange.—Lepidoptera of the Western United States for rare American or tropical specimens. C. W. Herr, Woodburn, Ore. R-3.

Wanted.—Insects in exchange for Japanese insects or to buy. Tell me your wishes. Hiromu Yamamoto, Matsuo-Kozan. Iwategun Iwateken, Japan.

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ENTOMOLOGICAL NEWS

DECEMBER, 1935

Vol. XLVI

No. 10



JOHN MERTON ALDRICH;
1866-1934.

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The Wasp, *Chalybion cyaneum* Fab., preys upon the Black Widow Spider, *Latrodectus mactans* Fab. (Hymen., Araneae).

By PHIL RAU, Kirkwood, Missouri.

The increase of the poisonous black widow spiders locally has been given glaring headlines in the daily press. My personal observations confirm the newspaper accounts regarding the increased abundance of the spiders. However, very little has been done to discover the natural enemies of the spider. If this spider proves to be seriously detrimental to man, then, it seems to me, no time should be lost in finding what natural checks may play a part in this game of "to eat or be eaten." Since wasps prey upon spiders and gather the various kinds in great numbers for food for their young, I am surprised not to find any black widow spiders, *L. mactans*, among the prey of *Sceliphron camentarium* or of the *Trypoxylon* wasps which occur in this vicinity.

However, the cuckoo-bird wasp, *Chalybion cyaneum*¹ does hunt, sting and store this spider for her young, as the following records show. On one occasion *Chalybion* which had her nest at one end of my laboratory, flew to the other end where I had a colony of young black widow spiders in an open cage. Here one by one she gathered about twenty spiders, stored them in her new cell and sealed them up with her egg. On another occasion at Ranken, Missouri, on August 14, 1932, I saw a *Chalybion* wasp in the act of sealing her cell. Upon opening it I found five *L. mactans* with an egg attached to one of them.² Three other mud nests were taken in the same barn at the same time, seven cells of which were either entirely or partly filled with black widow spiders. Three cells that were entirely filled

¹ This wasp is generally known as *C. coerulesum* Linn.

² The egg hatched on the 11th day.

with them had 11, 13 and 15 spiders respectively of various sizes.

Here then, was a wasp feeding poisonous spiders to her young, and I was anxious to see the physiological results of this gastronomic experiment. Observations gave me the following data: One of the eggs hatched, fed on the spider, and lived four days. In four other cases they thrived on these poisonous spiders but died when they were from one-fourth to one-third grown. In one of these cases the aborted larva actually began to spin the cocoon.

In reply to the question "Can *Chalybion* larvae feed on poisonous spiders and survive?", I should say from these meager experiments that undoubtedly the larvae under natural conditions, can reach maturity on this diet.³ If the spiders were detrimental to their health, the diet would have killed the wasps before they had reached one third full size. However, it is possible that the larvae can feed on the flesh of the spiders with impunity until they reach the poison glands which they must sooner or later, and then they are killed. It would be very interesting to find out by experiment if the wasps can be carried through to adulthood on this diet of whole spiders, and if not, what portions of the spider can they safely eat.

The Prevalence of Black Widow Spiders, *Latrodectus mactans* (Araneae: Theridiidae).

In the December, 1934, issue of *Archives of Internal Medicine*, Volume 54, No. 6, A. W. Blair, M. D., of the University of Alabama, gives a very interesting article on spider poisons entitled, "Experimental Study of the Effects of the Bite of the Female *Latrodectus mactans* on Man." This article includes a map of the United States, showing the distribution of *Latrodectus mactans*, taken from the work of Bogen. According to this map, there is no record from the state of New Jersey, although records are indicated from the state of Pennsylvania. There are also records from other nearby states, except Delaware.

It is not generally known that this spider is locally common and abundant in certain sections in and near Philadelphia. In

³ Opening the cells for examination was probably to some extent responsible for the shortened length of life of the larvae.

a few hours' time the author has taken forty to fifty specimens within the confines of the City of Philadelphia, along a railroad siding about one mile southwest of Bartram Gardens. This species is found in great numbers in the spring and fall and has been taken in this same location in the years 1932 to 1935, inclusive.

During the years 1934 and 1935 specimens were taken about eight miles from Ocean City, New Jersey. These were found in out-buildings on farms in surrounding territory, although in limited numbers.

These records are of interest due to the widespread publicity given the apparently large increase in the number of reported cases of poisoning from this species. Emil Bogen, in his prize essay for the California Medical Association in 1926, gave a very complete report on spider poisoning. In his report he mentions fifteen cases reported to the Los Angeles General Hospital that year. Medical reports from various sections of the country report an increasing number of cases of Arachnidism (spider poisoning) from this species. It would be interesting to know of similar cases actually occurring in territories where this spider is not now known to exist, such cases usually being reported erroneously because of the lack of definite information as to the prevalence of this spider.

R. C. CASSELBERRY, Lansdowne, Pennsylvania.

A List of the Ants of Oklahoma (Hymen.: Formicidae).

By M. R. SMITH, Department of Entomology, Mississippi
State College, State College, Miss.

(Continued from page 241.)

Subfamily *Formicinae*.

43. BRACHYMYRMEX sp. Cleveland county (H. M. H.).
44. PRENOLEPIS IMPARIS (Say). McClain county (L. B.);
Cleveland county (H. M. H.).
45. P. IMPARIS var. MINUTA Emery. Wichita National Forest
(W. F.); Latimer and Washita counties (W. F.).
46. PARATRECHINA LONGICORNIS (Latreille). McAlester (P.
D. S.). The crazy ant is an imported species which is
very troublesome in stores, houses, cafes, et cetera.

- P.* (*NYLANDERIA*) *VIVIDULA* subsp. *MELANDERI* Wheeler. This species which is recorded from Kansas and Texas should also be found in Oklahoma.
- P.* (*NYLANDERIA*) *PARVULA* Mayr. This species will probably be found in the northern and eastern sections of the state.
47. *LASIUS NIGER* var. *NEONIGER* Emery. Holdenville (T. F. McG.); Chickasha (M. W. S.); Wichita National Forest (W. F.); Cherokee, McClain, Cleveland, Washita, Greer, Cotton, Comanche and Jefferson counties (W. F.); Woods and Major counties (R. D. B.).
- L. NIGER ALIENUS* var. *AMERICANA* Emery. This widely distributed North American species should be found in the state.
- L. BREVICORNIS* Emery. This widely distributed form should also occur in the state.
48. *L. (A.) CLAVIGER* (Roger). Cleveland county (H. M. H.).
49. *L. (A.) INTERJECTUS* Mayr. Wichita National Forest (W. F.); Latimer, Jefferson counties (W. F.); Woods county (R. D. B.).
50. *L. (A.) LATIPES* Walsh. Wichita National Forest (W. F.).
- L. UMBRATUS MIXTUS* var. *APHIDICOLA* Walsh. This widely distributed species should also occur in Oklahoma.
51. *FORMICA PALLIDE FULVA* var. *SUCCINEA* Wheeler. Ponca City (A. C. Burrill); Wichita National Forest (W. F.); McClain county (J. R. C.).
- F. PALLIDE FULVA* subsp. *NITDIVENTRIS* Emery. This species should occur in the eastern section of the state.
52. *F. PALLIDE FULVA SCHAUFUSSII* var. *DOLOSA* Wheeler. Wichita National Forest (W. F.); Latimer and Jackson counties (W. F.).
- F. FUSCA* var. *SUBSERICEA* Say. One should expect to find this common species in the state.
- F. SANGUINEA* subsp. *PUBERULA* Emery. Undoubtedly this common slave making ant occurs in Oklahoma.
53. *F. PERPILOSA* Wheeler. Kenton (A. E. P.).

54. *MYRMECOCYSTUS MELLIGER* Forel subsp. or var. Wichita National Forest (W. F.); Comanche and Washita counties (W. F.).
55. *CAMPONOTUS HERCULEANUS* subsp. *PENNSYLVANICUS* (DeGeer). Durant (T. F. McG.); Norman (R. D. B.); Wichita National Forest (W. F.); Haskell, Latimer, and Jackson counties (W. F.); Cleveland county (O. S.); Idabel, Hugo, Stillwater (C. C. D.); Cherokee, Grand (A. E. P.); Wyandotte, Jay (W. D. D.); Pawnee and Osage counties (W. J. B.); McCurtian county (J. C.); Woodward (E. E. I.); Ponca City (A. C. B.). The carpenter ant, an important house-infesting species, probably does not extend any farther westward than Oklahoma.
56. *C. CASTANEUS* (Latreille). Latimer county (W. F.).
57. *C. CASTANEUS* subsp. *AMERICANUS* Mayr. Wichita National Forest (W. F.); Latimer and Jackson counties (W. F.); Sallisaw (A. E. H.); Ardmore (C. R. Jones); Ponca City (A. C. B.).
- C. SANSABEANUS* (Buckley). This species very probably occurs in the state.
58. *C. MACULATUS* subsp. *MACCOOKI* Forel. Wichita National Forest (W. F.); Cimarron county (W. F.).
59. *C. MACULATUS VICINUS* var. *NITIDIVENTRIS* Emery. Kenton (A. E. P.); Wyandotte (C. D. D.).
- C. CARYAE* (Fitch). This widely distributed species should be found in the state.
60. *C. CARYAE* var. *DECIPIENS* Emery. Wichita National Forest (W. F.).
61. *C. CARYAE* subsp. *RASILIS* Wheeler. Wichita National Forest (W. F.); Latimer county (W. F.); Stillwater (A. E. P.); Barnard (O. K. C.); McClain county (J. R. C.). This sweet-loving ant commonly invades houses at night.
62. *C. CARYAE RASILIS* var. *PAVIDUS* Wheeler. Latimer and Jefferson counties (W. F.).
63. *C. CARYAE* subsp. *DISCOLOR* (Buckley). Norman (R. D. B.); Ada (T. F. McG.).

64. C. (COLOBOPSIS) PYLARTES Wheeler. Cleveland county (W. F.).
65. C. (COLOBOPSIS) IMPRESSUS Roger. Okmulgee (J. D. M.)
66. C. (COLOBOPSIS) MISSISSIPPIENSIS M. R. Smith. Murray county (W. F.).

•••

Synonymical Notes on the Fossorial Wasps (Hymenoptera: Sphecidae, Pompilidae and Tiphidae).

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

(Continued from page 250.)

Unfortunately, Dahlbom and Smith, as well as all later authors and bibliographers with the exception of Le Peletier (Hist. Nat. Insect. Hymén. 1845, III:358) seem to have overlooked the fact that Van der Linden in the first part of his paper on the fossorial Hymenoptera of Europe, published in 1827 (Nouv. Mem. Acad. Sci. Bruxelles IV:362) erected the genus *Prionyx* for his new species *Ammophila? Kirbii*. Hymenopterists all seem agreed that *Sphex albisecta* Le Peletier & Serville and *Ammophila? Kirbii* van der Linden are conspecific, and place the latter author's name as a synonym of Le Peletier and Serville's *S. albisecta*. This has been due to the fact that the publication date of Van der Linden's species *Ammophila? Kirbii* is given by systematists and cataloguers alike as 1829. The second half of Van der Linden's paper appeared in 1829, but the first part which contains the description of *A. ? Kirbii* unquestionably appeared in 1827. In somewhat similar fashion an incorrect date has been assigned to *Sphex albisecta*, described by Le Peletier and Serville on page 462 of the tenth volume of the *Encyclopédie Méthodique*. The imprint date of this volume is given as 1825 but as Sherborn and Woodward have shown (Proc. Zool. Soc. London, 1899, p. 595) only pages 1 to 344 appeared in 1825, whereas pages 345 to 832 were not issued until 1828. *Sphex albisecta* Le Peletier & Serville 1828 must therefore be recorded as a

synonym of *Ammophila* ? *Kirbii* Van der Linden 1827. Thus *Prionyx* Van der Linden 1827, *Enodia* Dahlbom 1844, and *Parasphex* Smith 1856 are all isogenotypic.

The adoption of *Prionyx* would be most unfortunate inasmuch as it differs so slightly from its close relative *Priononyx* Dahlbom 1845.

MYZINUM Latreille 1803.

= *Myzine* Latreille 1805 [1804?].

Type: *Tiphia maculata* Fabricius 1793 (monobasic).

It seems to have escaped authors and bibliographers alike that one or two years prior to what is usually considered his first proposal of the genus *Myzine*, Latreille in 1803 on page 326 of the fifteenth volume of the Nouveau Dictionnaire d'Histoire Naturelle erected the genus *Myzinum* for ". . . la tiphie maculée de M. Fabricius [= *Tiphia maculata* Fabricius 1793], insect de l'Amerique septentrionale . . . de la Caroline . . ." Latreille spelled the genus *Myzinum*, giving as was his custom a vernacular name *myzine*. That this was not a chance typographical error is evidenced by the fact that in the Table des Noms Latins in Volume 24, page 64 of the same work, the name is also spelled *Myzinum*. On the other hand on page 178 of Volume 24 (*op. cit.*) in the Table Methodique, Hymenoptères it was given as *Myzine* but without, however, any description or citation of included species. We have sufficient evidence that Latreille had a keen appreciation of the fact that generic names should differ in at least more than one character from other known valid genera. *Myzine* would have been too easily confused with the Cyclostome *Myrine* Linnaeus 1758. This contention, I believe, is substantiated not only by the fact that the name *Myrine* immediately precedes Latreille's new genus *Myzinum* on page 326 (*op. cit.*) but also that Latreille wrote the section on fishes in the Table Méthodique of the same series. There, following the example set by Bosc who wrote the article on *Myrine* alluded to above, Latreille placed *Myrine glutinosa* L., 1758—the type of Linnaeus' monotypic genus *Myrine*—in Bloch's 1797 genus *Gastrobranchus*. By

1805,* however, Latreille apparently suffering from one of his lapses of memory gave both the Latin and vernacular spelling of the genus as *Myzine* and it was in this way that he used it in all his subsequent works. On the other hand, he may merely have been following a custom prevalent at the time, *i.e.* inasmuch as *Myrine* Linnaeus 1758 had been relegated to the synonymy of *Gastrobranchus* Bloch 1797, Linnaeus' name was to be considered no longer valid and hence no confusion might arise in the future from the similarity in spelling of the wasp genus and the Cyclostome one. A still further possibility may have been that Latreille in his original manuscript for the *Nouveau Dictionnaire* originally spelled the name *Myzine* and the spelling was changed in the first two instances by the editor of the series. At any rate, whatever the change in spelling may have been due to, *Myzinum* Latreille 1803 and *Myzine* Latreille 1805 [1804?] may be considered potentially different genera from a nomenclatorial standpoint. Since Latreille in 1803 included only "la tiphie maculée de M. Fabricius" [= *Tiphia maculata* Fabricius 1793] in *Myzinum*, this species automatically becomes the type of the genus *Myzinum* Latreille 1803. In 1805 [1804?] (*Hist. Nat. Crust. Insect.* XIII:269) Latreille cited in his genus *Myzine* two species: "la tiphie tachetée de Fabricius" [= *Tiphia maculata* Fabricius 1793] from North America and a European species which he states Rossi has figured under the name *Scolia scxfasciata* [= *Tiphia tripunctata* Rossi 1790]. Illiger in 1807 (*Magaz. f. Insektenk.* VI:194) in his comparison of the generic nomenclature of Fabricius, Latreille, and Jurine, retained only *Tiphia maculata* Fabricius in *Myzine* Latreille 1805 [1804?] and erected the genus *Meria* for *Bethylus Latreillii* Fabricius *sive* *Tiphia tripunctata* Latreille [= *Tiphia tripunctata* Rossi] which in the second volume, page 105 of the *Fauna Etrusca*, published the same year, he formally designated as the type of *Meria*. It is worth noting in this connection that Illiger in his paper on the compari-

* Sherborn in the *Index Animalium* gives the date of publication of *Myzine* in Volume XIII of Latreille's *Histoire Naturelle des Crustacés et Insectes* as 1804.

son of the generic nomenclature referred to above included only species of *Myzine* (sensu Latreillei) in Fabricius' genus *Elis*. Illiger thus automatically (v. Opinion 6, International Code of Zoological Nomenclature) in 1807 fixed *Tiphia maculata* Fabricius 1793 as the type of *Myzine* Latreille 1805 [1804?], with which Latreille concurred in 1810. *Myzine* Latreille 1805 [1804?] and *Myzinum* Latreille 1803 are therefore isogenotypic. The identity of *Tiphia maculata* Fabricius figured by Coquebert (Illustr. Iconogr. Insect., Pl. 13, Fig. 2) is somewhat of a mystery just at present; one of Panzer's or Say's species is probably a synonym of it. There is no question, however, that it is congeneric with those North American species of Tiphids which have lately been going under the name of *Elis* Fabricius 1804 and *Plesia* Jurine 1807, and which prior to Turner's (Ann. & Mag. Nat. Hist. 1909, (8) IV:165) and Rohwer's notes (Proc. U. S. Nat. Mus. 1911, XL:552 and Hymen. Conn. p. 617, 1916) usually went under the name *Myzine*. In view of the discussion above, Turner's statement (Ann. & Mag. 1908 (8) I:497) that no true *Myzine* occur in North America is quite erroneous. It will be necessary to revert once more to Latreille's name. Inasmuch as *Myzinum* and *Myzine* are isogenotypic and except in the first instance in 1803 the latter spelling was always used by Latreille and later authors, it might be well to adopt this form.† This, however, is a matter that may be left to the discretion of authors.

The Spider Prey of the Mud Wasp, *Sceliphron caementarium* (Araneae, Hymen.: Sphegidae).

By PHIL RAY, Kirkwood, Missouri.

In a recent paper¹ giving an account of the spider prey of the cuckoo bird wasp, *Chalybion cyaneum*, I stated that the mud

† The case of the Sphecoid *Nyssa* Latreille vs. *Nysson* Latreille is somewhat analogous to this one.

¹ *Antea*, pages 259-260.

clauber, *Sceliphron caementarium*, does not hunt the poisonous black widow spider, *Latrodectus mactans*. In the present paper I wish to give the list of spiders that *S. caementarium* is known to hunt. I say "is known to hunt" advisedly, because in the notes which follow, the mother wasps were actually seen to bring in the prey. Similar records made by earlier naturalists are not always reliable, since their method usually was to gather mud nests, open them and take inventory of the stored spiders, never for a moment stopping to look for evidence which might indicate which of the two genera, *Sceliphron* or *Chalybion*, was responsible for the collection. They could hardly have been expected to make this differentiation, since it has only recently come to light² that *Chalybion cyaneum* is not a nest builder, but is a house breaker who with drops of water, tears open the seal, empties the spiders belonging to *caementarium*, refills it with her own prey, lays an egg and then re-seals the cell. Therefore, one needs to be present when the wasps are at work in order to know precisely which species brings in certain spiders. That is just what has been done in this study and that too explains why the list of spiders is not larger.

The following table is based on observing twelve mothers nesting in St. Louis County, Missouri:

Spider Prey of *Sceliphron caementarium*.³

Date	No. of Cells	Contents
7/31/32	3	14 <i>Argiope aurantia</i> Lucas
9/1/30	1	1 <i>Argiope trifasciata</i> Forskål
		1 <i>Phidippus mystaccus</i> Hentz
		1 <i>Misumenoides aleatorius</i> Hentz
8/14/26	1	24 <i>Epeira stellata</i>
6/24/24	9	107 <i>Epeira prompta</i> Hentz
		3 <i>Epeira displicata</i> Hentz
		13 <i>Epeira scutulata</i> Hentz
		3 <i>Marptusa familiaris</i>
		2 <i>Phidippus multiformis</i>
		3 <i>Misumena</i> sp.
		1 <i>Oxyopes scalaris</i> Hentz
1 <i>Lycosa ocreata</i>		

² Rau, Ann. Ent. Soc. Amer. 21:21-35, 1928.

³ The spiders were identified by Miss Elizabeth Bryant, except the two nests dated June 24, 1924, and August 14, 1926; these were identified by Mr. J. H. Emerton.

Date	No. of Cells	Contents
8/16/32	1	1 <i>Oxyopes salticus</i> Hentz
8/16/32	1	7 <i>Argiope aurantia</i> Lucas (All males)
7/31/32	1	6 <i>Argiope aurantia</i> Lucas (All immature males)
7/31/32	1	5 <i>Argiope trifasciata</i> Forskål
8/16/32	1	3 <i>Epeira stellata</i> Walk 1 <i>Argiope trifasciata</i> Forskål 1 <i>Misumena vatia</i> Linn.
8/14/32	1	1 <i>Epeira trivittata</i> Keys.
8/16/32	2	1 <i>Misumena alectorica</i> Hentz 3 <i>Misumena asperata</i> Hentz 1 <i>Xysticus ferox</i> Hentz 1 <i>Xysticus stomachosus</i> Keys. 1 <i>Argiope aurantia</i> Lucas 3 <i>Oxyopes salticus</i> Hentz 1 <i>Dolomedes</i> Sp. 2 <i>Phidippus clarus</i> Keys. 1 <i>Phidippus multiformis</i>
8/16/32	1	4 <i>Argiope trifasciata</i> Forskål 2 <i>Epeira domiciliorum</i> Hentz 3 <i>Epeira trivittata</i> Keys. 1 <i>Epeira sanguinalis</i> Hentz

It will be noted that the above collection of spiders came from 23 cells, and while the orb-weavers appeared in greater frequency, other garden spiders were not disdained.

The 223 spiders listed above appeared in the following frequency:

Genus	Frequency	Habitat
<i>Epeira</i>	157	Orb-weavers. Open vegetation.
<i>Argiope</i>	39	Orb-weavers. Open vegetation.
<i>Misumena</i>	9	Crab spiders. Among flowers.
<i>Phidippus</i>	6	Under sticks and stones, sometimes seen on bark of trees and on walls of buildings.
<i>Marptusa</i>	3	On fences and buildings.
<i>Oxyopes</i>	5	Low bushes.
<i>Lycosa</i>	1	On or in the ground.
<i>Xysticus</i>	2	Under leaves and loose bark.
<i>Dolomedes</i>	1	Near water.
Total	223	

It is at once apparent from the prey selected that *Sceliphron caementarium* hunts her spiders among the open vegetation; especially does she get her prey from the orb-weavers and flower spiders, since 205 of the 223 spiders gathered by these mothers come from the genera *Epeira*, *Argiope*, and *Misumena*, all of which frequent the open vegetation. The other 18 species (all but the one *Lycosa*) have habits such as may bring them into the hunting area of *Sceliphron caementarium* (see table) where the wasp may conveniently take them.

While *S. caementarium* goes out into the sunshine and hunts for prey in the open vegetation, I think further observations will prove that *c. cyaneum* searches for them under rocks, on the bare ground and also in buildings. This is substantiated by the fact that on one occasion I saw a mother *cyaneum* bring in three spiders of *Asagena americana* Emerton [Bryant], a species which is usually found under stones, and also it will be remembered that the black widow spiders which she hunts nest under rocks and fallen logs. In addition to this I saw *cyaneum* actually attack a house spider in a barn, and on another occasion I report (Ent. Soc. Amer. 21-35, 1928) an attack by this wasp on a *Lycosa* spider which is also a ground inhabiting species.

Thus we find that the two species of wasps have their special hunting territories, just as do certain birds. The counterpart of this wasp behavior is to be seen in the specialized stamping-grounds found among the various kinds of spiders. The laws of evolution that brought about the specialized hunting practices of the devourers must likewise have been responsible for the varied behavior of those that were to be devoured.

A New Termatophylidea from Mexico (Hemiptera: Ternatophylinae)

By R. L. USINGER, University of California.

The genus *Ternatophylidea* was described by Reuter and Poppius¹ for the reception of a new species, *pilosa*, collected

¹ Öfv. Finska Vet. Soc. Forth., LIV, Afd. A, No. 1, pp. 4-5 1912.

by Mr. E. P. Van Duzee at Mandeville, Jamaica. A second species was recently collected by Mr. H. E. Hinton and the author in Central Mexico and is described below.

***Termatophylidea maculata* n. sp. (Fig. 1)**

Larger and much darker than *pilosa* (fig. 3) with the eyes narrower and the surface of the pronotum very different as described below. Corium marked with darker fuscous at base and apex and with scattered fuscous spots throughout.

♂. Surface glabrous, covered with long fulvous to white hairs. Head one-third longer than wide including eyes (less

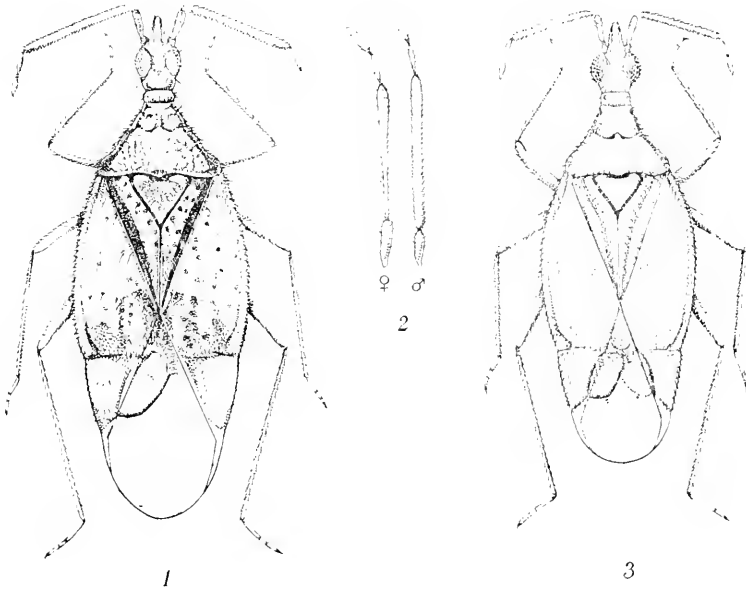


Figure 1. *Termatophylidea maculata* n. sp. drawn from the holotype.

Figure 2. *Termatophylidea maculata* n. sp. female and male antennae.

Figure 3. *Termatophylidea pilosa* Reut. and Popp. from a male of the original Mandeville series in the E. P. Van Duzee collection at the California Academy of Sciences.

Illustrations by Mrs. Frieda Abernathy.

than one-third longer in *pilosa*); eyes narrow, inner margins rather narrowly, evenly rounded (more broadly rounded in *pilosa*); interocular space greater than one-fourth total width of head, 8::20 (narrower, one-fourth total width, 5::20, in *pilosa*); length of head behind the eyes equal to one-half length

of eyes (much less, 4:13, in *pilosa*). Antennae but little shorter than length of head, pronotum, and scutellum together; proportion of segments 1 to 4 as 11:44:9:10; first two segments much thicker than front femora; first more slender on basal third, surpassing apex of tylus by one-third its length; second stout, cylindrical, densely, evenly clothed with apically directed short white hairs; third and fourth very slender, flat-fusiform. Pronotum clothed with extremely long, posteriorly directed, white hairs on anterior lobe and a shorter, denser pubescence posteriorly; dorsally constricted at middle, the constriction sub-oblique laterally, forming two sub-rhomboid depressions on anterior lobe, these latter separated from each other by a median longitudinal carina and from anterior collar by a transverse carina; anterior collar distinctly set off by a deep transverse suture; posterior margin feebly bisinuate, rounded laterally. Scutellum sub-convex, smooth, polished, broadly and shallowly emarginate at base. Hemelytra transparent, beset with long brown hairs on clavus and more sparsely on corium, each arising from a round fuscous spot; thickened outer margin of corium with longer hairs on basal half; cuneus considerably longer than broad at base, 25:16, covered with relatively short, sparse brown hairs. Underside of head and thorax naked. Venter covered with very fine white hairs.

Color fuscous, the head tinged with red at apex and lighter, testaceous, dorsally at base. Eyes silvery, tinged with red. Antennae ochraceous, the first segment more or less red. Rostrum ochraceous. Pronotum laterally and sub-marginally with a piceous stripe; centrally behind collar forming a sub-triangular ochraceous area which is darker at base and fulvous on anterior depressions. Scutellum fuscous with its basal angles broadly and sides narrowly ochraceous. Clavus fusco-testaceous, becoming fuscous sub-apically and on outer margin and with numerous darker spots on the disk. Corium fuscous at extreme base and broadly at apex, especially laterally and longitudinally before inner angle; light testaceous on margin and transparent on disk except for scattered brown spots which are more numerous toward middle. Cuneus fuscous on apical half, reddish on inner margin and sparsely elsewhere. Membrane uniformly cloudy with veins reddish. Under side of meso- and metathorax piceous. Sides of anterior coxal cavities, rim of metasternal orifice, and legs testaceous. Venter fuscous to fusco-piceous, obscurely annulated with fusco-testaceous. Genital segment at tip and claspers testaceous.

Length 3.84 mm., width (hemelytra) 1.32 mm.

♀. Slightly larger than male with the antennae quite different (fig. 2). Proportion of antennal segments 1 to 4 as 13:37:10:11; basal segment robust as in male; second slender, very gradually thickened from base to apex; third and fourth as in the male. Abdomen transversely convex beneath, slightly narrowed at base, widened posteriorly and then abruptly, triangularly narrowed to tip.

Color much as in the male. Scutellum uniformly fusco-testaceous except for black tip. Cuneus not infuscated, red except at base. Membrane with two large, semi-circular lateral clear areas. Most of ventral surface lighter, fulvous.

Length 4.24 mm., width (hemelytra) 1.52 mm.

Holotype, male, No. 3954, California Academy of Sciences, beaten by Mr. H. E. Hinton and the author from the foliage of alder, *Alnus acuminata*, at Real de Arriba, District of Temascaltepec, Mexico, V-24-'33, elev. 6370 ft. Allotype, No. 3955, California Academy of Sciences, same data as type and numerous paratypes from Real de Arriba, the village of Temascaltepec and elsewhere in the district from May twenty-fourth to the middle of July, 1933, deposited in the collections of the California Academy of Sciences, U. S. National Museum, British Museum and the author.

There is considerable color variation in the series of paratypes, the red becoming much more pronounced on the head, pronotum, and cuneus and even on the abdomen in specimens which are slightly tenerel. Also some specimens are much lighter and the fuscous spots of the corium are often much more numerous.

Two New Neotropical Species of *Murmidius* (Colydiidae, Coleoptera).

By HOWARD EVEREST HINTON, Zoological Laboratory,
Cambridge, England.

For the first new species herein described, the writer is indebted to Dr. E. A. Chapin of the United States National Museum through whom the loan of the above institution's neotropical Colydiidae was secured. For the opportunity of studying the second new species, the writer wishes to express his

thanks to Mr. G. J. Arrow of the British Museum (Natural History).

Until now only five species of the genus *Murmidius* Leach have been described, and of these one, *M. ovalis* Beck. (1817), has now become cosmopolitan, one, *M. segregatus* Waterh. (1876), is indigenous to the Mascarene Islands, and the remaining three are neotropical.

***Murmidius chapini* sp. n.**

Broadly obovate, moderately convex; moderately densely clothed throughout with extremely fine (mag. X 144), short, suberect to recumbent, pale hairs. Cuticle rufo-piceous, shining.

Head apparently impunctate but actually microscopically punctate with punctures which are mostly separated by two to four times their diameters.

Prothorax at broadest point near base more than twice as broad as long (50:21). Apical margin between inner margins of antennal cavities much narrower than base (30:50) and four times as broad as greatest transverse diameter of antennal cavities (30:7), feebly, arcuately sinuate; sides margined, feebly arcuate and moderately converging towards apex; base moderately strongly arcuate and nearly evenly so, but very feebly bisinuate on each side. Surface very finely punctate, but with the punctures distinctly coarser than those of head and separated mostly by two to three times their diameters; near sides with the punctation becoming slightly finer; near antennal cavities and on a single row near apical margin with the punctures about ten times as coarse and separated mostly by about once their diameters.

Elytra more than three times as long as prothorax (70:21) and broadest near basal one-half. Near humeri with a small and moderately strongly gibbous area. Not striate. Surface with the punctures about four times as coarse as those of pronotum and usually separated by twice their diameters.

Prosternum with the prosternal striae very broadly separated, gradually diverging towards apex and near apex becoming finer and diverging distinctly more strongly outwards, striae hardly attaining apical one-sixth; striae in front of anterior coxal cavities extending obliquely outwards, nearly straight, not quite attaining apical margin. Mesosternum anteriorly broadly and arcuately rounded, without a marginal stria at middle; at sides with the marginal stria rather sharply sinuate at middle. Meta-

sternum with a very finely impressed, complete, median, longitudinal line on disk; surface of disk nearly as finely as, but more sparsely punctate than, head; at sides slightly more densely and coarsely punctate than elytra. Ventral abdominal segments about as coarsely and densely punctate as pronotum. Length, 1 mm.; breadth, .7 mm.

Type: In the collection of the United States National Museum. GUATEMALA: Alta Vera Paz, Cacao, Trece Aguas, IV-27-1906 (*Barber, Schwarz*).

The writer takes great pleasure in naming this species after Dr. E. A. Chapin to whom he is indebted for numerous favours.

The new species may be distinguished from *M. irregularis* Reitt. (1877) by its much less convex form and more closely punctate elytra without any trace of having the punctures arranged in rows. Its much more densely punctate elytra will serve to separate it from *M. rectistriatus* Lewis (1888).

Murmidius globosus sp. n.

Broadly obovate, very strongly convex; moderately sparsely clothed with very fine, moderately short, recumbent, pale hairs. Cuticle shining, black to dark rufo-piceous; antennae, legs and margins of many sclerites paler rufo-piceous.

Head with a prominent carina extending from inner posterior portion of eye to base of clypeus. Surface microscopically alutaceous, obscurely, microscopically punctate with the punctures separated mostly by about three to four times their diameters.

Prothorax at broadest point near base more than twice as broad as long (68:25). Apical margin between inner margins of antennal cavities much narrower than base (68:38) and five times as broad as greatest transverse diameter of antennal cavities (38:7), feebly, arcuately sinuate, but slightly more strongly so just before interior apical angle on each side; sides margined, feebly arcuate and moderately converging towards apex; base moderately strongly and evenly arcuate except for a short, moderate sinuation on each side before basal angle. On pronotum on each side, beginning from inner apical margin of antennal cavity, is a broad, moderately deep, not definitely delimited, longitudinal impression which extends posteriorly and becomes obsolete at about basal one-fifth. Surface sculptured similarly to head.

Elytra four times as long as prothorax (100:25) and broad-

est at about middle; without a gibbous area near humeri. Surface not striate; punctures very fine, only slightly coarser than those of head and pronotum and separated mostly by four or five times their diameters or more.

Prosternum with the prosternal striae very broadly separated, straight, scarcely noticeably diverging towards apex and terminating at apical two-fifths; stria in front on anterior coxal cavity nearly straight, extending obliquely outward and hardly attaining apical one-fourth. Mesosternum anteriorly broadly and arcuately rounded, with the marginal stria obscure but complete; at sides with the marginal stria oblique but straight, not sinuate. Metasternum with a very finely impressed, median, longitudinal, complete line on disk; surface of disk about as finely punctate as pronotum and with the punctures seldom separated by as little as four times their diameters; at sides strongly, microscopically alutaceous, more sparsely, but not more coarsely, punctate. Ventral abdominal segments with the basal segment at middle punctate similarly to metasternal disk and at sides strongly alutaceous; four apical segments strongly and microscopically alutaceous throughout. Length, 1.5 mm.; breadth, 1.2 mm.

Type: In the collection of the British Museum (Natural History). CHILI: (*Germain*).

Paratypes: Two with same data as above.

This new species may be distinguished from the cosmopolitan *M. ovalis* Beck by the complete absence of any arrangement of the elytral punctures in rows and by the absence of a gibbous portion near humeri. It is close to none of the described neotropical species.

A New Sub-Alpine Genus of Halticini From North America. (Coleop.: Chrysomelidae).

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

Orestioides gen. nov.

A genus of Halticini related to *Crepidodera* and *Orestia*. Metafemora evidently dilated, oblong oval. Antennae eleven-segmented, about half as long as body, the segments except the last less than twice as long as broad. Head with frontal tubercles strongly delimited in front, feebly delimited behind,

somewhat confluent at middle. Pronotum with a transverse basal impression at basal fourth delimited at ends by longitudinal impressions extending from the base for a third the length of the pronotum; base of pronotum not margined. Elytra with a scutellar and nine discal unimpressed series of punctures which become more or less obsolete before the apex, the ninth series at basal fourth more than twice as distant from the margin as from the eighth series. Prosternum densely coarsely punctate, produced behind and expanded behind the procoxal cavities, which are closed behind, the apex of the prosternum with a feebly differentiated mesal area that is feebly delimited by a pair of feeble carinae that do not extend in front of the procoxae. Metasternum narrowly produced in a margined lobe between the mesocoxae, completely covering the mesosternum.

Type: Crepidodera robusta LeC.

Orestioides runs to *Crepidodera* and *Orestia* in Heikertinger's key (Kol. Rund., XI, 1924, p. 42) possessing the shorter submonilliform antennae of *Orestia* and the prosternum of *Crepidodera*. From other related genera (*Derocrepis*, *Chalcooides*, *Hippuriphila*, and *Ochrosis*) it is distinguished by the form of its frontal tubercles, which are feebly delimited behind. I derive the name from the closely related *Orestia*, whose seventeen species are confined, for the most part, to the mountainous regions surrounding the Mediterranean Sea.

CREPIDODERA ROBUSTA LeC. (Proc. Bost. Soc. Nat. Hist., XVI, 1874, p. 274.—Horn, Trans. Am. Ent. Soc., XVI, 1889, p. 239-241.—Heikertinger, Kol. Rund., XI, 1925, p. 65) was known to Horn by three specimens from the White Mountains of New Hampshire. Recently Mr. W. J. Brown (Can. Ent., LXIV, 1932, p. 209) recorded three specimens from Thunder Bay, Quebec, opposite Anticosti Island on the north shore of the Gulf of St. Laurence, and I have seen another specimen collected by him from an altitude of 3500 feet on Mt. Albert, Gaspé County, Quebec, on the south shore of the Gulf of St. Laurence. I have two specimens from Mt. Rainier, Washington, one taken by myself under a stone at Paradise Park (about 5500 feet) and one taken by Mr. S. E. Crumb near Tipsoo Lake (elevation 5314 feet).

Horn's description fits the material I have seen (two speci-

mens from Quebec and two from Washington) except that the pronotum is about seven-tenths as long as wide, not nearly twice as wide as long as described by Horn.

I am much indebted to Mr. W. J. Brown of the Canadian Department of Agriculture, for the loan of specimens of this interesting species.

Note:—Since submitting the above for publication, I took on July 19, 1935, a series of forty specimens of this species sweeping marsh grass at Longmire Springs on Mt. Rainier (elevation 2760 feet).

C. F. W. Muesebeck Named Division Head in U. S. Bureau of Entomology.

C. F. W. Muesebeck succeeds Harold Morrison as leader of the Division of Insect Identification in the U. S. Department of Agriculture, Lee A. Strong, Chief of the Bureau of Entomology and Plant Quarantine, announced on October 31 last.

Doctor Morrison, who has been in immediate charge of the unit for the identification and classification of insects since July 1, 1928, will resume his studies on the classification and identification of scale insects, on which he is one of the world's leading authorities.

Mr. Muesebeck, who has been associated with the division he now heads since 1931, as assistant leader for most of that time, is recognized as one of the foremost authorities on parasitic wasps, his contributions to the classification of certain groups of Braconidae having attracted the attention of entomologists throughout the world. He has made important contributions also to information on the habits of parasites. Mr. Muesebeck had charge of one of the department's field laboratories in Europe for the collection and importation of parasites of insect pests of forest trees. He is a native of New York state and a graduate of Cornell University.—U. S. DEPARTMENT OF AGRICULTURE, OFFICE OF INFORMATION.

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.—Bilsing, S. W.—Creating an entomological atmosphere in the south. [12] 28: 739-745. Bolivar, I.—El VI Congreso Internacional de Entomologia, Madrid. [EOS] 11: 97-100. Decker, G. C.—The parasites of some lepidopterous stalk borers in Iowa. [Iowa Jour. of Sci.] 9: 567-580. Felt, E. P.—Lights for light traps. [12] 28: 834. Jaeger-Podcetrtek, Dr.—Einfache entomologische mikropräparate. [17] 53: 15-16. Jones, M. P.—A peculiar insect situation along a seashore. [10] 37: 150-151. Kennicott, R.—Biographical note by D. C. Peattie. [Prog. Active, Chicago Ac. Sci.] 61: 71. Miller, N. C. E.—An improved air-pump for use in the preservation of larvae. [22] 26: 355-356, ill. Robertson, C.—Obituary by H. B. Parks. [19] 30: 163-164. Schenkling, S.—Ueber die alten auktionskataloge von Johann Carl Megerie. [109] 2: 153-156. Seitz, A.—Die zunehmende insektenarmut der kulturlandschaft. [17] 53: 1-5, 23-28, cont. Strand, E.—Miscellanea nomenclatorica zoologica et palaeontologica. [Folia Z. et Hydrob., Riga] 7: 300-306. Sweetman, H. L.—Successful examples of biological control of pest insects and plants. [22] 26: 373-377. Wheeler, L. R.—Do birds attack butterflies. [Sci. Progress, London] 30: 272-277.

ANATOMY, PHYSIOLOGY, ETC.—Abbott, C. E.—The ovipositing mechanism of *Tremex columba*. [6] 43:

- 337-340, ill. **Doyle & Metz**.—Structure of the chromosomes in the salivary gland cells in *Sciara* (Diptera). [92] 69: 126-135, ill. **Eidmann, H.**—Ueber die morphologie der legeröhre der nönne, *Lymantria monacha* (Lymantriidae). [Zool. Anz.] 111: 104-108, ill. **Eltringham, H.**—On the brush-organs of the male *Lithosia griseola*. [36] 83: 7-9, ill. **Emerson, A. E.**—Termitophile distribution and quantitative characters as indicators of physiological speciation in British Guiana termites. [7] 28: 369-395, ill. **Emmart, E. W.**—Studies of the chromosomes of *Anastrepha* (Trypetidae). [10] 37: 119-135, ill. **Evans, A. C.**—Studies on the influence of the environment on the sheep blow-fly. [116] 27: 291-307. **Fraenkel, G.**—A hormone causing pupation in the blow-fly. [Pro. R. Soc. Lond.] B, 118: 1-12, ill. **Gaebler, H.**—Ueber die funktionsfaehigkeit der stigmenhorner einiger dipterenlarven und puppen. [97] 55: 182-187. **Hanna, A. D.**—Fertility and toleration of low temperature in *Euchalcidia caryobori* (Chalcidinae). [22] 26: 315-322, ill. **Jollos, V.**—Studien zum evolutionsproblem. [97] 55: 390-436, ill. **Katsuki, K.**—Weitere versuche ueber erbliche mosaikbildung und gynandromorphismus bei *Bombyx mori*. [97] 55: 361-383, ill. **Mani, M. S.**—The nature and origin of insect colours. [Current Sci., Calcutta] 4: 142-145. **Marshall & Staley**.—Autogenous strains of *Culex pipiens* (Diptera). [31] 136: 641. **Mellanby, K.**—The evaporation of water from insects. [Biol. Rev. Camb. Phil. Soc.] 10: 317-333. The structure and function of the spinacles of the tick. [116] 27: 288-290, ill. **Mellor, J. E. M.**—Fly developing at a constantly very low temperature. [8] 71: 211. **Metalnikov & Meng**.—La tuberculose chez courtillières (*Gryllotalpa vulgaris*). [77] 119: 1102-1103. **Muliyil, J. A.**—The Y-granules in *Stenobothrus viridulus*, *Forficula auricularia*, *Agrotis segetum* and a few other insects. [Jour. R. Microsc. Soc.] 55: 184-197, ill. **Netolitzky, F.**—Ueber den wert mikroskulptur unterschung bei käfern. [Mikrokosmos] 28: 177-178, ill. **Nevin, F. R.**—Anatomy of *Cnemidocoptes mutans*, the scaly-leg mite of poultry. [7] 28: 338-367, ill. **Nieschulz, O.**—Ueber die larvenstadien von *Tabanus rubidus* u. *T. striatus*. [Zeit. f. Parasitenk., Berlin] 7: 639-656. **Oku u. Furiikawa**.—Experimentelle hervorrufung neuen geäders bei insekten bei versuche an libellen. [97] 55: 245-250, ill. **Pilat, M.**—The effects of intestinal poisoning on the blood of locusts (*Locusta migratoria*). [22] 26: 283-288, ill. **Poll, M.**—Recherches histophysiologiques sur les tubes de

Malpighi du *Tenebrio molitor*. [Recu. Ins. Zool. Torley-Rousseau] 5: 1-126, ill. **Popovici-Bazosanu, A.**—Beitrag zur kenntnis der subcoxa der insekten. [34] 111: 32-35, ill. **Reynolds, J. M.**—A new contribution to the problem of segmentation in the arthropoda. [Am. Jour. Sci.] 30: 373-382. **Schmidt, U.**—Beiträge zur anatomie und histologie der Hydracarinae besonders von *Diplodontus despiciens*. [46] 30: 99-176, ill. **Schultz, W.**—Ein voll-albino mit kaelteschwarzbarer iris und unmittelbarer aktivierbarkeit seiner versteckten farbungs-gene. [97] 55: 384-385. **Sen, S. K.**—The mechanism of feeding ticks. [116] 27: 365-368, ill. Structure of the proboscis in blood-sucking Diptera. [31] 139: 479. **Sharif, M.**—On the presence of wing buds in the pupa of Aphaniptera. [116] 27: 461-464, ill. **Skoblo, J. S.**—The effect of intermittent starvation upon the development of larvae of the meadow moth (*Loxostege sticticalis*). [22] 26: 345-354. **Smith, H. M.**—Synchronous flashing of fireflies. [68] 82: 151-152. **Snell, G. D.**—The determination of sex in *Habrobracon*. [Pro. Nat. Acad. Sci.] 21: 446-453. **Stehli, G.**—Ein Musikant des sommers: die feldgrille. [Kosmos] 1935: 260-262, ill. **Sutherland, J. L.**—Notes on the histology of the alimentary canal in some Australian termites. [Pro. R. Soc. Victoria] 47 (n.s.): 1-13, ill. **Tirelli, M.**—Per la migliore conoscenza degli stadi embrionali tipici illustrati dal Grandori nel *Bombyx mori*. [Arch. Zool. Italiano] 21: 485-501, ill. **Trägardh, I.**—Concerning the mouth-parts of the oribatids. [28] 52: 209-217; 53: 119-122, ill. **Weber, H.**—Der bau der imago der Aleurodinen. [Zoologica] 33, Lief. 6, hft. 89: 71 pp., ill. **Wigglesworth, V. B.**—The regulation of respiration in the flea, *Xenopsylla cheopis* (Pulicidae). [Pro. R. Soc. Lond.] B. 118: 397-419, ill.

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mals, from the Protozoa to man. The chapter on insects (107 pages) gives a brief systematic survey and a detailed account of the social insects and other forms of greatest popular interest. Volume 2 covers the plant world, gives a great deal of ecological matter and finally a very comprehensive account of man himself, his anatomy, physiology, his relations to other animals and plants and his individual and social development. In these latter chapters the principal insects of importance in man's life also have a place. The late Sir J. Arthur certainly loved the great world of animal life and his enthusiasm led him to put into this book not only his great store of detailed knowledge but also his thoughts, judgments and his philosophical interpretations, so that the book contains much of his own personality. Either volume may be opened at random and read with pleasure. There is an index of 75 pages.—

R. G. SCHMIEDER.

A New Species of *Cybaeus*. (Araneae : Agelenidae).

By HARRIET EXLINE, University of Washington, Seattle,
Washington.

***Cybaeus bulbosus* n. sp.**

♀ : 7.5 mm.—8.0 mm. Cephalothorax orange with a few radiating marks, rather slender; chelicerae same color, a little geniculate at the base and quite well armed with bristles, especially along the median surface. Legs same color as cephalothorax becoming a little darker toward the tips; anterior tibiae with three pairs of spines and two or three lateral spines. Sternum, endites and labium same color as cephalothorax, except that the endites are a little lighter at their tips. The lower margin of the furrow of the chelicera is armed with four or five small teeth and several denticles. Posterior eyes distinctly recurved, seen from above, equal in size and distantly and equally spaced. Anterior eyes in a row almost straight seen from the front, equally spaced; median eyes only half the diameter of the lateral eyes. Clypeus twice as high as the anterior lateral eyes. The abdomen is yellowish gray with irregular splashes of dark gray on the anterior part and three or four definite dark gray chevrons on the posterior third.

Epigynum with a medium-sized posterior atrium which does not include a posterior wall. Under the chitin of the epigynal area a small dark pair of sacs are conspicuous just anterior to the atrium; two larger pairs of sacs are perceptible through

the chitin, one lateral to the atrium, one antero-lateral anterior to the first mentioned pair. (Figure of epigynum.)

Holotype: Female, captured at Honeysuckle Ranger Station, IDAHO, Aug. 16, 1934. M. H. Hatch.¹ (Author's collection.)

Paratypes: 1 female, from St. Joe National Forest, IDAHO, Aug. 16, 1934, M. H. Hatch (A. M. N. H.); and 1 female from Newman L., Spokane County, WASHINGTON, Aug. 15, 1934, M. H. Hatch. (Author's collection.*)

This species differs from other species of *Cybacus* except *Cybacus chaudi*s Exline (Pan-Pacific Ent. xi, 1935, p. 131) in possessing three pairs of receptacular sacs. From *C. chaudi*s it differs in its small size, dark color, and the lack of a definite pattern in the anterior part of the abdomen with the dark chevrons in the posterior part (*C. chaudi*s has a faint narrow median band of chevrons along the entire dorsum.)

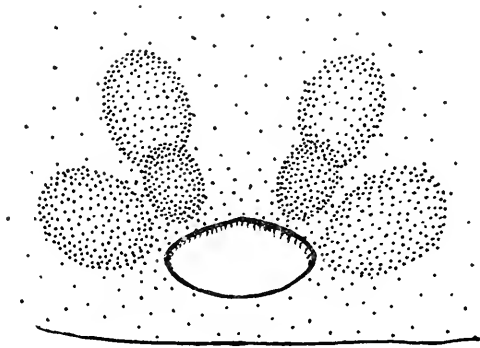


Figure of epigynum of *C. bulbosus*.

*The author wishes to express her indebtedness to Dr. M. H. Hatch of this University for this collection.

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ENTOMOLOGICAL NEWS

VOLUME XLVII, 1936



HENRY CHRISTOPHER MCCOOK,
1837-1911.

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JANUARY, 1936

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

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No. 1

The Future of Entomology.

Today I received a letter from a distinguished entomologist, in which he remarks that the Director of a large museum "is not the least bit interested in entomology." I have known several similar cases, of very keen and able zoologists, to whom insects made no appeal whatever. Nevertheless, entomology is bound to increase, in volume and importance. The vast numbers of insects, and their significance in relation to disease, agriculture, genetics, evolution, and general culture, give them a place in human affairs which cannot be denied. Under these circumstances, entomology claims ever increasing support. Dr. Lutz once remarked that if the insects were as well taken care of as the birds at the American Museum, it would be necessary to have seventy curators. Indeed, that was a modest estimate. Thus it results that in large institutions there is bound to arise a conflict of interests, because entomology is continually demanding space, cabinets, means for publication, not to speak of curators. Those in the higher positions are hardly ever entomologists, and cannot be expected to sympathise with these demands, if they can only be met by cutting down expenses in other directions. We are reminded of the early days of the Smithsonian Institution when Professor Henry resisted proposals to use the Smithsonian funds for a museum, feeling that they were insufficient, and the result would be unsatisfactory. Baird was appointed curator, and he had very different ideas. He longed to see a great National Museum. Baird and Henry did not quarrel, because Baird, with his tremendous sincerity and enthusiasm, went out and persuaded Congressmen and others to support the museum, so that it became an asset rather than a liability to the Smithsonian. It seems to me that entomologists must do likewise. They will get little by appeals to presidents, directors, or even scientific colleagues who are not entomologists. They will have to go out and find their public, and carry on a campaign throughout the country, until their reasonable demands are granted. T. D. A. COCKERELL.

A New Species of *Tracheloides* (Hymenoptera: Sphecidae).

By GRACE ADELBERT SANDHOUSE, Bureau of Entomology and Plant Quarantine, United States Department of Agriculture.

The following description of an apparently new species of *Tracheloides* from Colorado adds to the present known fauna of North America the first record of this genus, although Cockerell¹ described a fossil wasp, *Tracheloides mortuellus*, from the Tertiary shales at Florissant, Colorado, the description being based chiefly on characters of the wing-venation. While the writer has not seen any other species belonging in this genus, the species here considered agrees well with all the characters given for the group by Kohl² in his treatment of *Crabro* of the Palearctic region. In his table to species-groups (pages 18-21), the present species will run to the first part of complet 4, or *Tracheloides*. Additional characters of the genus may be found in the same paper on page 322.

Tracheloides hicksi, new species.

♀.—About 9 mm. long; entirely black, except for markings of ivory white on tibiae; pubescence silvery white. It may be separated from any other species of Crabroninae of the Nearctic fauna known to the writer by the following combination of characters: Anterior trochanter long; mandibles bidentate; eyes with fine short pubescence, inner margins converging slightly below; maxillary palpi with six joints; labial palpi with three.

Head, when seen from above, with sides nearly parallel, without modifications; dull, microscopically tessellate, punctures shallow and widely separated. Eyes with fine short pubescence, converging slightly below, distance between inner margins at lower and upper extremities as 2.5 to 3.25. Front above dull and tessellate, with sparse fine pubescence, lower part shining, laterally densely, more coarsely, pubescent; small median spine a short distance above antennal sockets, sockets separated from inner margin of eye by at least twice the distance between them. Vertex slightly convex, declivitous above occipital carina; ocelli forming a low triangle; postocellar line twice the distance between lateral and anterior ocelli, in proportion to ocelloocular

¹ Bul. Mus. Comp. Zool., Harvard College, vol. 50, 1906, pp. 45-46.

² Ann. des K.-k. naturhist. Hofmuseums, Bd. 29, 1915, pp. 11-453.

line as 2 to 2.5. Facial fovea shallow, slightly wider posteriorly, contiguous with inner margin of eye, beginning about opposite anterior margin of lateral ocellus and extending forward beyond anterior ocellus by a little more than its diameter. Occipital carina ordinary, becoming obsolete some distance from median line of venter of head. Clypeus laterally finely aciculate and punctate, medially shining between large shallow punctures separated by at least twice their diameter; median truncate produced portion of apical margin anteriorly with two V-shaped emarginations; on each side, about half-way between basal-lateral angle of projection and lateral extremity of clypeus, a rather narrow tooth. Postgenae broad, unmodified, sculpturing similar to that of vertex. Apex of mandible bidentate, superior tooth nearly twice as large as inferior; inner margin with two low teeth separated by a shallow emargination. Labial palpi with three joints, maxillary palpi with six. Third joint of antenna longer than fourth (as 2. to 1.5) or than any of those distad.

Thorax dull, microscopically tessellate and minutely carinate or striate, punctures shallow and widely separated; pubescence short and inconspicuous; anterior-lateral angles of pronotum rounded, pronotum not transversely carinate, but with a posterior transverse groove; anterior declivous portion with several low carinae just before the tubercle; mesoscutum and scutellum microscopically tessellate, median posterior portion of mesoscutum longitudinally striate; suture between mesoscutum and scutellum rather shallow and weakly foveolate; prepectal carina of mesopleuron sharply defined, lower half of mesopleuron and position cephalad of mesepisternal suture tessellate, upper posterior portion horizontally carinate; metatergum finely tessellate and punctate; metapleuron and lateral surface of propodeum horizontally carinate; dorsal surface of propodeum with fine radiating carinae, not bordered posteriorly by a furrow or carina.

Legs black, with stripes of ivory white extending the entire length of anterior and middle tibiae and a spot on outer base of hind tibia extending nearly half its length. Anterior trochanter long, its length in proportion to that of femur as 2.5 to 4; middle femur of uniform width, metatarsus finely serrate and spined on posterior margin; hind femur ordinary, tibia strongly narrowed basally, with rows of short spines, metatarsus slightly arcuate, inner margin with a row of dense short spines, outer with four longer spines.

Wings hyaline, faintly iridescent; nervures piceous; radial cell apically truncate, receiving intercubital vein about midway

on its lower margin; cubital cell receiving first recurrent vein about midway on its lower margin.

First abdominal tergite nearly five times as wide at extreme apex as at narrowest part of base; tergites one to three with apical margins constricted, third less strongly so; first and second tergites dull, with stronger aciculations, third and fourth shining between weaker aciculations, each with a submarginal row of stiff hairs, fifth and sixth duller, microscopically tessellate between large shallow punctures, on fifth and sides of sixth the punctures separated by three or four times their diameter, on the median base of sixth by almost twice their diameter; pygidial area strongly narrowed apically, with a median groove, sides of apical portion nearly parallel and not carinate. Sternites one to five shining, somewhat aciculate, each with a submarginal row of long hairs; sixth with punctures similar to those of sides of that tergite.

Type.—Female, from Boulder County, COLORADO, July 28, 1933, collected by Charles H. Hicks and bearing his number 3216. Some observations on the habits of this wasp will subsequently be published by Mr. Hicks. The type is in the collection of the U. S. National Museum; catalogue No. 50488.

Tracheloides hicksi Sandhouse Hunting Ants (Hymen.: Sphecidae).

By CHARLES H. HICKS, Burbank, California.

This new species of wasp was found late in July and early in August in Boulder Canyon, near Boulder, Colorado capturing ants of the genus *Liometopum* (Dolichoderinae). Some of the worker ants, which Dr. T. D. A. Cockerell has kindly determined for me, doubtless serve normally as food for the young of the wasp. Mr. C. H. Graves of Colorado Springs, Colorado, has taken photographs showing the peculiar nest structure of ants of the genus *Liometopum* and Professor William Morton Wheeler gives a review of these ants in a paper entitled "The North American Ants of the Genus *Liometopum*" in the Bulletin of the American Museum of Natural History, Vol. xxi, Art. xx., pp. 321-333, 1905. The following brief notes on the habits of the wasps and ants were taken at a rather limited

region some two miles west of Boulder, although a few specimens of the wasp have been seen farther up the canyon over a more extended area.

The wasps were first found on a very hot, clear afternoon on July 28 at a small pine tree growing on the side of the canyon near Boulder Creek. The wasps were observed following the ants along the tree trunk; certain of the ants appeared to be carrying scale insects, possibly the Pine Leaf Scale, *Chionaspis pinifoliae* (Fitch). The ants seemingly followed "paths" up and down the tree, mainly in the shade, and upon leaving the tree continued in the same manner on the ground toward their nest.

A given wasp, upon arriving at the tree, would start usually near the bottom of the moving column of ants, beginning some two feet from the ground and continue up the trunk flying, and very close to the ants. It could be seen that a single ant was quickly picked out from the rest and followed to a greater or less distance. In most instances, several separate individuals were followed in quick succession since the wasp might abandon her prey at the upper end of the trail, drop below and follow another, repeating this sequence a number of times before a "catch" was accomplished. She did not follow any one individual down in regular order although a few times and for short distances the course was downward. The ascent was comparatively slow on the part of the ant which made the wasp, even in active pursuit, appear to be hovering in the air in part as she followed close to the tree trunk and in a position to pounce upon the ant at the propitious moment. The ants, or a given ant, which was being followed seemed to sense the danger, for it increased its pace substantially or, as noted in a few instances, fell to safety to the ground.

Observations of repeated efforts by the wasp demonstrated certain facts. The wasp, after a longer or shorter period of hesitation or of stalking, suddenly would seize a worker ant from the trunk or limb of the tree. She then and at once would fly to a horizontal position with her prey. The flight often took the wasp and prey through and among the pine

needles, which made it difficult for the observer to follow the course. The needles being thick, the wasp sometimes did not easily find a suitable horizontal and open landing and would then continue flying to the limb of a tree nearby.

It appeared that the ant was first grasped with its head in the same direction as that of the wasp and with its dorsal side touching the ventral side of the wasp. I was able to see the prey held a number of times by the wasp when this position was noted. However, it could not be detected precisely by what means the prey was held, although the legs played a part and the sting apparently not. The wasp, at one time after she had alighted with her prey, was seen to bring her stinger around in position for stinging but its exact insertion and place could not be seen from my point of observation. It would appear, therefore, that after the wasp "nerves" herself to seize an ant from the tree, she immediately and hurriedly flies to a limb or suitable resting position to sting her victim.

Given wasps were observed as each, in turn, followed ants up the tree and it was found that the time spent in "stalking," before a seizure, lasted from forty seconds to two, and occasionally more than three, minutes. The time before a wasp, following a capture, was back for another prey, was on the average some one and one-half minutes.

Several wasps were frequently about at the same time hunting and catching prey. At certain times, however, as few as one or two lessened the difficulty of keeping an individual record. Sometimes a wasp would rest on the trunk of the tree for a few seconds. At such a time an ant might walk very near to it but the resting wasp would not attack it. It was only while the wasp was on the wing that the prey was seized. This was evidenced during the time that more than fifty captures were witnessed.

Sometimes the paths of two wasps cross in hunting and their reactions at such times have been noted. Such a contact may occur when one wasp is hunting up the tree while another is trailing downward. They do not fight one another, when suddenly meeting in this fashion, but fly quickly to another side

of the tree or, as seen in a few cases, entirely away for a time. Frequently a number of wasps may be hunting up the trunk of the tree at the same time, each intent upon its own ant and at a rather definite distance apart. After a capture, if the wasp fails to find a landing near she may fly high into the air and swiftly away. All attempts to follow these ants to their nests have proven futile.

Much time has been spent in an effort to find the nest of this wasp species by other means than that of attempting to follow the insect with her prey to her nest. Many sumac and other stems have been opened but no cells of the wasp nor remains of the ants have been found. Likewise time has been directed to watching areas of varied types of soils and of sand during the nesting season but with no greater success. It is not known at present how rare this species of wasp really is, nor how specific it may be as to prey preference—factors which may partially explain these failures in nest discovery and which, with others, may delay the time when its nest may be found and the biology of the species studied.

Two New Color Forms of *Polistes major* Palisot de Beauvois from California and Arizona (Hymenoptera : Vespidae).

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

A small collection of social wasps recently received for study from Dr. L. P. Wehrle, of the University of Arizona, contains several specimens of a well-marked form of *Polistes* which appears to have been overlooked thus far. Another related color form, also undescribed, from California, has been in my collection for some years.

Both new forms are color variations of *Polistes major* Palisot de Beauvois, which differs from all other *Polistes* of the United States in frequently (though not always) showing a prepectal (or epicnemial) suture on the mesopleura. When well-marked, this suture runs as an irregular, raised line on the

anterior part of the mesopleura, parallel with and a little above the vestigial sternopleural suture; anteriorly it curves upward and may extend to near the median episternal suture. The prepectal suture may, however, be sometimes very slightly marked or occasionally entirely lacking. All transitions may be found between the two extreme conditions. Since specimens with and others without prepectal suture occur together, in some instances being taken from the same nest, while they show no difference in other structural characters, I am forced to regard them all as belonging to one species. Nevertheless, it is noteworthy, that on the American continent specimens with prepectal suture are more common, while in the West Indies the reverse is true.

Apart from the prepectal suture, *P. major* may also be recognized by the following structural characters. Large species, with a fusiform, more or less depressed abdomen, moderately pointed and not compressed at apex; first tergite broad and short, triangular seen from above and a little wider at apex than long in the middle. Mesopleura microscopically alutaceous, without larger punctures; median episternal groove well developed, completely dividing the episternum into an upper and a lower sclerite; mesepimerum completely divided by a suture from the mesepisternum. Transverse striation of propodeum strong throughout, with some 20 to 22 regular ridges. Anterior margin of pronotum raised into a low collar, the humeral angles broadly rounded off and hardly projecting. Eyes bare. Vertex and upper half only of cheeks margined behind by a carina; lower half of cheeks rounded off into the gula. Oculo-malar space of female and worker long, about two-sevenths (less than one-third) of the length of the eye in front view; of male slightly over one-third of the length of the eye in front view. Clypeus of female and worker irregularly heptagonal in outline, with the upper margin the longest, slightly wider than high; upper lateral margins contiguous to the eyes for a short distance (about one-third of the length of the non-contiguous portion, and about one-fourth to one-third of the length of the oculo-malar space); apical margins converging to a strongly produced, but blunt, point.

In the male, the clypeus is flattened, about as long as wide, subquadrate in outline with the lateral angles broadly rounded off, and very widely separated from the inner orbits by exten-

sions of the sides of the face which reach the oculo-malar spaces; the apical margin almost straight, very slightly curved outwardly. Antenna of male slender, thread-like, the apical four segments conspicuously thinner than the others; all segments of normal shape, the third about as long as the scape and as the fourth and fifth together; the following decreasing in length to the twelfth, but all much longer than wide; the thirteenth very slender, faintly curved, about one and one-half times the length of the twelfth, obtuse at apex; sixth to thirteenth segments distinctly flattened on the under side. Seventh sternite of male without median tubercle, evenly depressed apically, but not grooved; the bordering slopes low and not projecting at the sides of the apical margin in profile. Genitalia of male of the usual type, very similar to those of *P. carnifex* (Fabricius), but the slender shaft of the penis shorter and ending in a small, short oval spoon.

Length (head + thorax + tergites 1 + 2) of female and worker: 13 to 17 mm.; of male: 16 to 17 mm. Length of fore wing: 16 to 23 mm.

P. major is most closely related to *P. carnifex* (Fabricius), with which it is often confused in collections, owing to the similarity in color of typical *P. major* and *P. carnifex*. All published records of *P. carnifex* from the Antilles refer, in my opinion, to *P. major*. Structurally *P. carnifex* may be recognized by the large, much swollen head. In female, worker, and male, the oculo-malar space is very long, one-third to one-half of the length of the eye seen in front; the sides of the clypeus touch the eyes over a very short distance or just barely, or may be even very narrowly separated from the inner orbits. Mesopleura with small but distinct, scattered punctures, never with even a trace of prepectal suture. The shape of the clypeus is much the same in both sexes, being only slightly less convex in the male than in the female. *P. carnifex* averages larger than *P. major*, reaching in length (h. + th. + t. 1 and 2) 17 to 22 mm. and in length of fore wing 23 to 26 mm. As yet I have seen no specimens of true *P. carnifex* from within the boundaries of the United States; but, since the species occurs

in Mexico, there seems to be no reason why it should not be found at least in the extreme southeastern corner of Texas.

P. major is known to me in three color forms.

POLISTES MAJOR, typical form.

Polistes major Palisot de Beauvois, 1813-1820, Insectes Rec. Afrique et Amérique, p. 206 (♀); Atlas, Hymén., Pl. VIII, fig. 1 (type locality: Santo Domingo).

Body extensively chrome-yellow (Ridgway's deep-chrome), with the following parts dark cinnamon-brown to brownish-black (nearest Ridgway's brownish-red): a transverse stripe on the vertex, including the ocelli and the upper margin of the ocular sinuses; the occiput; a narrow apical margin of the clypeus; tip of mandibles; mesonotum; anterior face of pronotum in the middle; sides of propleura; meso- and metasternum entirely, continued over the anterior half of the mesopleura and most of the metapleura; anterior and posterior sutures of post-scutellum; anterior margin of propodeum, extending backward on the sides and continued over the median groove (sometimes as a narrow line only); basal two-thirds of the first abdominal tergite and the entire first sternite; nearly the anterior half of the second tergite and somewhat more of its sternite; base of the two succeeding segments, more or less extensively according to the retraction of the abdomen; and most of the legs, except for a spot on the upper face of the hind coxæ, the tips of all the femora above, and occasionally part of the upper face of the front tibiæ, which are yellow; all tarsi brownish-yellow. The mandibles, antennæ and tegulæ are more ferruginous-brown, the scape and the middle of the flagellum being darker above; the oculo-malar space is often suffused with ferruginous to a varying extent. Wings dark cinnamon-brown all over, darkest along the costa and subcosta; radial cell not more infuscate than the remainder of the wing. In the male the yellow color is slightly more extensive than in the female and worker, covering most of the mesopleura and the under side of the front coxæ also.

Typical *P. major* I have seen from the following localities.—ARIZONA: Apache Camp, Santa Catalina Mts., 5500 ft., Pima County; Palmerlee (or Garces), Cochise County.—MEXICO: Tuxpan, Jalisco; Teotihuacan, State of Mexico; Tepic; Mazatlan.—GUATEMALA.—REPUBLIC OF HONDURAS: Puerto Castilla; Prieta; Lancetilla near Tela.—NICARAGUA: Managua.—CUBA: San José and Mina Carlota, Trinidad Mts., Santa Clara Prov.;

Preston, Oriente; Banes, Oriente; Alto Cedro, Oriente; Santiago de Cuba: Zaza de Media; north of Vinales; Havana; Mazorra; Santiago de las Vegas; Mariel; Herrera, Oriente; Soledad; Balandron; Baragua, Camaguey.—ISLE OF PINES: Nueva Gerona.—SANTO DOMINGO: San Lorenzo, Rep. Dom.; Sanchez, Rep. Dom.; San Francisco Mts., Rep. Dom.; Puerto Plata, Rep. Dom.; La Vega, Rep. Dom.; Romana, Rep. Dom.; Azna; Petionville, Haiti; Grande-Anse, Haiti; Port-au-Prince, Haiti; Carrefour, Haiti; Camp Perrin, Haiti; Cap Haitien, Haiti; Ennery, 1000 ft., Haiti.—TORTUGA ISLAND.—NAVASSA ISLAND.—BAHAMAS: Eleuthera.—BRAZIL: Rio de Janeiro; St. Amaro.

Until recently *P. major* was unknown from Porto Rico. In 1931, Mr. Francisco Seín, Jr., Assistant Entomologist, Dept. of Agriculture Experiment Station, Rio Piedras, Porto Rico, sent me a lot of males of this species from Lares, Porto Rico. He states in a letter accompanying the specimens: "It would be rather surprising that had this species been in Porto Rico all the time, no one should have collected it before. Since it has become common in some parts of the Island after the hurricane of 1928, it has been supposed that it was possibly blown in from some of the other West Indian islands." I quite agree that *P. major* is a recent arrival in Porto Rico, carried thither from Santo Domingo either by a hurricane, as suggested, or by the agency of man. It is an interesting illustration of the ease with which wasps may be transported to and rapidly colonize new territory, a fact which renders them of doubtful value for zoögeographical speculations.

P. MAJOR var. **palmarum**, new variety.

Female and Worker.—Ground color light ferruginous-brown, marked with bright yellow as follows: clypeus; lower half of face (including lower half of ocular sinuses); oculo-malar spaces and lower third of cheeks; mandibles (except brownish-black teeth); under side of scape; narrow anterior and posterior margins of pronotum; diffuse margins and middle line of scutellum; postscutellum; two broad, vertical stripes on propodeum, not reaching postscutellum; a lengthened spot under base of fore wing in upper corner of mesepisternum; broad apical

fasciæ on all tergites and sternites, covering most of fourth to sixth segments, those of second and third tergites with a minute ferruginous spot on each side; most of fore coxæ; a spot on under side of mid coxæ; under side of fore femora; apical spots on all femora. The tarsi are slightly yellowish. Wings rather uniformly infuscated and somewhat russet, with slight purplish reflections.

Holotype: Palm Springs, Riverside County, CALIFORNIA, female, April, 1928 (W. M. Wheeler).—*Paratype*: Palm Canyon, Colorado Desert, Riverside County, CALIFORNIA, 1000 ft., one worker, August 17, 1927 (J. C. Bradley). Both specimens at the Museum of Comparative Zoölogy, Cambridge, Mass.

P. major var. *palmarum* is homeochromic with some specimens of *P. fuscatus* var. *anaheimensis* Provancher, a common wasp of southern California, which was also taken at Palm Springs by Prof. Wheeler. In *anaheimensis* there are, however, usually at least traces of two yellow stripes on the mesonotum, which are lacking in *palmarum*. Moreover, the two wasps are readily differentiated by the shape of the clypeus, the length of the oculo-malar space and the striation of the propodeum. Both type specimens of *palmarum* have a slight prepectal suture in the upper portion of the mesopleura, no trace of which is ever found in any of the forms of *P. fuscatus* (Fabricius).

P. MAJOR var. **castaneicolor**, new variety.

Female and *Worker*.—Almost uniformly dark chestnut-brown. Abdomen and median segments of the flagellum, sometimes also sides of thorax and propodeum, more blackish. Tarsi of all legs dirty yellowish. Wings uniformly infuscated with brown, the costal and subcostal cells somewhat russet; the veins chestnut-brown. Inner orbits in some specimens narrowly yellowish below, as far as the ocular sinus.

Male.—Like the female; but the blackish median part of the flagellum restricted to the upper side; the clypeus, lower half of the face, and under side of fore coxæ generally suffused with yellow.

Holotype: Palmerlee (or Garces), Cochise County, ARIZONA, female (C. R. Biederman).—*Allotype*: Sa Catalina Mts., 3000 to 4000 ft., Pima County, ARIZONA, male (A. A. Nichol).—*Paratypes*: Santa Rita Mts., Pima County, ARIZONA (W. J.

Chamberlin); Tucson, Pima Co., ARIZONA (L. J. Finch); Sa Catalina Mts., Pima County, ARIZONA (A. A. Nichol); Cerro Quemado, San Lorenzo Mts., COLOMBIA (H. L. Viereck); Mt. San Lorenzo, Santa Marta, 5500 ft., COLOMBIA (George Salt).—Holotype and allotype at the Museum of Comparative Zoölogy, Cambridge, Mass. Paratypes at that Museum and at the Department of Entomology and Economic Zoölogy of the University of Arizona.

P. major var. *castaneicolor* is homeochromic with the typical color form of *P. canadensis* (Linnaeus), a common wasp over most of Central and South America. Both these wasps are found together in Colombia; but in Arizona typical *P. canadensis* is not known to occur. The only forms of *P. canadensis* in Arizona are the var. *nacajoc* Cresson, the var. *comanchus* H. de Saussure and the var. *kaibabensis* Hayward, all of which differ markedly in color from *P. major* var. *castaneicolor*.

Notes on North American Orthoptera of the Arctic-Alpine Zone.

By MORGAN HEBARD.

The response of species to an Arctic-Alpine environment is one of the most interesting subjects we have studied in our work on the Orthoptera. Recently we have discussed the survival of the male genitalic form of the instar preceding maturity in rare adults of species occurring in such environment, attributing this defective development to the unusual speed necessary for the imago to pass through its normal instars in the much shorter period of time during which the temperature permits such growth.

The ovoviviparity which occurs in certain Arctic butterflies, reported by Kusnezov¹ and by Klots,² further indicates that speeding up of normal growth occurs even in the egg stage of Arctic-Alpine insects.

¹Horae Ent. So. Ross., 39, p. 634 to 651, (1910).

²EXT. NEWS, XLVI, p. 58, (1935).

In adults of Arctic-Alpine forms, however, diffusion of the normal color pattern, its disappearance in some or obliteration by darkening in others, has been shown to be largely due to the unusually low temperatures to which they have been exposed (probably mainly effective during certain critical periods in the development of the individual).³ The depauperation, increase in robustness and accentuation of irregularities in contour may well be attributable to that same factor.

In establishing the proper status, whether a species, race or phase, of an Arctic-Alpine individual the significance of its apparently very distinctive characters must be carefully considered. We recognize as valid species only those which are not immediately supplanted in the next warmer Zone by a closely allied form. Such are all the species of the genus *Grylloblatta*, certain species of the genus *Bruneria*, *Circotettix maculatus* Scudder, all species of the genus *Ascmoplus*, some species of *Bradynotes* and *Acrodictes philopagus* Rehn and Hebard.

Where we have a fairly constant boreal response separated from the normal type of a species by intergrades over a comparatively narrow area we believe that geographic races should be recognized. Among these are *Circotettix rabula altior* Rehn,⁴ *Melanoplus oregonensis triangularis* Hebard, *Melanoplus borealis borealis* (Fieber), *Melanoplus borealis stupefactus* (Scudder) and *Melanoplus kennicotti nubicola* (Scudder).

Where the transition from a boreal type to the normal type is very gradual, however, extending over a wide area, we do not feel that racial recognition is warranted and have consequently synonymized names proposed for such gradations under *Melanoplus dodgei* (Thomas) and *Melanoplus bruneri* Scudder. The same is indicated in *Acropecllus clavatus* (Thomas). In a number of other species of North American Orthoptera similar gradual transition from the normal to often a quite striking

³Standfuss, *The Entomologist*, XXVIII, p. 69, (1895). See also Folsom, *Entomology with Reference to its Biological and Economic Aspects*, (1906).

⁴This is not an Arctic-Alpine race, but is the most boreal race of the species and occurs from the lower edge of the Hudsonian Zone to the lower portions of the Canadian Zone in the southern Rocky Mountains of the United States.

boreal type has not been known previously and the extremes have not been and should not be distinguished by name. Such we have noted in *Melanoplus montanus* (Thomas) and *Melanoplus fasciatus* (F. Walker).⁵

A certain few widely distributed forms may, however, reach the Arctic-Alpine Zone but show there little or no change from their normal. Among these are *Acrydium subulatum* (Linnaeus), *Chorthippus longicornis* (Latreille), *Melanoplus occidentalis* (Thomas) and *Melanoplus mexicanus* (Saussure).⁶

Much remains to be learned concerning the development of the boreal types of insects, and the Cascades and Rocky Mountains afford a decidedly more satisfactory field than the far North, due to the much greater proximity there of the Arctic-Alpine to the successively warmer Zones.

Though the Sierra Nevada and Sierra Madre of California have a much more varied fauna, this does not hold true there. In those mountains the demarkation of the Zones is so much more decided that there are few cases where species of the Arctic-Alpine can appear much below that Zone, and the species of the surrounding lowlands are in most cases dependent to such a degree on aridity and heat that their distribution usually terminates far below the high mountain summits.

The Coleoptera or Beetles of Georgia, II

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

(Continued from Volume XLVI, page 160.)

OMOPHRONIDAE.

2282—OMOPHRON LABIATUM Fab. Brunswick VIII, 22, '29.

HALIPLIDAE.

2299—HALIPLUS FASCIATUS Aube. Perry IV, 13, '31.

DYTISCIDAE.

2342—CANTHYDRUS GIBBULUS Aube. Macon III, 22, '31.

2347—HYDROCANTHUS OBLONGUS Shp. Okefenokee Swp. V, 7, '32; Brunswick VI, 5, '29.

2351—LACCOPHILUS MACULOSUS Germ. Atlanta III, 25, '31.

⁵ Neither of these species reach in their distribution the Arctic-Alpine Zone.

⁶ Excepting possibly a northern race, the validity of which is in doubt.

- (3); Cleveland V, 4, '28; Rome VII, 17, '31.
 2353—*L. PROXIMUS* Say. Atlanta V, 3, '28; Cleveland V, 4, '28.
 2359—*L. FASCIATUS* Aube. Rome V, 26, '31; Cairo VI, 18, '31.
 2388—*BIDESSUS PULICARIUS* Aube. Waycross V, 15, '32.
 2390—*B. AFFINIS* Say. Baxley IV, 13, '31.
 2394—*B. LACUSTRIS* Say. Albany VI, 1, '32.
 2395—*B. FUSCATUS* Crotch. Okefenokee Swp. V, 6, '32.
 2400—*CELINA ANGUSTATA* Aube. Quitman VI, 17, '31.
 2430—*DERONECTES GRISEOSTRIATUS* DeG. Atlanta III, 25, '31.
 2605—*COPELATUS GLYPHICUS* Say. Albany VI, 1, '32; Clayton VIII, 17, '29.
 2607—*C. CHEVOLATI* Aube. Albany VI, 1, '32.
 2609—*COPTOMOMUS OBSCURUS* Shp. Cleveland V, 4, '28; Folkston V, 8, '32.
 2610—*C. INTERROGATUS* Fab. Savannah IV, 11, '31 (11); Gainesville VI, 24, '31.
 2619—*RHANTUS CALIDUS* Fab. Clayton V, 28, '34.
 2650—*HYDATIUS BIMARGINATUS* Say. Cleveland V, 4, '28; Americus VI, 20, '31.
 2651—*ACILIUS SEMISULCATUS* Aube. Albany VI, 1, '32.
 2654—*THERMONECTES ORNATICOLLIS* Aube. Cleveland V, 4, '28.
 2655—*T. BASILARIS* Harr. St. Simons Is. V, 5, '30; Albany VII, 30, '31; Clayton VIII, 17, '29.
 2659—*GRAPHODERES LIBERUS* Say. Thomasville VI, 19, '31.
 2666—*CYBISTER OLIVIERI* Cr. Cairo VI, 18, '31.
 2667—*C. FIMBRIOLATUS* Say. Toccoa VII, 2, '31; Atlanta VIII, 1, '30.
 2668—*C. ELLIPTICUS* Led. Folkston V, 8, '32; Cairo VI, 18, '31.

GYRINIDAE.

- 2672—*DINEUTES ROBERTSI* Leng. Griffin VI, 12, '27; Toccoa VI, 16, '29.
 2674—*D. DISCOLOR* Aube. Clayton V, 28, '34; Colquit VI, 18, '31.
 2680—*D. AMERICANUS* Say. Atlanta VII, 4, '31.
 2681—*D. HORNII* Rhts. Cleveland V, 4, '28.
 2682—*D. EMARGINATUS* Say. Cleveland V, 4, '28; Folkston V, 8, '32.
 2683—*D. CAROLINUS* Lec. Macon III, 22, '31; Waynesboro IV, 10, '31; Savannah IV, 11, '31 (11); Perry IV, 13, '31 (2); Greenville IV, 28, '31 (5); Fort Valley IV, 29, '31; Col-

umbus IV, 29, '31; Stone Mt. V, 16, '28 (36); Springfield V, 29, '31 (7); Colquit VI, 18, '31 (3); Atlanta VII, 11, '31.

D. CILIATUS Foersh. Macon III, 20, '31; Augusta IV, 10, '31 (7); Tallulah Falls V, 13, '31 (2); Hamilton V, 19, '31; Milledgeville V, 28, '31.

2684—*GYRINUS MINUTUS* Fab. Folkston V, 8, '32.

2699—*G. PERNITIDUS* Lec. Colquit VI, 18, '31.

2700—*G. ANALIS* Say. Perry IV, 13, '31 (5); Stone Mt. IV, 19, '31 (3); V, 10, '29 (5); V, 16, '28 (234).

2707a—*G. BOREALIS*, var. *LUGENS* Lec. Cairo VI, 18, '31.

G. sp. Perry IV, 13, '31.

HYDROPHILIDAE.

2767—*HYDROCHIUS SIMPLEX* Lec. Macon IV, 29, '31.

2777—*BEROSUS PEREGRINUS* Hbst. Atlanta IV, 23, '30; Thomasville VI, 19, '31.

2783—*B. INFUSCATUS* Lec. Colquit VI, 18, '31.

2789—*HYDROUS TRIANGULARIS* Say. Atlanta VII, 14, '32.

2792—*DIBOLOCELUS OVALIS* Ziegl. Cairo VI, 18, '31.

2795—*HYDROPHILUS OBTUSATUS* Say. Cairo VI, 18, '31.

2797—*TROPISTERNUS STRIOLATUS* Lec. Atlanta III, 25, '31; Savannah IV, 11, '31 (10); St. Simons Is. IV, 12, '31; Sandersville V, 3, '31; Cleveland V, 4, '28; Colquit VI, 18, '31; VII, 18, '31.

2805—*T. GLABER* Hbst. Savannah IV, 11, '31; Toccoa V, 14, '30; Ringgold V, 23, '31; Thomasville VI, 19, '31.

2807—*T. LATERALIS* Fab. Baxley IV, 12, '31; Cairo VI, 18, '31; Atlanta VII, 5, '32.

2813—*HYDROBIUS TESSELATUS* Zimm. Ringgold V, 23, '31 (4).

2817—*PARACYMUS SUTURALIS* Lec. Perry IV, 3, '31.

2819—*P. SUBCUPREUS* Say. Macon IV, 29, '31.

2834—*ENOCHIRUS NEBULOSUS* Say. Macon IV, 29, '31.

2835—*E. OCHRACEUS* Melsh. Perry IV, 13, '31.

2836—*E. PERPLEXUS* Lec. Atlanta VII, 4, '31.

2837—*E. CINCTUS* Say. Baxley VI, 5, '29.

SILPHIDAE.

2911—*NECROPHORUS AMERICANUS* Oliv. Jonesboro VII, 2, '29.

2912—*N. SAYI* Lap. Atlanta VII, 7, '31; Stone Mt. XI, 2, '28.

2913—*N. ORBICOLLIS* Say. Blue Ridge VI, 14, '29.

2914—*N. MARGINATUS* Fab. Blairsville VI, 15, '29.

2918—*N. PUSTULATUS* Hersch. Quitman VI, 17, '31.

2920—*N. TOMENTOSUS* Web. Hamilton V, 19, '31; Toccoa VI, 16, '29; Blairsville VI, 26, '31.

2922—*SILPHIA SURINAMENSIS* Fab. Atlanta IV, 14, '32; VIII, 2, '31; Hamilton V, 19, '31 (2); Macon VI, 21, '29; Stone Mt. VIII, 12, '32 (2).

2926—*S. INEQUALIS* Fab. Atlanta III, 31, '35 (52); Hamilton V, 19, '31 (10); Macon VI, 21, '29.

2927—*S. NOVEBORACENSIS* Forst. Atlanta III, 31, 35 (2); VI, 12, '29; Hamilton V, 19, '31.

2928—*S. AMERICANA* Linn. Folkston V, 8, '32; Hamilton V, 19, '31 (6); Toccoa VI, 16, '29.

3027—*LEIODES GEMINATA* Horn. Toccoa VI, 16, '29.

3029—*AGATHIDIUM ONISCOIDES* Beauv. Blood Mt. VI, 25, '31.

3031—*A. DENTIGERUM* Horn. Blue Ridge VI, 26, '31

SCYDMAENIDAE.

3054—*LOPHODERUS ATLANTICUS* Schfr. Toccoa VII, 3, '31.

3099—*CONNOPIRON FOSSIGER* Lec. Clayton VIII, 17, '29.

3121—*C. HIRTELLUM* Lec. Cornelia VI, 28, '31.

3137—*C. CLAVATUM* Lec. Rockmart VI, 25, '32.

3154—*C. BASALE* Lec. Cairo VI, 18, '31.

3171—*SCYDMAENUS CRIBARIUS* Lec. Toccoa VI, 16, '29.

3188—*OPRESUS MISELLUS* Lec. Columbus V, 27, '31.

STAPHYLINIDAE.

3344—*ANTHOBIMUM HORNI* Fauv. Hiawassee VI, 15, '29.

3556—*APOCELLUS SPHAERICOLLIS* Say. Valdosta VIII, 14, '27.

3572—*OXYTELUS INSIGNITUS* Grav. Bainbridge VII, 31, '31.

3676—*BLEDIUS EMARGINATUS* Say. Folkston V, 8, '32.

3686—*B. CORDATUS* Say. Waycross VI, 10, '31.

3715—*STENUS GEMMEUS* Csy. Canton VII, 17, '31.

3872—*EUAESTHETUS AMERICANUS* Er. Dalton VII, 24, '31.

3883—*PINOPHILUS OPACUS* Lec. Atlanta VI, 17, '32; VII, 14, '32.

3892—*PALAMINUS TESTACEUS* Er. Cornelia VI, 16, '29.

3908—*GASTROLOBIMUM BICOLOR* Grav. Toccoa VIII, 16, '29.

3961—*APTERALIUM CAROLINAE* Csy. Tallulah Falls VII, 15, '28.

4260—*ASTENUS PROLIXUS* Er. Ellijay V, 14, '31.

4270—*A. BREVIPENNIS* Aust. Jasper VII, 17, '31.

4383—*OCTOBIUS PARCUS* Horn. Jasper VII, 17, '31.

4393—*PHILONTHUS LAETULUS* Say. Ringgold VIII, 17, '31.

4402—*P. CAUTUS* Er. Sandersville V, 31, '31.

4447—*P. CYANIPENNIS* Fab. Atlanta VI, 7, '28 (6); Sum-

merville VI, 30, '31; Neel Gap IX, 1, '29; X, 7, '30; Stone Mt. XI, 2, '28.

4514—*BELONUCHUS FORMOSUS* Grav. Tate VI, 27, '32.

4515—*B. EPHIPPIATUS* Say. Atlanta VII, 10, '30.

4533—*STAPHYLINUS MACULOSUS* Grav. Cairo VI, 18, '31; Thomasville VI, 19, '31; Stone Mt. VII, 1, '30; VII, 12, '29; Clayton VIII, 17, '29; X, 25, '31.

4536—*S. FEMORATUS* Fab. Griffin VI, 12, '27.

4543—*S. FOSSATOR* Grav. Dahlongega VI, 22, '32; Atlanta VII, 4, '30; VII, 7, '28.

4544—*S. COMES* Lec. Perry IV, 13, '31.

4545—*S. CINNAMOPTERUS* Grav. Atlanta III, 28, '29; V, 30, '29; Tate VI, 27, '32.

4546—*S. VIOLACEUS* Grav. Milledgeville V, 28, '31.

4548—*S. VIRIDANUS* Horn. Blue Ridge VI, 26, 31.

4549—*S. EXULANS* Er. Rome VI, 20, '30.

4555b—*CREOPHILUS MAXILLOSUS VILLOSUS* Grav. Hamilton V, 19, '31 (12); Atlanta V, 21, 30; Jesup VII, 22, '29; Stone Mt. VIII, 13, '32; X, 7, '32.

4586—*QUEDIUS CAPUCINUS* Grav. Atlanta V, 30, '29.

4634—*OXYPERUS VITTATUS* Grav. Stone Mt. XI, 2, '28.

4663—*TACHINUS FLAVIPENNIS* Dej. Stone Mt. V, 26, '27.

4665—*T. FIMBRIATUS* Grav. Stone Mt. V, 26, '27 (2); Augusta VI, 9, 32.

4669—*T. FUMIPENNIS* Say. West Point VI, 19, '32.

4681—*TACHYPORUS JOCOSUS* Say. Cartersville VIII, 16, '31.

4692—*ERCHOMUS LAEVIS* Lec. Swainsboro V, 31, '31.

4705—*CONOSOMA BASALIS* Er. Bainbridge VII, 31, '31.

4707—*C. CRASSUS* Grav. Ringgold VII, 24, '31.

4719—*BOLITOBIVS DIMIDIATUS* Er. Rockmart VI, 25, '32; Atlanta X, 7, '30 (2).

4730—*B. CINCTUS* Grav. Clarkeville VII, 25, '31; Atlanta X, 7, '30 (2).

4933—*BOLITOCARA TRISTIGMA* Csy. Hiawassee V, 14, '31; Rome VII, 17, '31; Atlanta X, 7, '30 (6).

4947—*EUMICROTA CORRUSCULA* Er. Gainesville VIII, 18, '28.

4995—*GYROPIAENA FASCIATA* Say. Cornelia VI, 28, '31.

5037—*HOPLANDRIA LATERALIS* Melsh. Blue Ridge VI, 26, '31.

5755—*FALAGRIA DISSECTA* Er. Cornelia VI, 28, '31.

5763—*ALEOCHARA CURTULA* Goeze. Blairsville VI, 15, '29.

5764—*A. LUSTRICA* Say. Hiawassee V, 14, '31.

5766—*A. LATA* Grav. Cornelia VI, 28, '31.

PSELAPHIDAE.

6248—BRACHYGLUTA CAVICORNIS Bndl. Baxley IV, 12, '31.

6264—REICHENBACHIA RUBICUNDA Aube. Macon VI, 21, '29.

6326—EUPSENIUS GLABER Lec. Savannah VII, 24, '29.

6333—TYCHUS MINOR Lec. Blairsville VI, 15, '29.

6352—PSELAPHUS LONGICLAVUS Lec. Albany VII, 30, '31.

6367—PILOPIUS CONSOBRINUS Lec. Columbus V, 19, '31.

CLAVIGERIDAE.

6388—ADRANEA COECUS Lec. Dahlongeva VII, 9, '31.

PTILIIDAE.

6393—NOSSIDIUM AMERICANUM Mots. Rome VII, 17, '31.

6426—PTERYX BRUNNEA Lec. Blue Ridge VI, 26, '31.

6430—PTINELLODES LECONTEI G. & H. Gainesville VIII, 18, '28.

6470—PTINELLA QUERCUS Lec. Macon VI, 21, '29.

SCAPHIIDIDAE.

6489—SCAPHISOMA CONVEXUM Say. Jonesboro VII, 2, '29.

6499—S. PUNCTULATUM Lec. Gainesville VIII, 16, '29.

S. SP. Atlanta X, 7, '30.

 Review.

DIE BLATT-MINEN MITTEL- UND NORD-EUROPAS. Bestimmungstabellen aller von Insekten-Larven der verschiedenen Ordnungen erzeugten Minen. By Professor MARTIN HERING (Univ. of Berlin). 7 plates and 500 text-figures. Lieferung I, pp. ix-xii + 1-112. Gustav Feller, Neubrandenburg, 1935. Subscription price, 12 RM per Lieferung. This book deals with the leaf-miners of middle and northern Europe, including England. Six parts, all to be issued within two years, will make up the completed volume of about 700 to 800 pages. Two editions are available, a small quarto and a pocket size octavo. The first part, just issued, contains a brief general introduction to leaf-mines and miners (24 pages). Then follows the main text in which the genera of host plants are taken up in alphabetical order, each with a dichotomous key to the leaf-mines of the particular genus. These keys, in most cases, should make it possible to quickly identify in the field any leaf-mine in the area covered by the book. The present part includes the genera from *Abies* to *Bromus*.—R. G. SCHMIEDER.

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

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annales Sci. Naturelles, Zoologie, Paris.
4. Canadian Entomologist. London, Canada.
5. Psyche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
15. Anuaes Academia Brasileira de Ciencias. Rio de Janeiro.
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 Lab. di Zool. gen. e agraria della Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
26. Entomologischer Anzeiger, hersg. Adolf Hoffmann. Wien, Austria.
27. Bollettino della Società Entomologica Italiana. Genova.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. Archivos do Instituto de Biologia Vegetal, R. d. Janeiro.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janeiro. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles.
34. Zoologischer Anzeiger, hrsq. v. E. Korschelt. Leipzig.
35. The Annals of Applied Biology. Cambridge, England.
36. Trans. Royal Entomological Society, London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chilena 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, hrsq. 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". Dresden.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
66. Report of the Proceedings of the Entomological Meeting. Pusa, India.
67. University of California Publications, Entomology. Berkeley, Cal.
68. Science. New York.
69. Physis. Revista Soc. Argentina Cien. Nat. Buenos Aires.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
73. Mem. Instituto Butantan. Sao Paulo, Brazil.
74. Sbornik entomolog. národního musea v Praze. Prague, Czechoslovakia.
75. Annals and Magazine of Natural History. London.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
80. Lepidopterologische Rundschau, hrsg. Adolf Hoffmann. Wien.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
85. Genetics. Princeton, New Jersey.
87. Archiv für Entwicklungsmechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
99. Mélanges exotico-entomologiques, Par Maurice Pic. Moulins, France.
100. Bulletin Intern., Acad. Polonaise Sci. et Lett. Cracovie.
101. Tijdschrift voor entomologie. Nederland. Ent. Ver., Amsterdam.
102. Entomologiske Meddelelser, Entomologisk Forening, Copenhagen.
103. Journal of the Kansas Entomological Society, Lawrence, Kansas.
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista Entomologia, Sao Paulo, Brazil.
106. Anales Sociedad Científica Argentina, Buenos Aires.
107. Proc., Royal Entomological Society, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten über morpholog. und taxonom. ent. aus Berlin-Dahlem.
110. Arbeiten über physiolog. u. angewandte ent. aus Berlin-Dahlem.
111. Memórias do Instituto Oswaldo Cruz. Rio de Janeiro.
112. Anales del Instituto de Biología Mexico.
113. Entomologische Beihefte aus Berlin Dahlem.
114. Occasional Papers of the Museum of Zoology, University of Michigan.
115. Memórias de la Soc. Cubana de Hist. Nat. Havana, Cuba.
116. Parasitology. Ed. Keilin and Hindle. London.

Entomological Literature

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

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

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.—Braendegaard, Henriksen & Spärck—Insects and arachnids. [Meddel. om Groenland] 104: No. 16. 18 pp. **Check lists:** of the Brentiidae, the Rutelinae (Coleoptera), the Embiidae, the ants; of Oceania. By Kleine, Ohaus, Friederichs, Wheeler. [Bishop Mus.] Oc. Pap. vol. 11, Nos. 1, 2, 7, 11. **Gause, G.**—On the causes of the mass appearance of insects. [Zool. Journ., Moscow] 14: 413-439 (in Russ.). **Hayward, K. J.**—The geographical aspect of Argentine Entomology. [21] 47: 109-110. **Hemmingeøn, A. M.**—A statistical analysis of the differences in body size of related species. [Vid. Medd. Dansk Nat. Foren.] 98: 125-160. **McKenzie, H. E.**—Biology and control of avocado insects and mites. [Univ. Cal. Agr. Exp. Sta.] Bull. 592. 48 pp. **Oehser, P. H.**—Homonyms and nomenclators. [Am. Midland Nat.] 16: 962-964. Rockefeller Institute in the medical and natural sciences, Work of the. [68] 82: 457. **Smith, R. C.**—The influence of civilization on the insect fauna in cultivated areas of North America. [Rept. Smiths. Inst., Wash.] 1934: 257-266.

ANATOMY, PHYSIOLOGY, ETC.—Allard, H. A.—Synchronous flashing of fireflies. [68] 82: 517-518. **de Beaumont, J.**—L'instinct et l'intelligence chez les insectes. [Bull. Soc. Vandoise Sci. Nat.] 58: 349-358. **Browman, L. G.**—The chitinous structures in the posterior abdominal seg-

ments of certain female termites. [Journ. Morph.] 57: 113-129, ill. **Colas-Belcour, J.**—Evolution post-embryonnaire et mues de *Ornithodoros erraticus*. [Bull. Soc. Path. Exot.] 28: 604-606. **Dobzhansky, T., and D. F. Poulson**—Oxygen consumption of *Drosophila* pupae. II. *Drosophila pseudoobscura*. [Zeitschr. Vergleich. Phys.] 22: 473-478. **Ephrussi et Beadle**—La transplantation des ovaires chez la drosophile. [78] 69: 492-502. **Friedmann, N.**—Ein Beitrag zur Kenntniss der embryonalen Entwicklung der abdominalfüsse bei den Schmetterlingsraupen. [Soc. Sci. Fenn. Comm. Biol. 1934] 4: 1-29, ill. **Goldschmidt, R.**—Gen und Aussencharakter. III (Untersuchungen an *Drosophila*). [97] 55: 535-554, ill. **Hoffman, W.**—Bau u. Leistung des Spinnapparates einiger Netzspinnen. [Jenaische Zeit. Naturw.] 70: 65-112, ill. **Kalabuchow, N. G.**—Anabiose bei Wirbeltieren und Insekten bei Temperaturen unter 0°. (Zur Frage ueber die Unterkühlung und das Gefrieren der Tieren.) [89, Zool. & Phys.] 55: 47-64. **Kosminsky and Warschawer**—Untersuchungen ueber Intersexualität bei *Lymantria dispar* L. III: Teil Auslösung intersexueller Verwandlungen durch Temperature in Wirkung. [Zool. Journ., Moscow] 14: 439-464 (in Russ. with Germ. summ.). **Kozhantschikov and Maslowa**—Zur Frage nach dem Temperatureoptimum des Lebens. IV: Ueber die Totalmenge des verbrauchten Sauerstoffs während der Puppenmetamorphosen. [89, Zool. & Phys.] 55: 219-230. **Krueger, K.**—Die doppelt-schraegstreifung bei den Muskelfasern der Zecken (Ixodidae). [94] 147: 275-294, ill. **Leifert, H.**—Untersuchungen ueber den Exkretstoffwechsel bei Eiern, Raupen und Puppen von *Antheraea pernyi*. [89, Zool. & Phys.] 55: 131-190. **Leverc-ault, P.**—The insect tarsus. [Univ. Kans. Sc. Bull.] 22: 521-526, ill. **Macleod, J.**—*Ixodes ricinus* in relation to its physical environment. [116] 27: 489-500. **Maercks, H.**—Der Einfluss der Nahrung auf die Entwicklung der Nonnenraupe. [110] 2: 175-195. **Maloeuf, N. S. R.**—The postembryonic history of the somatic musculature of the dragonfly thorax. [Journ. Morph.] 58: 87-106, ill. **Mansour, K.**—The development of the adult mid-gut of coleopterous insects. [Bull. Fac. Sci. Egypt. Univ.] No. 2: 34 pp., ill. **Mori, Kazuo**—Photoc reaction of *Chironomus* larvae on several drugs. [Sci. Rep. Tohoku Imp. Univ.] (4) Biol. 10: 387-408. **Mueller, T.**—Zur vergleichenden Myologie der Tardigraden. [94] 147: 171-204, ill. **Nobumasa, Y., and Kawada.**—On the sexual characteristics visible on the body of rice borers. [Journ. Imp. Agr. Exp. Sta. Tokyo] 2: 491-498, ill.

(In Jap. with English summary.) **Paterson, N. F.**—Observations on the embryology of *Corynoides pusis* (Coleoptera). [53] 78: 91-132, ill. **Poulson, D. F.**—Oxygen consumption of *Drosophila* pupae. I. *Drosophila melanogaster*. [Zeitschr. Vergleich. phys.] 22: 466-472. **Sautet, J.**—Influence du froid sur les oeufs d'*Anopheles maculipennis*. [77] 120: 412-413. **Sgonina, K.**—Zur sinnesphysiologie der Onychiuren (Collembola). [34] 112: 13-23. **Tate, P.**—The larva of *Phaonia mirabilis* predatory on mosquito larvae. [116] 27: 556-560, ill. **Thomsen, M.**—A comparative study of the development of the Stomoxydinae (especially *Haematobia stimulans* Meigen) with remarks on other coprophagous insects. [93] 1935: 531-552, ill. **Vachon, M.**—Sur la nutrition des pseudoscorpionides. [Bul. Sci. Bourgogne] 4: 38-55, ill. **Weyer, F.**—Ueber druesenartige Nervenzellen im Gehirn der Honig Biene. [34] 112: 137-141. **Whiting, P. W.**—Sex-determination in bees, wasps and ants. [Miscel. Am. Phil. Soc.] 1: 16-17.

ARACHNIDA AND MYRIOPODA.—**Braendegaard, J.**—Preliminary statement of the synonymy of certain Greenland spiders. [Vid. Medd. Dansk Nat. Foren.] 98: 47-48. **Canals, J.**—Opiliones de la Argentina. [Estudios Arachnologicos Pub. by Author] 6: 12 pp. (*). **Chamberlin and Ivie**—Miscellaneous new American spiders. [Bull. Univ. Utah] 26 (4): 1-79, ill. The black widow spider and its varieties in the United States. [Bull. Univ. Utah] 25(8): 1-28, ill. **Fonseca, F. de**—*Enlaelaps vitzthumi*, sp. n. (Caraina, Laelaptidae). [Mem. Inst. Butantan] 9: 58-64, illus. *Novas especies sul-americanas de parasitos do genero Liponissus Kolenati, 1858* (Acarina, Liponissidae). [Mem. Inst. Butantan] 9: 69-98, illus. *Ceratonyssus joaquimi* sp. n. (Acarina, Liponissidae) parasita de *Glossophaga soricina* (Pallas) de S. Paulo. [Mem. Inst. Butantan] 9: 115-123, illus. (*). Occorencia de sub-especie de *Ixodes ricinus* (L. 1758) no estado de S. Paulo (Acarina, Ixodidae). [Mem. Inst. Butantan] 9: 131-135, illus. (*). *Ixodes amarali*, sp. n. (Acarina, Ixodidae). [Mem. Inst. Butantan] 9: 137-140, illus. (*). Localizaçao, frequencia, distribuicao geographica e hospedadores de *Spelaeorhynchus latus* Banks 1917 (Acarina, Spelaeorhynchidae). [Mem. Inst. Butantan] 9: 145-148. **McIntosh, A.**—Description of a tick, *Ornithodoros coprophilus* from bat guano. [116] 27: 519-524, ill. (*S). **Matheson, R.**—Three new species of ticks, *Ornithodoros* (Acarina, Ixodoidea). [Journ. Parasit.] 21: 347-353,

ill. (*). **Mello-Leitao, C. de**—Tres novas aranhas tetrapneumones nas colleções do Instituto Butantan. [Mem. Inst. Butantan] 9: 355-360; illus. (*). Dois generos raros de Aranhas nas colleções do Instituto Butantan. [Mem. Inst. Butantan] 9: 363-366, illus. (*).

THE SMALLER ORDERS OF INSECTS.—**Bagnall, R. S.**—An extended classification of the Pauropoda to include two n. fam. [75] 16: 619-629, ill. **Ewing, H. E.**—The taxonomy of the Anopluran genera *Polyplox* and *Eremophthirius*, including the description of n. sps. [95] 48: 201-210, ill. (*). **Hsiu, Chu-Sieh**—An improved breeding apparatus for termites [in Japanese]. [Ent. & Phytopath., Hangchow] 3: 618-619, ill. **Peters, H. S.**—Mallophaga carried by Hippoboscids. [An. Carnegie Mus.] 24: 57-58. **Pritchard, A. E.**—Two new dragonflies from Oklahoma. [114] No. 319: 10 pp., ill.

HEMIPTERA.—**Ball, E. D.**—Some new Gyponas with notes on others. [91] 25: 497-503. **Beamer and Tuthill**—A monograph of the genera *Alapus* and *Hebecephalus* (Cicadellidae) [Univ. Kans. Sci. Bull.] 22: 527-547, ill. (*). **da Costa Lima, A.**—Catalogo das especies americanas de Lanternariidae (Fulgoroidea). [111] 30: 481-517. (S). **Deay, H. O.**—The genus *Tenagobia* (Corixidae). [Univ. Kans. Sci. Bull.] 22: 403-478, ill. **Drake & Harris**—New Veliidae from Central America. [95] 48: 191-194. (*). **Hidalgo, J.**—The genus *Abedus* (Belostomatidae). [Univ. Kans. Sc. Bull.] 22: 493-520, ill. (*). **Kaufmann, O.**—Beobachtungen und Versuche ueber die Rubeuwanze *Piesma quadrata*. [110] 2: 204-212. **Osborn, H.**—Insects of Porto Rico and the Virgin Islands. Homoptera (excepting the Sternorhynchi). [N. Y. Acad. Sci., Sci. Surv. Porto Rico & Virgin Isl.] 14: 111-260, illus. (*). **Plummer, C. C.**—Descriptions of new Membracidae from Mexico. [6] 43: 373-381, ill. **Rankin, K. P.**—Life history of *Lethocerus americanus* (Belostomatidae). [Univ. Kans. Sci. Bull.] 22: 479-492, ill.

LEPIDOPTERA.—**Clark, A. H.**—Arctic butterflies. (Rep. Smiths. Inst. Wash.) 1934: 267-296, ill. **Clarke, J. F. G.**—Notes and n. sps. of Microlepidoptera from Washington State. [4] 67: 244-254, ill. **Dannreuther, T.**—Note on the food-plant of *Danaus plexippus*, L. [9] 68: 240-241. **Davivault, L.**—Contribution a l'etude des insectes du bouleau [98] 62: 237-256; 282-297, illus. **Griffin, F. J.**—On the date of the preface to Hübner's "Sammlung europaeischer

Schmetterlinge." [21] 47: 110-111. **Hall, A.**—New forms of Nymphalinae and Ithomiinae. [9] 68: 221-227, ill. (*). **Heikertinger, F.**—Die Mimikrypten der Afrikanischen Nymphaliden und ihr Verhältnis zu den nichtmimetischen Verwandten. [97] 55: 461-483, ill. **Lane and Lane**—Notas sobre parasitismo em borboletas. [Rev. Mus. Paulista, Sao Paulo] 19: 443-446. **McDunnough, J.**—Notes on two Nova Scotia Butterflies. [4] 67: 211-212. **Querci, O.**—An account of my studies in the biology of *Pieris rapae*. III. [21] 47: 111-112. **Rousseau-Decelle, G.**—Note sur quelques formes nouvelles de Morpho. [25] 40: 219-226. (*). **Tisseuil, J.**—Contribution a l'étude de la papillonite guyanaise. [Bull. Soc. Path. Exot.] 28: 719-721.

DIPTERA.—**Borgmeier, T.**—Sobre alguns Phorideos da região neotropical. [30] 2: 125-134, ill. (*). **Brennan, J. M.**—The Pangoniinae of nearctic Am. (Tabanidae). [Univ. Kans. Sci. Bull.] 22: 249-402, ill. (*). **da Costa Lima, A.**—Especies de *Taeniorhynchus* (Culicidae) (S*). [111] 30: 453-469, ill. Um *Drosophilideo* predador de Coccideos. [Chacaras e Quintaes, Sao Paulo] 52: 2-4, ill. (S). Notas sobre Trypetidas Brasileiras. [15] 7: 235-250, ill. (*). **v. Frankenberg, G.**—Die Umkehrbewegung bei Leptogaster. [97] 55: 524-525, ill. **Johannsen, O. A.**—Aquatic diptera. II. Orthorrhapha, Brachycera and Cyclorrhapha. [Cornell Univ. Mem. 177: 62 pp., ill. (*). **Klein-Krautheim, F.**—Ueber massenauftreten und bekaempfung der gemeinen rasenhalmfliege (*Thaumatomyia notata*). [Ber. Oberhess. Gesel. Nat. u. Heilkund; Giessen] 16: 137-169. **Lopes, H. de S.**—A sub-familia Rhinotorinae (Rhopalomeridae). [30] 2: 19-26, ill. **Malloch, J. R.**—The North American species of *Lispocephala*. [75] 16: 562-572, cont. (*). **Prado, A.**—Contribuicoes ao conhecimento dos Culicideos de Sao Paulo. VI. Notas sobre os mosquitos originarios das taquaras: *Sabethoides intermedius* e *Megarhinus bambusicola*. [Mem. Inst. Butantan] 9: 195-199, ill. **Reinhard, H. J.**—North American two-winged flies of the genus *Doryphorophaga* (Tachinidae). [6] 43: 387-394. (*). **Riggert, E.**—Zur Kenntnis der Lebensgewohnheiten von *Osciella frit*, und ihrer Jugendstadien. [110] 2: 145-156. **Rowe and Knowlton**—The genus *Tabanus* in Utah. [4] 67: 238-244, ill. (*). **Shaw, F. R.**—Some new Mycetophilidae. [4] 67: 227-230, ill. **Shute, P. G.**—The value of the external spine of the harpago in identifying varieties of *Anopheles maculipennis*. [116] 27: 561-563, ill. **Takunaga, Masaaki**—On

the pupae of the Nymphomyiid fly. [Mushi] 8: 44-52, illus. **Wilcox, J.**—New Asilid flies of the genus *Ablautus* with a key to the species. [4] 67: 222-227.

COLEOPTERA.—**Brown, W. J.**—American species of *Ludius*: the *Cribrosus* and *Volitans* Groups. [4] 67: 213-221, illus. (*). **Chapin, E. A.**—N. sps. of Scarabaeidae from Puerto Rico and the Virgin Islands. [Journ. Agr. Univ. Puerto Rico, San Juan] 19: 67-71 (*). **Fisher, W. S.**—New Cerambycid Beetles from Puerto Rico. [Journ. Agr. Univ. Puerto Rico, San Juan] 19: 51-63. (*). New Eucnemid Beetles from Puerto Rico. [Journ. Agr. Univ. Puerto Rico, San Juan] 19: 65-66. (*). **Glen, R.**—Contributions to the morphology of the larval Elateridae (Coleoptera). No. 1: *Ludius aeripennis* destructor. [4] 67: 231-238, ill. **Hallock, H. C.**—Movements of larvae of the oriental beetle through soil. [6] 43: 413-425, ill. **Hawley and White**—Preliminary studies on the diseases of larvae of the Japanese beetle (*Popillia japonica*). [6] 43: 405-412. **Hoffmann, C. H.**—Biology and taxonomy of the genus *Trichiotinus* (Scarabaeidae, Coleoptera) [70] 15: 133-214, ill. **Lane and Camargo-Andrade**—Nota sobre *Phanaeus* (*Megaphanaeus*) *septentrionalis*. [Rev. Mus. Paulista, Sao Paulo] 19: 575-578, ill. **Pic, M.**—Neue Malacodermata. [26] 15: 253-256. (S). **Schedl, K. E.**—Neue Amerikanische borkenkaefer. [30] 2: 91-95. (*S). **Schurhoff, P. N.**—Beitrage zur kenntniiss der Cetoniden VII. [Mitt. Deutsche Ent. Gesell.] 6: 21-28. (*). **Wade, J. S.**—A contribution to a bibliography of the described immature stages of North American Coleoptera. (Mimeogr.) [Bureau of Entomology, Washington, D. C.] E358: 114 p.

HYMENOPTERA.—**Benson, R. B.**—On the genera of the Cephidae, and the erection of a new fam. Syntexidae. [75] 16: 535-553, ill. (*). **Borgmeier, T.**—Sobre alguns Cynipideos parasiticos e ceidogenos do Brasil (Cynipidae). [30] 2: 97-124, ill. (*). **Goetsch, W.**—Biologie und Verbreitung chilenischer Wuesten-, Steppen-, und Waldameisen. [89, Syst.] 67: 235-318, ill. **Lane & Lane**—(see under Lepidoptera). **Menozi, C.**—Le Formiche del Cile. [89, Abt. Syst.] 67: 319-336, ill. (*). **Nielsen, E.**—A third supplementary note upon the life histories of the *Polysphinctas*. (Ichneumonid.) [102] 19: 193-215, illus. **Saz, E.**—La *Mutilla europea* y los *Bombus* de Nuria. [Bo. Soc. Ent. Espana] 17: 85-98. **Tinkham, E. R.**—The Mutillidae of

Presidio and Jeff Davis counties of the Big Bend region of Trans-Pecos Texas. [4] 67: 207-211. **Weyrauch, W.**—*Dolichovespula* und *Vespula*. Vergleichende Uebersicht ueber zwei wesentliche Lebenstypen bei sozialen wesen. Mit Bezugnahme auf die Frage nach der Fortschrittlichkeit tierischer Organization. [97] 55: 484-524, ill. **Zikan, J. F.**—Die sozialen wesen der gattung *Mischocyttarus*, nebst beschreibung von 27 neuen arten (*Vespidae*). [Arg. Ins. Biol. Veg. R. d. J.] 1: 143-203, ill.

SPECIAL NOTICES.—**Catalogus Insectorum Sinen-sium** (Catalogue of Chinese Insects). By C. F. Wu. Vol. 2: Homoptera, Hemiptera, Dermaptera. 634 p., Fan Mem. Inst. Biology, Peiping, China. **Indian Entomology**, List of publications on (compiled by the Officiating Imperial Entomologist, Pusa, India). [Imp. Council Agr. Res.] Misc. Bull. no. 5, 28 p. **Nomenclature**—Madrid and Lisbon. [21] 47: 126. Generic names in the so-called Erlangen List of Hymenoptera 1801 suppressed by the Commission, and about 60 generic names of Hymenoptera, Lepidoptera and Orthoptera definitely fixed.

Doings of Societies.

The 12th annual meeting of the Rocky Mountain Conference of Entomologists was held in Pingree Park, Colorado, August 18 to 23, 1935, inclusive. Eight sessions were held for papers and discussions. The following is a list of the more formal subjects:

LEPIDOPTERA.—Cut Worms, H. H. Walkden; Light Traps for Codling Moth, G. E. Marshall; Codling Moth Control, M. S. Troth; Codling Moth Studies, J. H. Newton.

COLEOPTERA.—White Grubs, C. L. Fluke; Alfalfa Weevil Studies, G. I. Reeves.

DIPTERA.—Tabanids as Vectors of Anaplasmosis in Cattle, C. E. Sanborn; Wing Venation in the Brachycerous Diptera, C. B. Philip.

HYMENOPTERA.—Wild Bees of North America, T. D. A. Cockerell.

HOMOPTERA.—The Beet Leaf Hopper and Curley Top, O. A. Hills; The Relation of Aphids to the Spread of Bean Mosaic, Wm. J. Zaunmeyer; The Psyllid Yellows of Tomatoes and Potatoes, George M. List; Kinds of Aphids Infesting Groups of Plants, M. A. Palmer.

GENERAL.—Mill Fumigation, R. T. Cotton; Insects of Pasture Grasses, Donald A. Wilbur; Kansas Insects in 1935, Geo. A. Dean; Spray Residue, C. L. Fluke; Insect Transmission of Equine Encephalomyelitis, G. F. Knowlton; Swamp Fever or Infectious Enemia of Horses, John W. Scott; The Rocky Mountain Spotted Fever, R. R. Parker; The Eastern Type of the Rocky Mountain Spotted Fever, A. D. Shaftesbury; Tularaemia with Special Reference to Arthropod Vectors, C. B. Philip; The Methods of Modern Taxonomy, M. T. James; Taxonomy, A. B. Klots; Immature Insects, W. P. Hayes; Ticks and the Rocky Mountain Spotted Fever (Lantern) R. R. Parker; The Peach Mosaic and the Insects that may be Vectors, George M. List; Economic Investigations of the Natural History Survey in Illinois, M. D. Farrar; Several motion pictures on wild life and conservation were shown by Professor and Mrs. T. D. A. Cockerell.

A total of 92 registered during the week, 49 of these being directly interested in entomology. The following is a list of these:

Nellie Bilstad, Mrs. R. J. Bushnell, Ralph J. Bushnell, C. L. Fluke, Madison, Wisconsin; Cornelius B. Philip, R. R. Parker, Hamilton, Montana; C. E. Sanborn, Stillwater, Oklahoma; Geo. A. Dean, Richard T. Cotton, Robert Cotton, H. H. Walkden, Donald A. Wilbur, R. L. Parker, Manhattan, Kansas; W. P. Hayes, M. D. Farrar, Urbana, Illinois; A. D. Shaftesbury, Greensboro, North Carolina; Ralph Swain, St. Louis, Mo.; Alexander B. Klots, Herbert Rucker, New York City, N. Y.; O. A. Hills, Grand Junction, Colorado; M. S. Troth, G. E. Marshall, Orleans, Indiana; E. J. Sorenson, J. S. Stanford, W. M. Henderson, G. F. Knowlton, Logan, Utah; Miriam A. Palmer, Mrs. M. T. James, Maurice T. James, Leslie B. Daniels, R. G. Richmond, George M. List, John L. Hoerner, Gordon T. Mickle, R. G. Mack, C. R. Jones, C. P. Gillette, Fort Collins, Colorado; Carrol Wade, J. H. Newton, Paonia, Colorado; Otis Wade, Lincoln, Nebr.; John W. Scott, Laramie, Wyoming; A. C. Maxson, Longmont, Colorado; T. D. A. Cockerell, Mrs. T. D. A. Cockerell, Boulder, Colorado; George I. Reeves, Salt Lake City, Utah; Charles D. Michener, Pasadena, California; E. R. Bliss, Greeley, Colorado; W. J. Zaumeyer, Washington, D. C.; Geo. W. Stiles, Jr., Denver, Colorado.

The officers elected for 1936 were C. P. Gillette, Chairman; Donald A. Wilbur, Vice-chairman; Geo. M. List, Secretary, and C. R. Jones, Treasurer.—GEORGE M. LIST, *Secretary*.

ENTOMOLOGICAL NEWS for December, 1935, was mailed at the Philadelphia Post Office, Dec. 27, 1935.

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 Cocoons of *Actias luna* and *Automeris io*. Exchange considered. Eggs in season. Virginia Weaver, 822 S. College Ave., Tulsa, Okla.

Geometers Wanted from all parts of United States, for cash or exchange. Edward Guedet, P. O. Box 305, Napa, California.

Wanted—Tabanidae (Horseflies and Deerflies). Exchange, purchase, or for determination. G. B. Fairchild, P. O. Box 272, Monticello, Fla.

Exchange.—Lepidoptera of the Western United States for rare American or tropical specimens. C. W. Herr, Woodburn, Ore. R-3.

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Wanted.—To get in touch with Specialists who will make determinations for a share of our duplicates. We have many undetermined specimens from all parts of Iowa.—H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Wanted.—Communication with anyone who has or is collecting Lepidoptera in Burlington County, New Jersey Also anyone having a microscope for sale.—E. P. Darlington, New Lisbon, N. J.

Wanted for Cash or Exchange.—North American Butterflies in series especially from type localities and remote places. C. F. dos Passos, Mendham, New Jersey.

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FEBRUARY, 1936

Vol. XLVII

No. 2



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TO CONTRIBUTORS. All contributions will be considered and passed upon at our earliest convenience and, as far as may be, will be published according to date of reception. The receipt of all papers will be acknowledged. Owing to the limited size of each number of the News, articles longer than six printed pages will be published in two or more installments, unless the author be willing to pay for the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division. Proof will be sent to authors. Twenty-five "extras" of an author's contribution, without change in form and without covers, will be given free when they are wanted; if more than twenty-five copies are desired *this should be stated on the MS.*

No illustrations will be published in the News for the present, except where authors furnish the necessary blocks (or pay in advance the cost of making blocks) and also pay for the cost of printing plates. No charge for printing text-figures. Information as to the cost will be furnished in each case on application to the Editor. Blocks furnished or paid for by authors will, of course, be returned to authors, after publication, if desired.

Stated Meetings of The American Entomological Society will be held at 800 P. M., in 1936, on the fourth Thursday of each month excepting June, July, August, November and December, and on the third Thursday of November and December.

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

The printer of the "News" will furnish reprints of articles, without covers, over and above the twenty-five given free at the following rates: One or two pages, twenty five copies, 35 cents three or four pages, twenty-five copies, 70 cents; five to eight pages, twenty-five copies, \$1.40; nine to twelve pages twenty five copies, \$2.00; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty five copies, 25 cents; greater numbers of copies will be at the corresponding multiples of these rates. Printed covers for 50 copies, \$4.00 or more, according to number of pages bound.

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VOL. XLVII.

FEBRUARY, 1936

No. 2

At the International Congresses of Entomology and Zoology, of 1935.

By J. CHESTER BRADLEY, Cornell University, Ithaca, New York.

Twelve hours on the *rapide* from Paris had brought us, as midnight approached, to the Spanish frontier town of Irun. The Iberian trains run on tracks of a wider gauge, so must be boarded from the other side of the station, after passing the customs examination within the station. But we were of no mind to travel through Spain by night, so checked our baggages and, thrilled to be walking on Spanish soil, sought a hotel.

Early the next morning we were marvelling at the fast-changing landscape, as we travelled ever southward. The green vegetation of France and the foot of the Pyrenees became less and less as we came farther south, until we were in a sun-baked golden-brown land, into which the wide-spreading haciendas and monotone brown villages fit with perfect harmony. Strong was the illusion that this land was California, that we were perhaps crossing the Tejon Pass, or winding over the San Diablo Mountains toward the Kettleman Plains. Then it came over us how perfectly at home the Spanish settlers of California must have felt, and we felt a sense of sorrow that our own more blatant, less harmonious civilization should have crowded in to destroy in that state so lovely a reproduction of old Spain.

The day wore slowly on; the train grew crowded and very hot. In the late afternoon, as we wound very circuitously among the dry and barren hills, there stood before us on a confronting elevation the ancient city of Ávila, complete within its turreted walls. We could have reached Madrid that evening, but the Congress was not to commence for another day, so we descended and found quarters. Only Carcassone in

France can compare in the grandeur of its encircling medieval walls. Those of Ávila were built in the eleventh century and are still perfect, imposing, towered and battlemented. Into them the great Cathedral, severe in its grandeur, melts, as though itself a fortress.

On the next afternoon we took an autobus over the forested Sierra de Guadarrama to Madrid. Arriving in the cool hours of early evening, we found our hotel, headquarters for the American contingent, overlooking the very heart of the city, the pulsating Puerto del Sol. Here had already arrived the Dominion Entomologist, Dr. Arthur Gibson and his family, Dr. Wm. A. Riley of the University of Minnesota, Mr. and Mrs. H. G. Crawford of the Canadian Entomological Service, Miss M. B. Scotland of Albany State Teachers College, Dr. and Mrs. O. A. Johannsen of Cornell, and Dr. and Mrs. Stejneger of the U. S. National Museum. Among other Americans present but making their headquarters elsewhere, were Dr. Avinoff, Director of the Carnegie Museum, and his nephew, Dr. and Mrs. Charles Fox and Mr. B. Mayne of the U. S. Public Health Service, and Mr. Carpenter, a graduate student from the University of Oklahoma, shortly to assume the life of a Rhodes Scholar at Oxford. Messrs. H. L. Parker and C. P. Clausen, of the U. S. Bureau of Entomology, arrived later by motor from Hyères. The Congress being under the official auspices of the Spanish Government, eight of the Americans were accredited as official delegates of the United States Government. Imposing diploma-like documents in their possession attested to their status. (We found ours, and the notice that we were entitled to travel on a special diplomatic transport, on our desk at home, after our return.)

The opening informal reception was at half-past nine on the evening of our arrival in Madrid, Thursday, September the fifth. Eager to greet old friends, we hastened to it, and after the preliminaries of registration were attended to, found the entomologists gathered in the patio of the lovely new auditorium which was to serve as our headquarters. Though receptions may be at times boring, it is a delightful experience to

gather with those whose common interests we share, to find among them many an old friend, and to meet and talk with others whose names we have long known, if not their persons.

The Congress was presided over by the venerable Dr. Ignacio Bolivar y Urrutia, who throughout the week was the center of an admiring circle, wherever he went. Amongst those European entomologists who will be remembered by all Americans who were at the Ithaca Congress seven years ago were Messrs. Karl Jordan, F. W. Edwards, G. Fox Wilson, N. D. Riley and W. H. T. Tamms of England, Dr. Martini of Hamburg, A. Ball, and A. d'Orchymont of Belgium, H. C. Efflatoun Bey of Cairo, R. Jeannel, R. Minkiewicz from Warsaw, I. Tragårdh and N. A. Kemner from Sweden, G. Ceballos and the very busy and efficient secretary, Dr. Candido Bolivar y Pieltain from Spain.

One of the first things that we were to learn in Spain was that if Spaniards need sleep at night, they conceal the fact admirably. Functions are prolonged into hours that no longer are wee and small; and the Puerto del Sol seems a beehive of activity until near dawn.

On Friday morning the President of Spain presided at the formal opening session of the Congress. There were addresses of welcome from Dr. Bolivar, President of the Congress, and of felicitation from selected delegates from abroad. Afterwards we returned to our hotel for lunch, and in the afternoon were guests of the Local Committee of the Congress on an excursion made by autobus to El Pardo, a short way beyond the suburbs of Madrid. El Pardo is a former palace, and its chief glory is the wonderful collection of tapestries, especially many designed by Goya. Subsequently we saw Goya's original cartoons, from which the tapestries had been produced, at the Prado in Madrid, but the tapestries give a much finer, more brilliant impression than the originals. It was announced that we were to have a merienda—which is the Spanish word for any sort of picnic luncheon—at the Beach of Madrid. As Madrid is in the center of Spain and on no body of water, our curiosity was aroused. An artificial lake has been created, and the merienda,

an elaborate and delicious repast, was served in the refreshing coolness of the gathering dusk on the semi-circular terrace of a fashionable restaurant. Dusk deepened to darkness, and electric lights were turned on. Couples began to dance, and Spanish dances were improvised for our entertainment. Suddenly the lights went out, and the dancing was continued in the moonlight, later with a few improvised torches. Just the right touch of enchantment to perfect the loveliness.

Saturday was devoted to scientific sessions. The program provided for general sessions on four mornings, and for sectional meetings on three afternoons and one morning. Papers and discussion were in Spanish, Italian, French, English and German. There were doubtless gifted individuals who could understand it all, but the most of us not too practised in hearing foreign tongues, listened to the papers in our own language and wondered what the others were about. Of course the mere fact that it is a well-known man speaking lends interest in some cases, even when he can not be understood.

On Saturday evening the President of Spain received the congressionists formally at the Palace. Arriving a little late, we had to make our entrance quite alone. Up the grand marble staircase of the palace, the presidential guards drawn up on each side in their most brilliant uniforms, standing at present arms, we climbed interminably, feeling like an anticlimax. We bowed to His Excellency the President, and passed from room to room, marvelling at the royal furnishings, paintings, tapestries, objects of art. Perhaps we marvelled more genuinely at the wonderful array of Spanish delicacies, spread out on a grand buffet to tempt our appetities. But evidently entomologists, when foregathered internationally, require no tempting, for the buffets were so vigorously attacked that we felt a little ashamed. But of course that is what the buffet was for, and it would seem that we at least showed our hearty appreciation.

On Sunday all sessions were transferred from Madrid to the Escorial. A long caravan of autobuses transported us thither, thirty miles distant, and 1200 ft. upward. Those who were not desirous of attending the sessions were conducted in parties

by well-informed guides through the vast monastery of San Lorenzo el Escorial. This gloomy edifice was constructed by the bloody King Philip II, between the years 1563 and 1584; and from here he supervised the formation of the armada to support his claim to the Throne of England. It has been described as "a miserable place for a miserable gouty vampire whose ghostly bigot soul still seems to bat around the funeral urns like the twilight shades closing over a dying monarchy."

Very impressive however, deep within a great crypt, were the tombs of the monarchs of Spain, some empty to receive the mortal remains of monarchs yet unborn—and who perhaps will now never be born. Apart from these, exquisitely wrought in marble, white or colored, the many tombs of members of the royal family who had themselves never reigned. Our luncheon was served in the dining hall of a boarding school. Instead of remaining for the afternoon sessions, some of us returned to Madrid in time to see a bull-fight, since that day would be our only opportunity.

On Monday morning the University of Madrid conferred the doctorate "honoris causa" on Dr. Jeannel and others. In the evening there was a formal reception by the Mayor of Madrid given in the city hall. The Municipal Band rendered a delightful concert of Spanish music in our honor. The program also included Rimsky-Korsakov's *Capricha Español*, which seemed doubly appropriate to the occasion. Afterwards there was the usual elaborate buffet feast.

Tuesday was occupied in an all-day excursion to the Sierra de Guadarrama. The Alpine biological station was visited, and there was plenty of opportunity for collecting, although it was in dry season. Later in the day LaGranja and the mellowly medieval Segovia were visited.

On Wednesday afternoon we visited Toledo by autocar, most wonderful of all Spanish cities. So short a visit for such a spot was tantalizing. We had only time to enjoy its incomparable setting, overlooking the Tagus, to visit and admire the house of El Greco and his museum, to see workmen producing the articles of steel, inlaid with gold, for which Toledo is famed,

and to visit the majestic cathedral, the only church in Christendom where the mozarabic ritual still survives.

Back again at Madrid, in the evening (beginning at half past ten) we were entertained by a program described as a "Fiesta of Spanish Art." The first number was a theatrical performance, "The celebrated life and the death of General Marlborough," a delicious parody of Italian opera, very, very cleverly staged, and exceedingly droll. It was followed by Spanish songs and dances, lasting far into the night.

At the closing session of the Congress, on Thursday afternoon, it was decided that the next session, in 1938, should be held in Berlin, under the presidency of Dr. E. Martini. The last event of the Congress, on Thursday evening, was a thoroughly enjoyable and very colorful banquet, held at the Ritz, Madrid's finest hostelry. The Congressionists were guests of the local committee on this occasion.

We all left Madrid with real regret and with most delightful impressions of our sojourn. Everyone felt that the energetic Spanish Committee had done everything possible to provide for the comfort, convenience and entertainment of those attending. Everything had run smoothly, efficiently, without any hitch or confusion. The buildings in which the meetings were held were adequate, modern and peculiarly attractive. Close by were a group of pleasant dormitories, where many of those in attendance availed themselves of opportunity to stay. And just beyond was the very adequate building housing the museums of zoology and of geology. Many an hour was stolen from the meetings by one member or another to examine the rich entomological collections housed there. And finally one can not leave unmentioned the real attractiveness of the city of Madrid itself, which must be pronounced one of the most pleasing of the capitals of Europe—not a sleepy medieval city, like some of its picturesque neighbors, but a very modern, busy metropolis, of wide avenues, magnificent buildings, lovely parks.

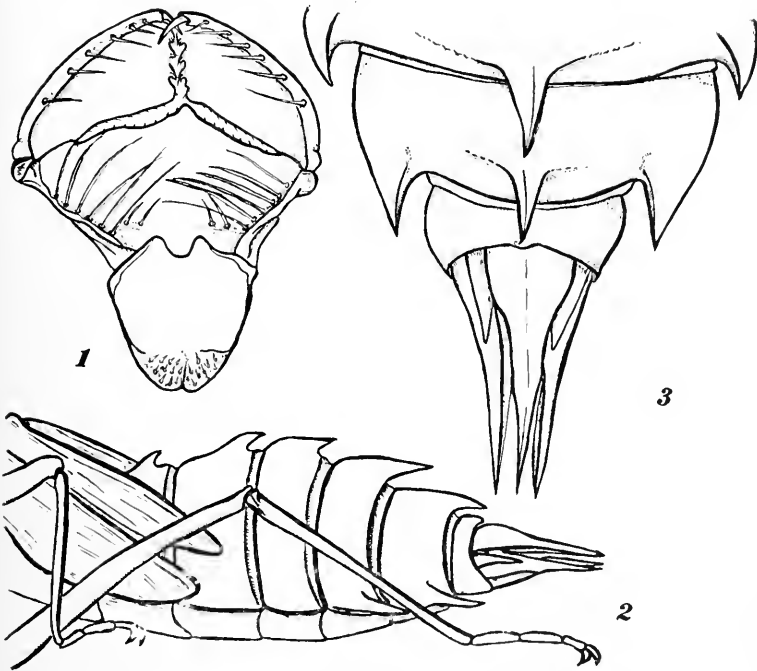
(To be continued.)

**The Immature Form of *Brachymesia gravida*, with
Notes on the Taxonomy of the Group (Odonata:
Libellulidae).**

By C. FRANCIS BYERS.¹

The writer has recently come into possession of reared material of *Brachymesia gravida* (Calvert). Inasmuch as the immature forms of the various species of this genus have remained unknown until the present writing, the following description and necessary taxonomic notes have been prepared.

Description of nymph. (Based on four reared exuviae.) Total length 26 mm.; maximum width (venter of segment 6) 8 mm. Nymphs clean and smooth, almost devoid of pubes-



Brachymesia gravida nymph, female.
Alachua County, Florida.

Fig. 1. Labium. Fig. 2. Abdomen, lateral view. Fig. 3. Terminal segments and appendages, dorsal view.

¹Contribution from the Department of Biology, University of Florida.

cence; light in color, marked irregularly with darker brown; general appearance long and robust, somewhat suggestive of the *Trameini*.

Head about two-thirds as long as broad, widest across the eyes, which are fairly prominent and distinctly lateral in position (not capping the antero-lateral angles of the head). Head lacking pubescence except for a mat of very short spine-like hairs along the hind margin extending ventrad to the region of the occiput and beneath the eyes.

Hinge of the labium reaching to slightly below the anterior margin of mesothorax. Mentum slightly broader than long; median border evenly contoured, projected centrally into a low rounded tooth-like elevation (Fig. 1); mental setae 8, arranged in two series on each side of the mentum, one series consisting of 6 long pale setae situated very near the lateral mental margin (setae nos. 3-4 longest), the other series consisting of 2 very short setae situated deeper and mesad in the bowl of the mentum. Lateral setae 6; crenulations of the lateral lobes 5-8, the first 5 below the movable-hook well developed, a little over half as high as long, each bearing a group of one large and occasionally 1 or 2 smaller setae, the remainder of the crenulations low and irregular.

Legs moderately long and thin; hind femora and tibiae each 8 mm. long, tarsus 3.5 mm., tarsal claws 1 mm.; all femora with 2 or 3 brown encircling bands. Hind wing pads reaching to the base or middle of segment 6.

Abdomen elongate oval, greatest width (8 mm.) at segment 6, distinctly wider than thorax. Dorsal hooks on segments 3-9; those on 7-9 long, straight, compressed and acute; the dorsal hook on segment 9 reaching over the apex of segment 10; segment 10 with a short dorsal median projection (Fig. 2). Lateral spines on segments 8-9; those on 9 reaching nearly to the base of the abdominal appendages; those on 8 to about the basal third of 9 (Fig. 3). Abdominal appendages 3 mm. long (three times the length of the lateral margin of segment 10, or about equal to the length of the dorsum of 8 + 9). Median appendage triangular, about three times as long as broad; inferior appendages of nearly the same length; lateral appendages approximately one-third the length of the inferiors and the median. Abdomen devoid of pubescence.

Material. FLORIDA, Alachua County: Newman's Lake, 4 exuviae of reared females, May 15, 1935, (J. D. Kilby); Warburg Lake, 3 early instar nymphs, 1934, (R. P. Trogdon). Pinellas County: St. Petersburg, 1 nymph (18 mm.), November 30, 1933 (H. K. Wallace).

The four exuviae from which the foregoing description was drawn, were collected, along with the female adults which emerged from them, by Mr. John D. Kilby, graduate student at the University of Florida, at Newman's Lake near Gainesville. Mr. Kilby states that he took the specimens in an emerging condition from floating vegetation (pond-lilies) while he was collecting amphibia at night. The nymphs were placed in separate paper bags and brought into the laboratory where the emergence and the development of the adults was consummated. *Perithemis seminole*, male and female, was taken emerging at the same time.

Dr. Elsie Broughton Klots in her paper on the dragonflies of Porto Rico and the Virgin Islands,² has described a number of dragonfly nymphs on supposition, among them *Brachymesia*. The nymph so described and figured differs so widely from the present writer's material as to make it hardly likely that it belongs to the genus *Brachymesia*, even allowing for a difference of species (*B. herbida* vs. *B. gravida*). She speaks of the nymph (page 50) as being "Most easily recognized by the hairy body and the peculiar eyes," and adds "Eyes small and on the superior surface of the head." The lateral setae of the labium are five in number and the mental setae in all number around 8-13. Dr. Klots further states "No dorsal hooks, but with median tufts of short hairs." These points are quite at variance with *Brachymesia* and off-hand suggest *Erythrodiplax*.

In the same paper, Dr. Klots also described the nymph of *Miathyria marcella* on supposition. The nymph so described closely resembles the reared material of *Brachymesia gravida* in the writer's possession, the chief differences being in the number of lateral and mental setae. *Brachymesia herbida* (Gundlach) is the species of the islands, while *Brachymesia gravida* has long been known as an inhabitant of the United States. *Miathyria marcella* was first recorded from the United States by Dr. James G. Needham³ in 1933 on the basis of nymphal material collected near Ft. Pierce, Florida.

(To be continued.)

² Insects of Porto Rico and The Virgin Islands. Odonata or Dragonflies. Scientific Survey of Porto Rico and the Virgin Islands, Vol. XIV, Pt. 1. N. Y. Acad. of Science, 1932.

³ New Records of Odonata from the United States. Ent. News, page 98. April, 1933.

Description of the Male of *Calendra dietrichi* Satht (Coleoptera : Curculionidae).

By A. F. SATTERTHWAIT, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture.

This species was described in ENTOMOLOGICAL NEWS, vol-44, 1933, pages 210-211, from an adult female reared March 4, 1932, from a larva in rice stubble from Wiggins, Mississippi, collected by Mr. Henry Dietrich. A second female, collected by Mr. Dietrich, was in hand when the species was described. No male was found, however, until the writer was privileged to study the general collection of *Calendra* from the Museum of Comparative Zoology, loaned by Dr. P. J. Darlington, Jr.

CALENDRA DIETRICHII Satht.

♂. The description of front tibia, pronotum, beak, head, elytra, pygidium, last ventral sternite, and venter, and of color, as noted for the type female applies equally well to this male, except that the impunctate areas on the pronotum of the male would not accommodate two additional punctures, and that the elytral punctures of interval 2 are about 15 in number in the basal half, of interval 3 about 24 in basal half, and of striae 1 and 2 about 10 each in basal half. The hairs on the pygidium and on the last ventral sternite are of uniform length, stiff, rufous. The first and second abdominal sternites are slightly depressed.

Measurements of male in millimeters. Total length 8.2. Beak: Length about 2.55, width at middle 0.31, width at apex about 0.55, width at base 0.92, least depth about 0.63. Pronotum: Length about 2.55, width 3.27. Elytra: Length 4.45; humeral width 3.62.

The label on the specimen reads: "Fl[orid]a. W. G. Dietz Colln."

Italian Malarial Mosquitoes.

In southern Italy about 88 per cent of the farmers live under urban conditions. They live in towns and go back and forth to their work each day. Around these many scattered population centers it has become standard practice to spread Paris green on all anopheline breeding places within one and one-half miles. Anopheline breeding has been made a nuisance under the law and land-owners are responsible for eliminating it within one and one-half miles of inhabited centers.—ROCKEFELLER FOUNDATION Annual Report for 1934.

Facts Concerning the Rearing of Tenebrionidae.¹ (Coleoptera).

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

The purpose of this communication is to report some facts relating to the successful rearing of certain species of Tenebrionidae, that are of importance to systematic and economic entomologists alike, namely: *Elcodes*, *Coniontis* and *Blapstinus*. The latter are known as "bean-girdlers." The main reason for rearing the several species, has been to study the larval and pupal characters for taxonomic differentiation. Certain of the observations revealed the cause of some of the deformities that occur in adult beetles.

In 1927, the author began trying to rear different species of *Blapstinus*, but without success for four years. Quite recently while collecting in the vicinity of Watsonville, Santa Cruz County, California, there was found inhabiting the leaf-mould and vegetable debris of a backyard, numerous adults of a species of *Blapstinus* and small cylindrical larvae. Believing that there was some relationship between them, a series of each were collected separately and a quantity of the leaf-mould and coarser vegetable matter was gathered and all taken to my laboratory. Separate breeding jars were prepared for the larvae and adults. In due time numerous larvae were observed in the jar with the adults, and the larvae in the other jar pupated. A few imagos were permitted to emerge. The success attained in obtaining larvae and pupae, is to be attributed to the using of leaf-mould and vegetable debris secured from the habitat of the species.

Before considering other facts it is desirable to describe how the breeding jars are prepared: Mayonnaise jars are regularly used or the smaller fruit jars. These are filled half-full of leaf-mould and powdered cow-chip (the latter serves as pabu-

¹Read before the conjoint meeting of the Ent. Soc. of Amer., and Pacif. Coast Ent. Soc., June 22, 1934, during the meeting of the Pacific Div. of the A.A.A.S., held at the Univ. of Calif., Berkeley.

lum), equal parts well mixed with some of the coarser vegetable debris placed on top. The contents of each jar must be kept damp by throwing water with a pipette, against the inner surface of the jars; the water gravitates to the bottom of the soil, the central portion remaining dry. In this way three zones are created: An outer and deep damp area, an inner or dry and between the two an intermediate one. The larvae can select whichever area they prefer. The soil must be dampened every second or third day according to the degree of evaporation. Too great dryness or dampness must be avoided; the needs of each species must be carefully studied. In the beginning of the research the soil and pabulum were not sterilized and this later became the source of much trouble and disaster.

After several species were under observation, it was noticed that in some of the jars the larvae in particular were more or less restless, coming to the surface instead of remaining in the soil. Once each week the contents of the jars should be poured out on paper: the upper or loose and drier part first, then the deeper or damp portion; each is to be carefully examined and notes recorded. During the examination the larvae and adults are placed in separate glass receptacles; cast larval skins put in vials for study, eggs when seen should be measured for each species and camera lucida outlines made. In the beginning, when eggs and newly hatched larvae are present, examinations should not be made too often. The damp soil should be first returned to the jars, followed by the drier part. In every instance the larvae and adults are examined under the microscope and then returned to their jars. The examinations also showed the presence of mites and the degree of infestation, not only in the soil, but upon the larvae and adults as well.

As time went on no eggs or larvae were found, or in very limited number, in the more heavily infested jars; in others larvae were abundant. In checking up on the results of the examinations, it was found that the difference in the number of larvae in the several jars was in direct proportion to the degree of mite infestation. Microscopic examination of the soil under low power showed shriveled eggs and even clumps of mites about others, as well as on the young larvae. There was not

the least doubt but that the mites were feeding on the eggs and larvae; the older larvae were able to fight off the mites to a greater or less extent. The continual annoyance by the mites was the cause of the restlessness in the larvae mentioned above.

Sterilization of the contents of the jars was commenced after removal of the older larvae and adults; this was done by placing the jars on the laboratory radiator for twenty-four to forty-eight hours; during this time they became so hot that they could not be handled by the naked hand. Jars containing eggs and young larvae could not be treated that way and had to progress as best they could.

As a part of the research it was desirable to study the effect of the mite infestation upon the insects during their entire development. In infested jars when pupae began to appear and, later, adults to emerge, a large per cent of the imagos were more or less deformed. Some had shriveled elytra and appendages in all degrees of atrophy. At the time of weekly examinations pupae were found covered with mites, chiefly on the elytral pads and legs; larvae so weakened that they could not cast the larval skin at time of ecdysis or of pupation and imagos dead in the act of emergence.

The soil in a number of the jars became a teeming mass of mites. In fact, the mites were so abundant that they could be gathered with broad forceps and preserved in alcohol so as to partly fill a drachm vial. Sterilization brought the infestation rapidly under control. At the weekly examinations the larger larvae and adults were sterilized with a very soft camel-hair brush, moistened with paraffine oil or alcohol, but not in sufficient amount to enter the spiracles; never with any free oil or alcohol, although at first a few larvae and adults were destroyed in that way.

During the height of the infestation adult *Elcodes* became covered by a whitish coating that had a very faint bluish tinge, due to the young or traveling mites. The parts not covered by them were where the insect could brush them off with its legs. Under such conditions the oil and alcoholic brushing served a good purpose. Moisture is essential for the mites, the drier cultures were scarcely infested.

In order to obtain a knowledge of the species of mites, slides were prepared for microscopic examination and sent to Mr.

Nathan Banks, of the entomological department of Harvard University.

Mr. Banks reported as follows: "In one of the slides is a species of *Tyroglyphus*. There is one female very similar to *Tyroglyphus farinac* De Geer, and a host of the hypopial nymphoid form. This form does not feed, but attaches to an insect where it lives in hopes of being transported to a similar spot where it will drop, moult and develop to the adult."

"In slide two is a *Rhizoglyphus* sp. There are several very similar forms. This belongs to the same family Tyroglyphidae, and has the same habits, most of the specimens on the slide are immature; it also has a hypopial or traveling nymph."

"Both of these mites feed on decaying vegetable and animal matter and breed very rapidly. Some on mushrooms. I doubt if they feed on a healthy grub, but possibly. There is another mite that is often a pest in breeding jars—*Pediculoides*, the female becomes a large whitish globule. This will attack living healthy larvae and kill them, and will continue to feed on the decaying matter."

SUMMARY.

In many cases for successful rearing of certain species of Tenebrionidae, it is necessary to have soil, vegetable debris and pabulum from the area inhabited by the species.

All soil, leaf mould, vegetable debris and pabulum should be sterilized before stocking a breeding jar, even to cleaning the guests, when possible.

It is an undoubted fact, verified by abundant observations, that mites do attack the eggs, young larvae and pupae, destroying the eggs and larvae, as well as causing deformity of the imagos or death of the pupae, by undermining their strength, and of full grown larvae, resulting in their inability to complete their metamorphoses.

The above facts prove that mites may be beneficial or injurious agents, depending on whether or not their hosts are injurious or beneficial.

The above facts are of value to economic entomologists in their fight against insect pests; they also account for many deformities observed in adult beetles collected in the field.

ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., FEBRUARY, 1936.

Entomological News: a Statement and an Appeal.

With the number for December, 1935, ENTOMOLOGICAL NEWS completed its forty-sixth annual volume. In earlier years, corresponding to the more favorable economic condition of the United States, and perhaps of the world in general, it enjoyed, like other entomological journals, a larger income and published more pages and illustrations than in the last decade. One feature, peculiarly its own among periodicals devoted to the study of insects, it has, however, been able to maintain almost unimpaired. This is its monthly classified list of the current entomological literature.

Whether the NEWS can continue its existence will depend on increased support. To make this evident we present herewith figures showing receipts and expenditures for the year 1935.

RECEIPTS

Annual subscriptions (353)*	\$1,042.10
Contributions for illustrations.....	\$57.12
Contributions for extra pages.....	25.60
Advertisements	117.30
Sale of back numbers and miscel.....	27.24
	227.26
Total receipts	\$1,269.36

EXPENDITURES

Printing Nos. 1-10 text and index.....	\$1,242.88
Printing illustrations	64.03
Postage, regular edition	\$41.00
Postage, on sales	8.40
Postage, on authors' separates	4.70
	54.10
Printer's corrections	45.30

* Resident members of the American Entomological Society enjoy a special rate of \$1.50 per annual volume.

Printing extra pages	31.80
Mailing envelopes	\$28.00
Postal card notices, stencils, etc.....	12.40
	40.40
Back numbers and refund	10.00
	10.00
Total expenditures	\$1,488.51

The excess of expenditures over receipts is \$219.15.

In past years the American Entomological Society has contributed to reduce such deficits. Owing to decreased income, the Society is no longer able to do this, as its prior obligation is to its Transactions which date back sixty-eight years.

The editors of the NEWS receive no salary, honoraria or even free copies of the NEWS; all of them are subscribers, one subscribes for two copies. Books and papers sent to the NEWS for review are placed in the Society's library; they do not serve as perquisites for the editors.

Seventy-three additional subscribers to the NEWS would wipe out the 1935 deficit. One hundred additional subscribers would not only do that but also enable the NEWS to begin furnishing illustrations for articles.

It rests with our subscribers. Will YOU induce your non-subscribing entomological friends to subscribe and enable this journal to keep going?

THE EDITORS.

Royal Entomological Society of London. *Stylops*.

Contributors to *Stylops* are advised that, as from January 1, 1936, that journal will be incorporated with the *Proceedings of the Royal Entomological Society of London* as *Series B.*, and as from that date Dr. S. A. Neave will relinquish the editorship, which will be taken over by the Secretary of the Society.—41, Queen's Gate, South Kensington, London, S. W. 7. December 2, 1935.

Entomological Literature

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

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

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 instalments.

(*) 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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contraction in the production of configuration in insect skeleton. [Journ. Morph.] 58: 41-86, illus. **Mergelsberg, O.**—Ueber die postimaginale entwicklung (physogastrie) und den hermaphroditismus bei afrikanischen Termitoxien (Dipt.). [89] 60: 345-398, illus. **von Mitis, H.**—Zur Biologie der Corixiden: Stridulation. [46] 30: 479-495, illus. **Oosthuizen, M. J.**—The effect of high temperature on the confused flour beetle. [Univ. Nebr. Agr. Exp. Sta.] Tech. Bull. 107: 45 pp., illus. **Parks, Hal B.**—The imaginal discs of *Drosophila melanogaster*. [19] 30: 192-196, illus. Gregariousness in *Papilio philenor*. [19] 30: 196. **Paulian, R.**—Sur l'atrophie des ailes et des élytres chez les Coléoptères. [Miscell. Ent.] 36: 94-96. **Piepho, H.**—Ueber die temperaturmodifikabilität und genetik zweier rottaugiger rassen der mehlmotte *Ephestia kuehniella*. [87] 133: 495-517, illus. **Reynolds, J. M.**—A new contribution to the problem of segmentation in the Arthropoda. [16] 30: 373-382. **Saz, E.**—Maravillas del instinto que guía a los animales en el cuidado de sus hijos. [Bol. Soc. Ent. España.]. 17: 39-47. **Shibata, K.**—Studies on the super-cooling death of Insects. [Mem. Fac. Sci. Taihoku Imp. Univ. Formosa] 16: 91-103. Studies on the death-temperature of a fruit-fly, *Chaetodacus cucurbitae*, at the frozen state and the influence of supercooling upon its temperature. [Mem. Fac. Sci. Taihoku Imp. Univ. Formosa] 16: 105-116. **Stuart, R. S.**—The anatomy and histology of the malpighian tubules and the adjacent alimentary canal in *Melanoplus differentialis*. [Jour. Morph.] 58: 173-188, illus. **Tillyard, R. J.**—Evolution of progoneate and opisthgoneate types in the Myriapod-Hexapod group of terrestrial Arthropoda. [Amer. Jour. Sci.] 30: 438-449. **Toth, L.**—Beitrag zur Kenntnis der Aphidspeicheldruese. [46] 30: 496-505, illus. **Trojan, E.**—Zur frage der oligomerie weiblicher Akuleaten (Hym.). [46] 30: 597-628, illus. **Weyer, F.**—Epithelerneuerung im mitteldarm der Termiten während der hautung. [46] 30: 648-672, illus.

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An Unusual Mating of Velvet Ants (Hymen.: Mutillidae).

While collecting insects near Atlanta, Georgia, on July 24, 1935, I observed a very unusual mating of velvet ants at 5:20 P. M. I saw a large number of males flying under a small pine tree. The tree was about ten feet tall and the limbs came to within two feet of the ground. There were several small wild plum bushes growing under the pine tree, making sweeping with an insect net almost impossible.

There were at least twenty-five males flying under the pine tree and amongst the wild plum bushes. I crawled up into the center of the swarm of males, and discovered a ball of males rolling and tumbling upon the ground. This tumbling mass was about one and a half inches in diameter. When I picked up the tumbling mass, they all flew away except a pair in copulation. There must have been at least fifteen males in this rolling, tumbling mass. Within a minute after I placed the pair in a cyanide bottle, not a male was to be seen anywhere. I waited near the pine tree for about fifteen minutes and captured four males that returned. This swarm of males were all *Mutilla* (*Timulla*) *briarvus* Blake.

During the afternoon I took several males of other species, but had not taken nor seen a single *briarvus*. They must have all been at the mating swarm. I watched the males flying for

about five minutes before I crawled up under the pine tree. They would fly down to the tumbling mass (however, I could not see the mass from my position) and others would fly up. There must have been at least forty males flying under the pine tree, and in the rolling, tumbling mass upon the ground. I was greatly surprised to find the males vanish out of sight almost immediately after I had placed the pair in copulation in the cyanide bottle.

P. W. FATTIG, Emory University, Emory University, Georgia.

New Butterfly Record for United States. (Lepid.: Nymphalidae).

During a recent collecting trip in Itasca Park, Minnesota, an interesting butterfly record was obtained. A specimen of *Erebia discoidalis* Kirby (Nymphalidae) was taken by the writer near Bohall Lake in the park on May 31, 1935. Itasca State Park is located in northern Minnesota about 220 miles northwest of the Twin Cities and about 120 miles south of Rainy Lake on the Canadian border.

The butterfly was taken in a rather small, swampy clearing surrounded by willows in a dense forest of mixed hardwoods and conifers. It was in fresh condition and apparently had emerged recently. The fresh condition of the specimen and the early date of its capture would seem to indicate that the butterfly is native to Minnesota and not a chance migrant from farther north.

According to W. J. Holland in "The Butterfly Book" (Revised edition 1931), the Red-Disked Alpine, as it is commonly known, is a common butterfly of the far North. It is found from Hudson Bay in the East to Alaska on the Pacific Coast. The species was described by Kirby about 1837 from several specimens taken at Cumberland House, Saskatchewan. Although W. J. Holland's "Butterfly Guide" (1929) reports that it is probably found on the high mountains of Idaho and Montana, I am unable to find any published record of this butterfly for the United States. Mr. R. A. Leussler, of Omaha, Nebraska, has been consulted, and he knows of no instance of its being taken previously in this country.

The specimen is deposited in the University of Minnesota collection in the Department of Entomology, St. Paul, Minnesota.

R. H. DAGGY, University of Minnesota, St. Paul, Minn.

* Paper No. 1374 of the Scientific Journal Series of the Minnesota Agricultural Experiment Station.

DAS WERDEN EINER GROSSEN ENCYCLOPAEDIE. Eine Jubilaeums-Schrift, by Dr. WILHELM JUNK. W. Junk, 's-Gravenhage (Holland). 1935. Price: 0.80 Dutch florins.

A personal communication to the public in which Dr. Junk describes the development of the "Coleopterorum Catalogus" through the past 25 years, and relates, with pardonable pride, the part he himself has played in this undertaking, not only as its publisher but also as a co-editor. He refers to the "C.C." as a "gigantic encyclopedia" and as "the greatest undertaking in the interests of a special field of natural science that has ever been created on this Earth in any language." "Even after a hundred years it will continue to be the source of all information of the type such a catalogue is designed to furnish. It is difficult to conceive of such a work ever again being created anew, especially in view of the alarming falling off in the number of workers in systematic Entomology."

Linnaeus in his 10th edition described 574 beetles. Dejean, in 1802, listed 910 species, and in 1837 (4th ed.) 22,399. Gemminger and Harold's great catalogue, 1868-76, lists ca. 77,000 species. Contrasted with these figures we find that the "C.C." contains to date 175,666 species. Those not yet listed comprise mainly some of the sub-families of the Curculionidae, a family containing about 70,000 species. The total number of beetles known is estimated at 240,000.

Although the need of a new catalogue was generally felt, the idea of actually publishing such was first suggested by H. Gebien of Hamburg in 1904. At that time Gebien tried to interest G. Kraatz of Berlin; but the latter was too busy organizing a new museum so that in 1906 Gebien turned to S. Schenkling who became the editor of the Catalogus. Three years later, however, before the idea had really matured, the Hungarian E. Csiki had actually set out to publish a new catalogue, some parts of which were ready to go to press. Upon hearing from Schenkling, Csiki immediately gave up his own less ambitious undertaking in favor of the C. C. and it was but shortly after this, in 1910, that the first part of the Catalogus appeared. Since then 141 parts have been issued, with 21,036 pages, making up 27 volumes. Even during the World War publication was not suspended and 15 parts were issued during those years. The work will be completed during the next six years and will consist of 31 volumes, the last volume being the index.

Dr. Junk also tells something of the difficulties he encountered, in finding specialists willing to contribute, and having found them, in guiding their work and in actually obtaining

their copy,—in one instance copy promised him 20 years ago has not yet been received! Altogether 26 scientists have contributed to the catalogue, 23 of them German, 11 French, 7 Austrian and 6 English. Among them were 19 museum workers, 5 university professors, 6 college teachers, 7 public school teachers, 10 officials, 1 physician, 2 attorneys, 1 engineer, 1 business man, 1 confectioner, 4 private citizens and 5 whose occupations are unknown.

After pointing out the scientific importance of the C.C., Dr. Junk goes on to say that its publication has had another effect, an indirect one: for it was the stimulus that "caused by publishing house, as the only one of its kind, to specialize along a line which seeks to counteract the evils of specialization. . . . This it strives to accomplish by devoting itself to summarizing present attainments in various special fields. In the descriptive natural sciences such a summarization can be accomplished largely by a compilation of catalogues. . . . And so, hardly a year after the C.C. was begun, work was started on a similar catalogue of the butterflies and two years later on one of the fossils and, only last year, on one of cave animals." Of these the Fossilium Catalogus will probably exceed in size even the beetle catalogue.

Finally Dr. Junk pays high tribute to Dr. Schenkling the editor, to his ability in maintaining the most friendly relationships between contributors and publisher, to his scientific accomplishments, the universality of his knowledge and his bibliographic and editorial accuracy. In conclusion, it is announced that all the 141 parts of the Coleopterorum Catalogus published to date may now be purchased at the reduced price of RM 1100. At this figure the cost per signature (16 pages) is .080 RM, which Dr. Junk assures us is quite low as compared with usual charge of 2 RM for German scientific publications with a small circulation.

This Jubilaeums-Schrift has also appeared as pages iii to xv of Dr. Junk's "Bibliographia Coleopterologica." This B. C. is a compilation containing, besides the above mentioned, his Catalog No. 87, Coleoptera, comprising pages 149 to 310, which lists entomological Periodica, works on Coleoptera, Coleopterorum Larvae, Coleoptera noxia, a Supplementum: Alii Insectorum ordines, and an index of the families treated in the works listed. This catalog is not only a list of the publications Dr. Junk has for sale but, to some extent, is a very good bibliography of the more important works on the Coleoptera. The B. C. is printed on good paper and bound, making a very serv-

iceable looking book which should be of interest to Coleopterists. The price is given as 10 shillings.

The NEWS extends to Dr. Junk and Dr. Schenkling congratulations on the occasion of the 25th Anniversary of the Coleopterorum Catalogus.

R. G. SCHMIEDER and E. T. CRESSON, JR.

DIPTEROLOGI. Dr. Wilhelm Junk, Publisher. Den Haag, (Holland). 19 pages. Price, Holl. fl. 1.25. This is a list of the working dipterists of the World, with their addresses and their special fields of study and should be a useful list for students of the Diptera.

HYMENOPTERORUM CATALOGUS. Ed. II. HEDICKE. W. Junk, Publisher. The inauguration of this work has just been announced, "as a new link of the chain of my catalogi." It is estimated that this catalog will enumerate more than 150,000 species as compared with 50,000 listed by the Catalogus Hymenopterorum of Dalla Torre. It will be issued in parts, in style conforming with his other catalogs, at the subscription price of 70 cents per signature (of 16 pages) which price will be reduced 10 percent, as soon as 160 subscribers are secured.

This H. C. is the sixth in the series of Dr. Junk's unsurpassed catalogs; a list which also includes the Coleopterorum Catalogus, Lepidopterorum Catalogus, Fossilium Catalogus, Psyllidarum Catalogus (completed, 913 pp.) and the Animalium Cavernarum Catalogus. All of these are indispensable to workers in those fields. Dr. Junk will be 70 years old on February 3, 1936. E. T. CRESSON, JR.

Clusters of *Atherix variegata* Walk., Mistaken for Rust Patches (Diptera: Leptidae).

W. E. BRITTON, New Haven, Connecticut.

On June 6, two employees of the State Highway Department brought to the Station some flies and a reddish brown deposit from a concrete highway bridge that was constructed three or four years ago over the Housatonic River at Cornwall Bridge, Connecticut. Engineer inspectors had reported that the construction work on this bridge had not been adequately supervised or inspected, inasmuch as rust spots from the steel re-inforcing material showed on the outside of the bridge. The Highway Commissioner sent someone to examine the bridge and it was found that these spots were more or less covered with flies, some of which were alive and others dead. They proved to be *Atherix variegata* Walker, of the Family Leptidae

or Rhagionidae. The egg-masses are cream-colored when first deposited but later turn to reddish brown or fawn color, and these colored areas were mistaken for rust spots. Still later the accumulation of dead flies, dirt and debris gave a distinctly gray color to the deposit. According to the information obtained, the largest discolored spot had an area of about 50 square feet on the crown of the arch under the bridge floor and about 50 feet above the water. Other spots were smaller and nearer the water. One spot of not more than a square foot was on the under side of a cross beam and not more than 15 feet above the water.

Dr. R. B. Friend, of this Department, visited the bridge June 13. Evidently all flies and the egg-mass deposit had been removed from the concrete bridge, but under the old wooden covered bridge near by there were heavy deposits of dead flies and old egg-masses at least half an inch in thickness. Apparently all eggs had hatched, and no living flies were seen. Egg-masses deposited in the laboratory hatched in six days, and the young larvae wriggled about in the water. They are said to be predaceous.

According to literature, the flies of this species cluster in large numbers and lay their eggs on objects over or near the water, and on hatching the young larvae drop into the water. Apparently the larvae live in running water, as there are several records of this species occurring at altitudes of 6,000 and 7,000 feet in Colorado, Utah and Wyoming. There are also many records at lower elevations in New England and New Jersey. The altitude of Cornwall Bridge, Connecticut, is about 500 feet.

If these western records refer to *Atherix variegata*, as Dr. Leonard¹ seems to believe, this species is the one used for food by certain Indian tribes in California, as reported by the late Dr. J. M. Aldrich.²

¹ A Revision of the Dipterous Family Rhagionidae, Memoir No. 7, Am. Ent. Soc., p. 82, 1930.

² Ent. News, 23, p. 159, 1912.

EXCHANGES

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

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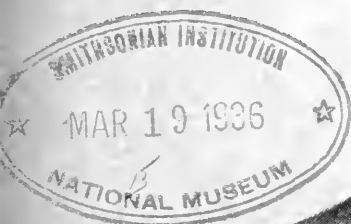
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ENTOMOLOGICAL NEWS

MARCH, 1936

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No. 3



HENRY CHRISTOPHER MCCOOK,
 1837-1911.

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

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At the International Congresses of Entomology and Zoology, of 1935.

By J. CHESTER BRADLEY, Cornell University, Ithaca, New York.

(Continued from page 34.)

The long-protracted journey to Lisbon no one enjoyed, for it was beset with many difficulties in the way of poor connections, crowded accommodations, even a five-hour wait at a wayside station in Portugal. But these things seem normal to Iberian railroading and eventually they were of the past, and we were comfortably at home in a hotel in Lisbon, late Saturday evening.

Lisbon, like Rome, is a city built upon hills. The commercial center, in which our hotel was located, is in a valley at water-level. The hills and streets lead sharply upward on either side, and the heights are also reached by various elevators and short cable-car lines. The Faculty of Sciences of the University, formerly known as the Polytechnic College, is housed on one of these hills, and served as headquarters of the Zoological Congress. The dreary buildings, erected in 1844, contrasted unfavorably with the beautiful structures in which the sessions of the Entomological Congress had been held.

On Sunday morning the opening formal session of the Congress was held in the hall of the Geographical Society. The President of the Republic presided and several addresses were delivered, but the acoustics of the hall were such that few could hear what was being said. In the afternoon we were taken for a drive through Lisbon in a long procession of taxi-cabs. The most characteristic and pleasing feature of Lisbon is the tiled exteriors of the houses, both residences and commercial buildings, in never ending design and many colors. This is of course the result of Moorish influence. Coming to the summit of one of the hills, the procession halted at a "mirador," liter-

ally "gazing-place." We all got out of our taxis, strolled about and enjoyed the lovely panorama of city, hills and Tagus. Also we visited a very ancient tiny chapel which was there. The drive was followed by a reception at the Ministry of Public Instruction. It was interesting to compare the technique of the Portuguese buffet with the Spanish. But it is beyond possibility to describe the great variety of delicious things that were provided for our delectation at this and many more such events to come. At half-past nine in the evening there was a performance for us, at one of the theatres, described as an "Artistic Night Entertainment upon Portuguese Motives." It was very enjoyable.

General sessions of the Congress were held on Monday, Wednesday and Friday mornings and at 9:30 on two evenings. From which one will see that in Lisbon, as in Madrid, night is a time for activity. Sectional meetings were held on two mornings and three afternoons. There were few papers on entomology in the section devoted to that subject, but several read in other sections. In all there were twelve sections.

Late on Monday afternoon we were taken for a boat ride on the Tagus. Many students from the Medical College took a very enthusiastic share in the excursions, and a number of these organized some lively dancing on this steamer.

Tuesday, after ferrying across the Tagus, we had an interesting excursion by autobus to Setubal lasting all afternoon. Near Palmella we climbed to the imposing ruins of an ancient castle. Nearby were three white-washed windmills, the first we had seen, the wheels with their sail-like arms, turning lazily in the breeze. A lovely drive along the coast brought us to a fishing village, where we visited a sardine-canning factory. Everything within was very clean and sanitary. After a further drive we came to a fortress-like building, the ramparts of which rose from rocks over the sea. It was a former monastery, now turned into a hospital for consumptives. We entered a court overlooking the sea, where long tables were spread with the usual diversity of delicacies for a feast.

Thursday we were taken for an all day excursion by taxis. First we visited the old royal monastery of Mafra. Afterwards we visited the lovely grounds of a private estate, where large tree-ferns, and many kinds of tropical plants and trees were under cultivation. At Cintra we were guests of the municipality at a long-drawn-out luncheon. Then we were driven up a wooded hillside on the summit of which was a beautiful, but not ancient castle, built in Moorish style. Leaving this we wound down through a labyrinth of roads among pleasant woodlands, until we reached a small rustic forestry station and museum, on the lawn of which we were served with another picnic of Portuguese delicacies. Eventually we drove to Estoril, a seaside resort, where in a very fashionable and modernistic casino we were guests of the President of the Congress at an elaborate and delicious banquet. This was followed by an "Artistic fest" and lasted very late into the night.

During the week the International Commission on Zoological Nomenclature held frequent sessions. Among other matters they acted upon recommendations that had been received from the Committee on Entomological Nomenclature which had held sessions during the Congress in Madrid. Of the measures enacted of interest to entomologists were several cases in which the rules were suspended and types fixed to conserve certain generic names of Orthoptera, of butterflies and of Hymenoptera. The latter involves family and subfamily names, and now permit the retention of Cimbicidae, Crabronidae, Ichneumoninae, Pimplinae, Braconinae, Proctotrypidae, Prosopidae, Bethyridae, Sphecinae, Ammophilinae, Pompilidae and others in their old usage.

There were over 380 registrations at the Zoological Congress, and about 430 at the Entomological. But each of these figures included a good many persons who registered but did not attend, and institutions which became corporate members.

The final meetings of the Zoological Congress and the closing banquet were held on Saturday, but we did not stay for them. Instead we took the tri-weekly train for Villa Real de San Antonio, from which point we ferried across the river to

Spain and took an auto to Seville. After a couple of days in that incomparable city, enjoying, despite suffocating heat, the contrast between northern Spain and Audalusia, and after a couple of pleasantly cool days on the sea at Cadiz, we took an autobus over the hills to Gibraltar. On the evening of the 27th we were ready and waiting to board the Conte di Savoia, as she came steaming into the harbour, every light blazing, and towering above our tender like a scintillating mountain.

—♦—

The Immature Form of *Brachymesia gravida*, with Notes on the Taxonomy of the Group (Odonata: Libellulidae).

By C. FRANCIS BYERS.

(Continued from page 37)

Because of the new material presented in Dr. Klot's work, indicated above, and the present writing, the author thinks it advisable to construct a key to the genera of the American Libellulid nymphs. At present the better available keys⁴ are to the fauna of a restricted geographical area and the more general keys are inadequate. In the following key those genera described on supposition by Dr. Klot's are indicated by placing the generic name in quotation marks.

KEY TO THE AMERICAN GENERA OF ANISOPTEROUS DRAGONFLY NYMPHS POSSESSING A LABIUM IN THE FORM OF A MASK.

(Corduliinae and Libellulinae.)

- 1—Head with a prominent frontal horn between the bases
of the antennae [Macromiini]
- Head without a prominent frontal horn..... (2)
- 2—Abdomen with dorsal hooks present..... (3)
- Abdomen with *no* dorsal hooks present..... (21)
- 3—A dorsal hook present on abdominal segment 9..... (4)
- A dorsal hook *absent* on abdominal segment 9..... (14)
- 4—Lateral spines of segment 9 attaining or surpassing
the tips of the abdominal appendages..... (5)
- Lateral spines of segment 9 not attaining the apex of
abdominal appendages (7)

⁴ From which I have freely drawn for the material in the present key and to whose authors I am thus indebted.

- 5—Lateral spines of segment 8 set at an angle to the long axis of the abdomen, not parallel to those of segment 9. Lateral labial setae 5-6; mental 7-11. Length 21 mm.*Neurocordulia*
 Lateral spines of segment 8 not set at an angle, and parallel to those of segment 9 (6)
- 6—Lateral labial setae 4-5; mental, 4. Mentum about as long as wide. Length, 27 mm.*Épicordulia*
 Lateral labial setae 6-8; mental, 9-10. Mentum longer than wide. Length, about 16 mm.*Tetragoncuria*
- 7—Superior and inferior abdominal appendages long; as long as the mid-dorsal length of abdominal segments 8 + 9 (8)
 Superior and inferior abdominal appendages short; not as long as the mid-dorsal length of segments 8 + 9 (9)
- 8—Lateral labial setae 8; mental 9 "*Miathyria*"
 Lateral labial setae 6; mental 8.....*Brachymesia*
- 9—Mental setae 8-9. Dorsal hooks small and blunt. Crenulations of lateral lobes of the labium high... (10)
 Mental setae 10-14. Dorsal hooks sharp and slender. (11)
- 10—Lateral labial setae 6; mental 8..... "*Macrothemis*"
 Lateral labial setae 7; mental setae 9-10..... "*Scapanea*"
- 11—Lateral abdominal appendages nearly as long as the superior (12)
 Lateral abdominal appendages usually not over half as long as the superior (13)
- 12—Crenulations of the lateral lobes of the labium low. Dorsal hooks absent on abdominal segments 3-4. Lateral spines on abdominal segment 9 approximately as long as the dorsum of the same segment. Length 15-20 mm.*Helocordulia*
 Crenulations of the lateral lobes of the labium high. Dorsal hooks present on abdominal segments 3-4. Lateral spines on abdominal segment 9 not more, usually much less, than the length of the same segment. Length 18-27 mm.*Somatochlora*
- 13—Length of the lateral labial lobes measured from the base of the movable hook to the lateral point of articulation with the mentum longer than the distance from this point of articulation to the base of the mentum. Lateral labial setae 5. Length 15 mm.*Perithemis*
 Length of the lateral labial lobes as measured above shorter than the mentum. Lateral labial setae 7-10. Length about 20 mm. "*Dythemis*"

- 14—Eyes at side of head (lateral)(15)
 Eyes capping the anterolateral angles of the head;
 more frontal than lateral(18)
- 15—Lateral abdominal appendages nearly as long as the
 inferiors. Lateral labial setae 7*Dorocordulia*
 Lateral abdominal appendages usually about half the
 length of the inferiors. Lateral labial setae 9-14..(16)
- 16—Dorsal abdominal hooks usually as long as the seg-
 ments bearing them. A dorsal hook on abdominal
 segment 3 in most species. Inferior abdominal ap-
 pendages not or but slightly longer than the su-
 perior*Leucorrhinia*
 Dorsal abdominal hooks shorter than the segments
 bearing them. Without a hook on abdominal seg-
 ment 3. Inferior abdominal appendages markedly
 longer than the superior(17)
- 17—Lateral abdominal spines long and straight, those of
 9 extending to the tips of the inferior appendages
 or beyond*Celithemis*
 Lateral abdominal appendages shorter and incurved.
Sympetrum
- 18—Mental labial setae 0-4*Ladona*
 Mental labial setae 8-15(19)
- 19—Body smooth. Low dorsal hooks on abdominal seg-
 ments 2-6. Crenulations of lateral lobes of the
 labium very deep. Mental labial setae 14-15. [Dis-
 tribution: SW. States, Tex., Mex. to Brazil].
Palliothemis
 Body hairy. Dorsal hooks on abdominal segments
 3-6 or 8. Crenulations of lateral lobes moderate.
 Mental labial setae 8-13. [Distribution not as
 above.](20)
- 20—Median lobe of the labium evenly contoured....*Libellula*
 Median lobe of the labium crenulate on the front bor-
 der*Plathemis*
- 21—Inferior abdominal appendages strongly decurved... (22)
 Inferior abdominal appendages straight.....(23)
- 22—Lateral labial setae 11-12.....*Leptthemis*
 Lateral labial setae 8-9(*Mesothemis*) *Erythemis*
- 23—Eyes capping the anterolateral angles of the head
 (frontal), usually small and not very prominent..(24)
 Eyes at the side of the head (lateral), usually large
 and prominent(26)
- 24—Lateral abdominal appendages nearly as long as the
 superior. Length of abdominal segment 10 + ap-

- pendages shorter than the length of segment 9 measured on the mid-ventral line. Crenulations of the lateral lobes of the labium high. *Somatochlora*
- Lateral abdominal appendages one-third to one-half as long as the superior. Length of abdominal segment 10 + appendages longer than segment 9 measured on the mid-ventral line. Crenulations of the lateral lobes of the labium shallow. (25)
- 25—Median lobe of the labium evenly contoured. . . *Libellula*
Median lobe of the labium crenulate on the front border *Orthemis*
- 26—Abdominal appendages long, slender and needle-pointed. Lateral spines of segments 8 and 9 long and incurved. Those on 8 at least as long as the lateral margin of segment 9. (27)
Abdominal appendages short and heavy, not projected into a long needle-point. Lateral spines on segments 8 and 9 flat and straight. Those on 8 not as long as the margin of segment 9. (28)
- 27—Lateral spines on abdominal segment 9 as long as the inferior abdominal appendages. Crenulations of the lateral labial lobes obsolete *Tramea*
Lateral spines of abdominal segment 9 not as long as the inferior abdominal appendages, about as long as the laterals. Crenulations of the lateral labial lobes deep *Pantala*
- 28—Lateral abdominal appendages more than half as long as the inferior (three-fourths to as long usually). Lateral labial setae 6-7 (29)
Lateral abdominal appendages less than one-half the length of the inferior (one-third to one-half). Lateral labial setae 9-14 (30)
- 29—Inferior abdominal appendages as long as the superior. Lateral labial setae 6. Length 10 mm. *Nannotkemis*
Inferior abdominal appendages longer than the superior. Lateral labial setae 7. Length greater than 15 mm. (usually 18-19 mm.) *Cordulia*
- 30—Lateral spines present on abdominal segment 8. (31)
Lateral spines lacking on abdominal segment 8, rudimentary on 9 *Sympetrum*
- 31—Lateral spines of abdominal segment 8 short; of 9 long. The lateral spines of 9 as long as the abdominal appendages, longer than the margin of segment 9 *Pachydiplax*

- Lateral spines of abdominal segments 8 and 9 more nearly the same length. Those of segment 9 less in length than the margin of segment 9..... (32)
- 32—Distribution Northern: Me., Wisc.; Hudson's Bay to B. C. and Alaska (33)
- Distribution Southern: Tropics and Gulf Strip; S. E. States, Tex.; W. Ind.; Mex. to Argentine. *Erythrodiplax*
"Micrathyria"
- 33—Prominent bunches of setae present on the dorsum of abdominal segments 4-9 *Erythrodiplax*
No such arrangement of setae on the abdomen.
Leucorrhinia
- Unknown Genera: [*Platycordulia*, *Williamsonia*, *Pseudolcon*, *Uracis*, *Macrodiplox*, *Tauriphila*, *Ephidatia*, *Brechmorhoga*].

A Summary of Insects Attracted to Liquid Baits.¹

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

During 1933 and 1934, seventy-five attractants were used to attract oriental fruit moths in a peach orchard interplanted with apple trees in Adams County, Pennsylvania. Each experiment consisted of ten traps. The tests were repeated four times during the summer, covering a period of twenty-one weeks, except in a few cases where materials were not attractive. A mixture of one part refiner's syrup and twenty parts water was placed in all traps, with chemicals added at the rate of one cubic centimeter, or one gram, per trap. Most of the acids were soluble in the baits. Cinnamic, camphoric and picric acids and borneol were dissolved in alcohol before adding them to the mixture. Methyl cinnamate, piperonal and thymol were dissolved in warm mineral oil and then emulsified. These and all other chemicals were emulsified with 3 grams of number 235 American Cyanamid spreader, 30 cc. of water and 10 grams or 10 cc. of the attractant. This made sufficient bait for ten traps. A record was kept of insects that visited the baits. Since reports have been published on many of these, the present paper is concerned primarily with miscellaneous insects

¹ Publication authorized by the Director of The Pennsylvania Agricultural Experiment Station, November 6, 1934, as Technical Paper No. 664.

which have been taken in relatively large numbers, and may prove of value to other workers.

DIPTERA.

Tabanidae were captured in relatively large numbers. About seventy-five percent of the catches were females. This was rather surprising as the females are largely blood feeders. Seven species of *Tabanus* were taken: *T. lasiophthalmus* Macq., during May and June; *T. atratus* Fab., from June 11 to September, 13; *T. sulcifrons* Macq., during July and August; *T. giganteus* De Geer, chiefly during late September and early October; and occasional specimens of *T. nigrescens* P. B., *T. lincola* Fab. and *T. costalis* Wied. A few incidental captures of *Chrysops* were made. Dr. J. S. Hine checked the identification of these species for the writer. Soap, sodium oleate, camphoric and oleic acids were outstanding attractants.

Reports on Ortalidae have been published heretofore.² During 1933, notes were taken on three species: *Euresta notata*; *Pseudotephritis rai*; and *Callopistromyia annulipes*. These are grouped in the following table. Sweet baits, such as amyl acetate and syrup, were most attractive. Acids were generally unattractive, although citric and malic acids caught comparatively large numbers.

Judging from the comparatively small numbers taken in traps, Syrphidae are not attracted but are probably chance catches. On the other hand, a remarkable number of species were taken. These include *Volucella vesiculosa* Fab., *Ferdinandea divex* O. S., *Syrphus ribesii* Linn., *Mesogramma marginata* Say., *M. polita* Say, *Tenthredomyia abbreviata* Loew, *Spilomyia hamifera* Loew, *Criorhina decora* Macq., *Ceriodes willistonii* Kohl, *C. signifera* Loew, *Chrysogaster nitida* Wied., *Sphacrophora cylindrica* Say, *Platychirus erraticus* Curran, *Milesia virginianensis* Drury, *Mallota posticata* Fab., *Syritta pipiens* L., and *Didca fasciata* Macq. The above determinations were made by Mr. R. C. Shamon and Mr. C. G. Green through the cour-

² Notes on Ortalidae. ENT. NEWS 30, No. 6: 169-172, 1928. Notes on Pennsylvania Ortalidae. ENT. NEWS 40: 84-87, 1929.

tesy of the late Dr. J. M. Aldrich of the United States National Museum. *Ferdinandea divces* and *Syrphus ribesii* were the common captures during May, while *Volucella vesiculosa* and *Mesogramma marginata* were the common species taken during June, July and August. They show a preference, if any, for the sweet baits.

At least a dozen species of Stratiomyidae were taken in baits. These have not been determined but are preserved for future study.

Bibio femoratus Wied. came to baits in large numbers from May 2 to June 16, 1933; 513 specimens were captured. There seemed to be little difference in the attractiveness of the various baits. Baffles increased the catches considerably.

Twelve specimens of the rare *Onocodes incultus* O. S., were taken from one set of traps on June 15.

Other Diptera were taken in large numbers. *Anisopus* was exceedingly abundant, especially during April, although specimens were taken in May, June and July. Drosophilidae, Muscidae, Tabanidae and Anthomyiidae were attracted in liberal numbers.

LEPIDOPTERA.

During 1934, an attempt was made to skim certain moths, other than the oriental fruit moth, from the surface of the baits. The codling moth, *Carpocapsa pomonella* Clem., the bud-moths, *Sparganothis idacusalis* Walk. and *Spilonota ocellana* D. & S., and the leaf-rollers, *Eulia velutinana* Walk., *Archips argyrospila* Walk., and *A. rosaceana* Harris, were taken in comparatively small numbers. These insects were probably not abundant in the twelve-year-old orchard where the work was conducted, but it is suspected that bud-moths and leaf-rollers might respond freely to some baits.

The peach borer is not readily attracted to baits, and as a rule, only the males respond to the stimulus. Adults were trapped earlier in the season than previous records indicate that they fly. One male was captured the week of May 24 to 31. Four specimens were taken during the week of May 31 to June 6. It is possible that a bait may be discovered that will be useful in determining the flight periods of this moth.

Synanthedon scitula Harris, the larva of which feeds in the galls of various trees, was taken in rather striking numbers during June. A few were captured earlier than this, and some during July, but none after August 8. Sweet baits were most attractive. Acids, with the exception of citric, malic, tartaric and succinic, were unattractive.

Noctuidae rank next in numbers to the oriental fruit moth, and are generally attracted by the same type of baits. There is at least one exception. Terpinyl acetate is highly attractive to the oriental fruit moth but not strongly attractive to the Noctuidae.

Although many other moths were captured it was difficult to make determinations because the bait destroyed essential characters. *Eustrotia carnicola* Guenee, however, was a conspicuous visitor.

HYMENOPTERA.

Parasitic insects are a minor factor in the operation of baits and have never been taken in appreciable numbers. During 1933, only thirty specimens of *Glypta rufiscutellaris* and *Macrocentrus ancylicora* were captured in 400 traps operating over a period of twenty-one weeks. Other parasitic forms were rare visitors.

Honey bees are not strongly attracted to syrup or aromatic baits. Citral and anethol were the only materials that attracted a noticeable number.

Several species of Vespidae were taken in baits but were apparently not attracted. The species taken were *V. diabolica* Sauss, *V. maculata* L., *V. crabro* L., and *V. maculifrons* Buy.

Polistes pallipes Lep. was captured in moderate numbers chiefly in late June and early July.

Other Hymenoptera were captured but the magnitude of the problem prohibited accurate records. Ants, of course, were taken in great numbers. Tenthredinidae were frequent visitors. Mutillidae, Chrysididae, Ichneumonidae and Chalcididae were taken rarely. *Monobia quadridens* and *Sphecius speciosus* were seen quite frequently in baits.

COLEOPTERA.

Glischrochilus fasciatus (Oliv.), a natural sap-feeder, was taken in moderate to large numbers from April 25 to September 25, but the catches were noticeably reduced during August and September. It was attracted by sweet baits, particularly syrup and water. The addition of soap and sodium oleate increased the catches. Amyl acetate and anethol were especially alluring. Acids, on the whole, were not attractive, although tartaric, acetic and formic acids caught many of these beetles. Cinnamic acid was decidedly repulsive.

Elateridae, chiefly species of *Mcclanotus*, were captured largely during June. Although 158 specimens were taken during 1934, it is probable that they were attracted not by the baits but, having the habits of visiting peach and apple, accidentally tumbled into the traps.

Cerambycidae came to the traps freely, especially when they were placed in or near wooded areas. During 1933 and 1934 the traps were not located near woodlands and the catches were comparatively small. The addition of sodium arsenite to the syrup seemed to increase the catches considerably.

Euphoria inda, as might be expected, was taken chiefly in June, although some were captured in July, August and September. Sweet baits, amyl acetate and plain syrup, were most attractive. Acids were decidedly unattractive.

Lachnosternae were numerous when traps are placed in the vicinity of wooded areas. The traps used were placed in a peach orchard, and only 215 specimens were taken during 1933.

The plum curculio, *Conotrachelus nenuphar* (Hbst.), is not attracted to baits, but occasionally falls in the traps when the trees are jarred.

Other Coleoptera have been taken in great abundance and data are reported in a previous paper.³

(To be continued)

³ Coleoptera taken from Bait Traps. Ann. Amer. Ent. Soc. 22: 427-437, 1929.

The Mantispidae of the Douglas Lake, Michigan Region, With Some Biological Observations (Neurop.)¹.

By H. B. HUNGERFORD, Lawrence, Kansas.

(Plate I in the April number)

The Mantispidae have been rare, or at least uncommon, insects wherever I have collected. Certainly the general collector would take them only occasionally and the capture of one of these curious mantis-like neuropterons would be a noteworthy surprise.

Until the summer of 1934, only four specimens had been taken in the Douglas Lake, Michigan, region in ten seasons' collecting. The University of Michigan Biological Station is located on Douglas Lake where I have conducted a class in entomology each season. Since there have been from 20 to 30 students each summer, most of them graduate students and all required to make extensive general collections of insects, I must say that Mantispids in that region are seldom taken by sweeping and such methods usually employed by the general collector. However, during the season of 1934, there were either larger numbers of *Mantispa* present or we have hit upon a more productive method of searching for them. I am inclined to believe that the latter is responsible for the fact that we secured 26 specimens of *Mantispa interrupta* Say during the summer.

Miss Janet Wilder, a graduate student from Mount Holyoke College, deserves the credit for discovering where and how to look for this species. She brought a pinned specimen to the first class meeting and when I expressed my desire to secure living specimens for study, she brought in several live specimens together with field notes concerning them. During the session she gave me eleven live specimens which she obtained by searching especially for them. Not one of the other twenty-six students secured a specimen by this method, although they were told how to look for them. Two females were captured at the arc light one night and I took eleven specimens by diligent search for them. We found 22 specimens on red oak

¹Contribution from University of Michigan Biological Station.

(*Quercus rubra borealis*) where they were resting on the foliage or twigs. While we searched quite as diligently, the maples and other trees, we found only two specimens on maple and one of the maples was intertwined with an oak. Since the insect is a predaceous one, it is difficult to account for its preference for the oaks. The oaks were infested with *Kermes* scales which were attended by ants and in one case, a Mantispid was devouring an ant. However, in the cages no preference for ants was shown and flies appeared to be the most acceptable food, although they captured other insects including adult Myrmelionids. They did not like Mirids and other bugs. The specimens were placed in laboratory cages, either alone or in pairs. Sometimes pairs lived together for weeks. In two cases the females ate their mates and in one case a male devoured the female.

They do very well in confinement if given a few drops of water each day and a housefly or other insect for food. Living insects will be accepted from the tweezers, or they will be captured when liberated in the cage. One female *Mantispa interrupta* Say, captured July 19 at the light, lived 67 days and was transported from Michigan to Kansas without difficulty and without interference with her egg-laying activity. She laid nine batches of eggs on different dates as follows: July 24, 1269 eggs; August 2, 2348 eggs; August 11, 1329 eggs; August 14, 1385 eggs; August 26, 652 eggs and 345 eggs; September 1, 180 eggs; September 13, 413 eggs and September 21, 464 eggs. She died on September 24th after depositing in captivity 8385 eggs! Another female kept 52 days laid 6262 eggs, another 49 days laid 6850 eggs, another 42 days laid 5222 eggs, another 23 days laid 3464, and two others deposited more than 2000 eggs each. Ten of the twelve females deposited eggs in captivity.

The above figures are interesting since, until recently, our knowledge was based on observations of European workers who reported that *Mantispa styriaca* Poda laid "many eggs." Just recently, indeed since my observations were made, Dr. R. C. Smith in the October (1934) Journal of the Kansas Entomological Society has given us our first definite idea con-

cerning the reproductive capacity of a Mantispid species. He reports some 2200 eggs for a female of *Mantispa sayi* Banks. It is by no means certain that 2200 eggs for *Mantispa sayi* Banks or 8385 eggs² for *Mantispa interrupta* Say represent the biotic potential of these species. The figures do suggest, however, the hazards that these uncommon insects encounter in their development.

Until this year (1934) it has been necessary for our American text books to quote Friedrich Brauer's observations on *Mantispa styriaca* Poda published in 1869. He described the eggs of this European species and reported that the larvae overwintered and in the following spring entered the egg cocoons of certain spiders such as *Arctosa allodroma*, *Lycosa inquilina* and *Dolomedes*. Poujade (1898) added *Drassodes hypocrita* E. Sim. and Main (1931) a Drassid Spider as host. The last-named author secured the emergence of adults in July which deposited a large number of eggs at the end of August. This suggests a long preoviposition period. Mr. Main also observed that the males possess an extrusible organ on the dorsal surface of the abdomen. This was investigated histologically the following year by Dr. Eltringham. Prior to Dr. Smith's paper no information concerning the development of any American species of the genus *Mantispa* was known.

Dr. Hine (1902) reported the collection of *Mantispa interrupta* Say at Vinton, Ohio, June 10, 1900. This was reported to be a male taken from the trunk of a small tree. On June 20, 1901, Mr. Morse took what was reported to be a female at the same place by beating oak foliage. Dr. Hine also stated that "In comparison, the general coloration of the body of the female is lighter than the male." In all the specimens I have seen the reverse is true. The male abdomen is gray with a dark longitudinal band above and below, while that of the female is cinnamon brown particularly beneath. The last

²The female that deposited 8385 eggs was taken July 19th and began laying eggs in captivity July 24th. Since we had captured 16 specimens before July 19th and the first female taken on June 26th began oviposition on July 3rd, it is quite possible that this one taken July 19th had already deposited eggs before she was captured.

visible abdominal sternite of the female is broad and large while in the male it is small. Of course, the male has a pair of claspers equipped with hooks that show in relaxed specimens. Furthermore, I cannot agree with Dr. Hine's description of the wings. Perhaps he had some *Mantispa sayi* Banks in the lot.³

Dr. Smith (1934) records some biological data regarding three species in Kansas, namely *Mantispa sayi* Banks, *Mantispa interrupta* Say and *Climaciella brunnea* (Say).⁴ He described the egg stage and the hatching of *M. sayi* Banks and found the incubation period to be from 9 to 11 days. The larvae all died in a few days, refusing to enter spider egg sacs. He also described the egg of *Climaciella brunnea* (Say) which had an incubation period of 11 days. While he did not describe the eggs of *Mantispa interrupta* Say, he published a photograph of an egg batch that was deposited by an adult taken October 8 and, moreover, secured the emergence of two pupae from egg sacs gathered in the field and believed to be those of *Philacus militaris* Htz., a jumping spider. These pupae emerged on the 10th and 13th of October. This information as to the host of *Mantispa interrupta* (Say) is most welcome and timely, since I have 36,895 larvae in winter storage, some of which, I hope, will be available for life history studies in the spring.⁵ It seems likely that with a host spider known, it will be easy enough to follow the larval and pupal development if the minute larvae can be wintered successfully. There are points also concerning mating and oviposition that need further study.

(To be continued.)

³ Recently Dr. R. H. Beamer examined the Mantispas mentioned above and reports: Specimen labeled "Vinton, Ohio, June 10, 1900," is *M. interrupta* Say; the one "Vinton, Ohio, Morse, June 20, 1901," is *M. sayi* Banks ♀; the one "Sandusky, Ohio, Osborn," is *M. sayi* Banks ♂. Thus Dr. Hine did have two species before him.

⁴ Described by Say as *Mantispa brunnea* but Enderlein (1910), made it the type species of his new genus *Climaciella*, a name which Dr. Banks (1912), recognized.

⁵ While Prauer's species wintered in the first larval stage, Smith's observation indicates the possibility of our *Mantispa* wintering as adults also. This is supported by Kuwayama,⁵ who took *M. formosana* Okamoto in February, March, and through the summer to October, and Nakahara⁷ obtained *Climaciella magna* (Mikaye) April to October.

Five New Southwestern Coleoptera (Buprestidae and Cerambycidae).

By J. N. KNULL, Ohio State University, Columbus, Ohio.

Acmaeodera uvaldensis n. sp. (Buprestidae).

Elytra moderately convex dorsally, nearly straight ventrally, aeneous above and beneath with brownish tinge, each elytron with irregular yellow markings as follows: four along side starting back of humeral angle, four on disk starting in line with first, two lateral apical red spots.

Head flat, coarsely punctate, clothed with long white pubescence; antennae serrate from the fifth joint.

Pronotum twice as wide as long, wider in the rear than in front, widest in the middle; side margins well indicated in front, inferior toward base; disk convex, shallow depression in front of scutellum, a prominent crescent-shaped depression on each side at base; surface evenly punctate in center, punctures much larger and more numerous laterally, clothed with long white pubescence along sides.

Elytra moderately convex, slightly wider than base of pronotum; sides sinuate back of humeral angles, expanded back of middle, acutely attenuate at tips, which are acute, margins coarsely serrate; disk convex, humeri elevated; surface striato-punctate, punctures large, confluent, intervals wider than punctures, with single rows of much finer punctures, pubescence long.

Abdomen beneath coarsely punctured, white pubescence dense; last ventral segment broadly rounded with a distinct subapical carina; anterior margin of prosternum sinuate, with a distinct tooth on each side of the middle.

Length 9 mm.; width 3 mm.

Described from a single specimen collected at Uvalde, TEXAS, May 21, 1935, by the author. *Holotype* in my collection.

According to Fall's key,¹ this species would run to *A. fenyesi* Fall, but it can be separated by the lack of the subapical plate on the abdomen and shape of pronotum. It is closely related to *A. purshiae* Fishr., but the markings on the elytra will serve to distinguish the two species.

Xenorhipis osborni n. sp. (Buprestidae).

Form similar to *X. brendeli* Lec., size smaller.

♂.—Head convex, slight depression on front near vertex;

¹H. C. Fall, Jour. N. Y. Ent. Soc., 7, p. 5, 1899.

surface crenulate; color dark blue; eyes small, finely granulate; antennae dull testaceous, extending to middle of elytra when laid along under side of pronotum, flabellate, quite similar to that of *X. brendeli* Lec. figured by Horn,² rami beginning at the second joint.

Pronotum one-and-one-half times as wide as long; anterior margin slightly sinuate, median lobe broadly rounded; base deeply emarginate at middle of each elytron; disk convex, slight depression in front of scutellum; lateral margins inferior in front, present on basal third only; sides nearly parallel, slightly rounded anteriorly, sinuate near base; surface crenulate; color bright metallic blue in middle; bright cupreous along sides. Scutellum oval, granulate, dark blue.

Elytra not quite as wide as pronotum at base, not covering the abdomen but extending to end of third abdominal segment, nearly twice as long as wide; sides parallel anteriorly, sinuate back of middle, apices broadly rounded; side margins serrulate on apical third; disk impressed on white fasciae; surface of white area densely punctate, dark area roughly, asperately punctate; color bright metallic green at base and in region of scutellum, a white fascia on each elytron extending from side margin nearly to suture in middle, anterior portion extending diagonally from sutural to humeral region, rest of elytra piceous; under wings visible, extending to slightly beyond tip of abdomen.

Beneath bright blue; abdomen coarsely, asperately punctate; legs piceus; sides of metasternum with a large, hairy depression, or excavation.

Length 5.5 mm.; width 1.5 mm.

♀.—Differs from the male in having normal antennae, extending slightly behind humeral angles when laid along under side of pronotum, serrate from the fourth joint; eyes slightly smaller, front bright metallic blue.

Pronotum bright metallic green along sides, anterior and basal margins, central area dark blue.

Elytra less strongly sculptured in dark areas, extending to end of fourth abdominal segment; each elytron with a median transverse white fascia extending from lateral margin nearly to suture, a broad transverse bright metallic green area at base, extending along suture, another at apex, rest of elytron piceous; dorsal surface of abdomen bright metallic green.

²G. H. Horn, Trans. Amer. Ent. Soc., 10, p. 165, 1882.

Ventral surface and legs dark blue; sides of meso- and metasternum bright metallic green; depression of metasternum lacking; abdominal punctures light.

Length 5 mm.; width 1.5 mm.

Described from a small series of both sexes collected by the writer on dying cat's claw (*Acacia constricta* Benth.) in the Davis Mountains, TEXAS, May 24 to 27, 1935. The females were extremely active in the bright sunshine.

Holotype male, *allotype* female and *paratypes* in writer's collection, *paratype* in collection of Ohio State University.

It gives me pleasure to name this interesting species after Professor Herbert Osborn. This insect appears to be a connecting link between *Xenorhipis* and *Hesperorhipis* described by Fall³ and it possesses certain characters which will fit either genus. However the antennae of the male agree with those of *Xenorhipis* and I have placed it provisionally in this genus.

***Agrilus parkeri* Knull (Buprestidae).**

Mr. Parker has called my attention to the fact that the type material of this species was collected in June, instead of July as I stated.⁴

(To be continued.)

WARD'S ENTOMOLOGICAL BULLETIN. Vol. 3, No. 3. January, 1936. We find in this number; notes on the "twisted winged insects (Stylopidae)"; on a collecting expedition down the coast of Florida by S. C. Bishop and C. R. Crosby; "More about the black widow" being found in Orient, Long Island; "On pinning Odonata"; "You can make this handy beating net" described by W. Proctor of Bar Harbor; "New species" being found by L. L. Pechuman in Bronx, New York; "On shipping insects," about which the writer questions the advisability of completely filling the vials with the preservative, but suggests leaving an air space for expansion and reducing the danger of the contents washing about by forcing in a good wad of cotton, not so far as to damage the specimens; "Bargains of the month."—E. T. CRESSON, JR.

³ H. C. Fall, Pan-Pacific, Ent., 7, No. 2, p. 74, 1930.

⁴ J. N. Knull, ENT. NEWS, 46, p. 189, 1935.

ENTOMOLOGICAL NEWS

PHILADELPHIA, PA., MARCH, 1936.

ENTOMOLOGY AT THE CONVOCATION WEEK MEETINGS,
DECEMBER 30, 1935, TO JANUARY 4, 1936.

Our annual summary of the entomological items of the programs of the American Association for the Advancement of Science and Associated Societies, held at St. Louis, Missouri, and of the American Society of Zoologists, held at Princeton, New Jersey, follows.

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

Entomological Society of America	44
American Association of Economic Entomologists.....	116
*Section F, Zoological Sciences, A.A.A.S. (excluding joint sessions with Amer. Soc. Parasit. and Ecol. Soc. Amer.)	19
American Society of Parasitologists	3
Wilson Ornithological Club	1
American Phytopathological Society	1
Mycological Society of America	1
Ecological Society of America (joint meeting with Section F, A.A.A.S.)	5
Genetics Society of America	12
*Phi Sigma Society	14
Limnological Society of America	1
Section N, Medical Sciences, A.A.A.S.	1
*American Society for Horticultural Science.....	4
Potato Association of America	1
American Society of Zoologists	16
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Total	239

These papers were distributed in subject as follows:

i	*Anatomy and Morphology	6
*General Entomology	Physiology	28
Collecting and Rearing	*Ecology	23
Methods	Behavior	1
*Entomological Instruction	Geographical Distribution.	6
Entomological Museums..	Genetics	5
Cytology	Evolution	1
*Embryology and Life History	*Taxonomy	13
19	Parasites and Diseases of	
	Insects	5

General Economic Entomology	11	*Orthoptera	33
Insecticides	25	Isoptera	1
Apiculture	11	Ephemera	2
Arthropods affecting Man	5	Odonata	2
do. do. Other Animals... ..	2	Homoptera	15
*do. do. Cereals and Field Crops	21	*Heteroptera	10
do. do. Truck Crops.....	13	*Thysanoptera	3
do. do. Households	1	*Coleoptera (excluding Japanese Beetle)	26
do. do. Ornamental and Greenhouse Plants	2	Japanese Beetle	3
*do. do. Fruits and Fruit Trees	20	Hymenoptera (excluding Honey Bee)	5
do. do. Forest and Shade Trees	6	Honey Bee	6
*do. do. Miscellaneous Plants	14	Trichoptera	1
ii		Lepidoptera (excluding the three following)	18
*Araneae	5	Codling Moth	13
*Acarina	5	Oriental Fruit Moth... ..	2
Collembola	1	*Corn Borer	4
		Diptera (excluding <i>Drosophila</i>)	17
		<i>Drosophila</i>	6

Many of these figures are duplications, both between sections i and ii and also within sections. Increases in numbers of papers over the corresponding figures for 1934 are starred (*). The total number of papers, 239, is the same as we gave for the Pittsburgh meeting (1934).

Both entomological societies met, as last year, in the same hotel (Jefferson). The Entomological Society was presided over by Prof. C. H. Kennedy, Ohio State University; Prof. H. B. Hungerford continued as Secretary and was elected President for 1936. The annual address was delivered by Mr. Curtis P. Clausen, U. S. Bureau of Entomology, on "Insect Parasitism and Biological Control," at the combined entomologists' dinner on December 31, at 8 p. m.

The President of the Economic Entomologists was Mr. L. A. Strong, chief of the U. S. Bureau of Entomology, the Secretary, Mr. A. I. Bourne, Amherst, Massachusetts. The President's address was entitled "Stabilizing Entomology," with the Entomological Society in joint session, December 30, at noon. The symposium, on "Orchard Sanitation," was presided over by Prof. J. J. Davis.

Entomological Literature

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

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

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.—Austin & Pitcher.—A laboratory method for rearing Sciarid and Phorid flies. [8] 72: 12-15, illus. **Balfour-Browne, F.**—The species problem. [Brit. Assoc. Adv. Sci. Rept.] 1935: 63-78. **Farnes, H. F.**—Recent Advances in Entomology. [Science Prog.] 30: 503-510. **Davies, W. M.**—A water-power mechanical insect trap. [22] 26: 553-557, illus. **Gause, G.**—On the causes of the mass appearance of the insects. [Zool. Jour. Moscow] 14: 413-438. [Russian]. **Jaques, H. E.**—Some methods of labeling and housing large insect collections. [4] 68: 1-7, illus. **Nicholson & Bailey.**—The balance of animal populations. [93] 1935: 551-598, ill. **Smith, H. S.**—The role of biotic factors in the determination of population densities. [12] 28: 873-898, ill. **Welch, P. S.**—Linnology. New York. 471 pp. **Williams & Milne.**—A mechanical insect trap. [22] 26: 543-551, illus. **Woodbury, A. M.**—Animal relationship of Great Salt Lake. [84] 17: 1-8.

ANATOMY, PHYSIOLOGY, ETC.—Ahrens, W.—Monographie des weiblichen Geschlechtsapparates der Termiten (Nach Untersuchung an *Termes Redemani*). [Jena Zeitschr. Wissen.] 63: 223-302, illus. **Ancona, L.**—Nota acerca de las células lisigenas y fagocitarias de las crisalidas de *Aegiale hesperiaris*. [112] 6: 193-199, ill. **Badonnel, A.**—Recherches sur l'anatomie des psocues. [Bul. Biol. France et Belg.] Suppl. 18: 241 pp., ill. **Darlington, C. D.**—Sex-

determining mechanism of *Drosophila miranda*. [90] 70: 74-75. **Gresson, R. A. R.**—The spermatogenesis of *Stenophylax stellatus*. (Trichoptera). [53] 78: 311-327, ill. **Hanna, A. D.**—The morphology and anatomy of *Euchalcidia caryobori*. [Bull. Soc. R. Ent. Egypte] 1935: 326-362, ill. **Herms & Wheeler.**—Tick transmission of California relapsing fever. [12] 28: 846-855, ill. **Hingston, R. W. G.**—The meaning of animal color and adornment. London. 411 pp., ill. **Janda V.**—Contribution a l'étude des changements periodiques de la coloration chez *Dixippus morosus*. [Men. Soc. R. Sc. Boheme] Sci., 1934, XII: 30 pp., ill. **Jeannel, R.**—Homochromie et Mimétisme. [Rev. Française d'Ent.] 2: 113-116. **Jue-Sing Hu & Feng.**—The morphological studies on the mouth parts of some Diptera. [Peking Nat. H. Bull] 10: 117-125, ill. **Kaufmann, B. P.**—The chromosomes of *Drosophila amanassae*. [68] 83: 39. **Kerkis, J.**—Chromosome conjugation in hybrids between *Drosophila melanogaster* and *D. simulans*. [90] 70: 81-85. **Kitchel & Hoskins.**—Respiratory ventilation in the cockroach in air, in carbon dioxide and in nicotine atmospheres. [12] 28: 924-933, ill. **Kocian, V.**—Ueber den Einfluss des Elektrizitätsstromes mit einer hohen Frequenz und Spannung auf die Metamorphose und Sauerstoffverbrauch der Insektenpuppen und -larven. 89 [Abt. Zool.] 56: 1-7, illus. **Komarow, P.**—Beitrage zur kenntnis des polymorphismus der sozialen insekten (*Apis mellifera*). [Zool. Jour. Moscow] 14: 171-191, ill. [Russ. resumé Germ.] **Kosminsky u. Warschawer.**—Untersuchungen ueber intersexualitat bei *Lymantria dispar*. [Zool. Jour. Moscow] 14: 271-310; 439-464, ill. [Russ. Res. Germ.] **Mansour, K.**—On the microorganism-free and the infected *Calandra granaria* (Curculionidae). [Bull. Soc. R. Ent. Egypte] 1935: 290-307, ill. **Neiswander, R. B.**—The Alimentary Tract of the Oriental Fruit Moth Larva. [43] 35: 434-439, illus. **Peacock & Greenshields.**—Note on the behavior of certain cell inclusions during mitosis in Tenthredinidae. [53] 78: 303-309, ill. **Thomsen, M.**—A comparative study of the development of the Stomoxydinae (especially *Haematobia stimulans*) with remarks on other coprophagous muscids. [93] 1935: 531-550, ill. **Trimble, C. A.**—The External Morphology of *Hydrous triangularis* (Colco: Hydrophilid). [43] 35: 440-450, illus. **Vimmer, V.**—Ueber die Fanoni Pharyngei, Batelli, im Pharynx von Dipterenlarven. [Casopsis] 32: 198-202, illus..

ARACHNIDA AND MYRIOPODA.—**Beier, M.**—Einige neue neotropische Pseudoscorpione. 89 [Abt. Syst.]

67: 443-447, illus. **Bonnet, P.**—La longevite chez les Araignees. [25] 40: 272-277. **McGregor, E. A.**—The Texas Citrus Mite, a n. sp. [10] 37: 161-165, illus. **Mello-Leitao.**—Dois novos Mimetidae do Brasil meridional com algumas notas sobre a familia. [15] 7: 323-327, ill. **Mello-Leitao e Arle.**—Consideracoes sobre a ordem Palpigradi, com a descricao de uma n. sp. [15] 7: 339-343, ill. **Viets, K.**—Eine neue Hyadesia (Sarcoptiformes, Acari) von Curacao. 89 *Abt. Syst.* 67: 425-428, illus. Halacariden aus Westindien. 89 [*Abt. Syst.*] 67: 389-424, illus. (*). **Willmann, C.**—Orobaten von Bonaire und Curaçao. 89 [*Abt. Syst.*] 67: 429-442, illus. (*).

THE SMALLER ORDERS OF INSECTS.—**Alexander, A. E.**—Termites in central New York State. [68] 83: 34. **Bailey, S. F.**—A list of the Thysanoptera of California. [55] 11: 163-169. **Borror, D. J.**—New Records of Ohio Dragonflies (Odonata). [43] 35: 451-456. **Moulton, D.**—New California Thysanoptera. [55] 11: 170-174. **Navas, R. P. L.**—Insectos suramericanos. [*Rev. Acad. Cien. Madrid*] 32: 360-375, ill. (*). **Reynolds, J. M.**—The Nature of Aptery in the Apterygota. [90] 70: 75-80.

ORTHOPTERA.—**Chopard, L.**—Le phenomene des phases existe-t-il a etat rudimentaire chez certains Orthopteres. [*Bull. Soc. Hist. N. Afrique du Nord*] 1935: 269-271. **Roubaud, E.**—Recherches experimentales sur le criquet pelerin. [*Bul. Soc. Hist. N. Afrique du Nord*] 1935: 272-280. **Rubtzov, I. A.**—Phase variation in non-swarming grasshoppers. [22] 26: 499-522, illus. **Saifi, M.**—Ipognatismo ed Oxycefalia negli Ortoteri. [*Bol. Z. Union Z. Italia.*] 6: 311-315, ill.

HEMIPTERA—**da Costa Lima, A.**—Genero *Microtomus*. (Reduviidae). [15] 7: 315-322, ill. (*S). **Essig, E. O.**—California Aphididae, New Cloudy-veined species. [55] 11: 156-162, illus. **Green, E. E.**—On Three New Species of Ceroplastes from South America (Coccidae). [109] 2: 272-275, illus. **Lange, W. H.**—Notes on *Ambrysus mormon* (Naucorid). [55] 11: 155. **Michalk, O.**—Zur Morphologie und Ablage der Eier bei den Heteropteren. [11] 1935: 148-175, illus. **Oman, P. W.**—New neotropical empoascan leafhoppers. [91] 26: 34-40, ill. **Pinto e Lent.**—Hemipteros predadores de insectos, provenientes do Brazil e Argentina. Sobre as especies do genero *Psammolestes*. [15] 7: 277-282; 333-337, ill. (*). **Poisson, R.**—Les Notonectes du groupe

N. lutea. (Notonectidae). [Rev. Française d'Ent.] 117-123, ill. **Skablo, J.**—Influence of the intermittent starvation on the development of the larvae of *Loxostege sticticalis* (Meadow moth) [Zool. Jour. Moscow] 14: 159-170. [Russ. resume Engl.] **Van Duzee, E. P.**—Note on *Ptochiomera caeca*. [55] 11: 174 (*). A note on *Elasmostethus*. [55] 11: 177.

LEPIDOPTERA.—**Bates, M.**—The Satyrid genus *Calisto*. [Oc. Pap. Boston Soc. Nat. Hist.] 8: 229-248, illus. (S*). Notes on Cuban butterflies. [Mem. Soc. Cuba. Hist. Nat.] 9: 225-228, ill. (*). **Benjamin, F. H.**—Notes on the *Lepusculina-Leporina* series of *Apatela* (Phalaenid). [55] 11: 145-155 (*). Notes and New Species (Phalaenidae). [38] 34: 194-210. **Bryk, F.**—Das Tierreich. Lief. 65. Parnassiidae. Subf. Parnassiinae. 790 pp., ill. **Cockayne, E. A.**—Notes on the Life-History of *Agrotis ipsilon*. [21] 48: 2-4. **Comstock & Dammers.**—Notes on the Life Histories of Three Butterflies and Three Moths from California. [38] 34: 211-225, illus. **Hovanitz, W.**—Notes on some California Butterflies. [55] 11: 190-192. **Hulbirt, E. L.**—Two unusual Butterflies taken in Southern California. [38] 34: 210. **Kuehn, A.**—Versuche ueber die wirkungs-weise der erbanlagen. [88] 24: 1-10, ill. **Plate, L.**—Genetische und phylogenetische Analyse der *Colias*-Kreuzungen des Herrn Emil von Silbernagel. [Jena Zeitschr. Wissen.] 63: 197-222, illus. **Schau, W.**—New Species of Lasiocampidae from Neotropical countries. [75] 17: 47-66. **Schwanwitsch, B. N.**—Symmetry in the wing-pattern of Papilionid butterflies. [9] 69: 7-12, illus. **Spitz, R.**—Revisao das cinco especies do genero *Myelobia*. [Rev. Mus. Paulista] 19: 579-594, ill. **Vasquez, L.**—Contribucion al conocimiento de los lepidopteros Mexicanos. *Halisidota caryae*. [112] 6: 215-244, ill. **Williams, C. B.**—Further evidence for the migration of butterflies. [Bull. Soc. R. Ent. Egypt] 19: 250-261.

DIPTERA.—**Austin & Pitcher.**—(See under General.) **Castro, G. M. O.**—Estudo sobre uma especie de "*Limatus*" que se cria em buracos de pau. [Rev. Dept. Nac. Prod. An., Rio de Janeiro] 2: 143-151, illus. (S*). **Evans, A. C.**—Physiological races of *Lucilia sericata*. [31] 137: 33-34. **Marshall & Staley.**—Generic and subgeneric differences in the mouth-parts of male mosquitos. [22] 26: 531-532, illus. **Philip, C. B.**—The *Furcatus* Group of Western North American flies of the genus *Chrysops* (Tabanid). [10] 37: 153-161. (*). **Reinig, W. F.**—Ueber Anomalien des Flue-

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One feature of this new book of interest and service to many is an Appendix giving a brief summary of the appearance, life history and distribution of thirteen species of *Bombus* (*Bremus*) and four species of *Psithyrus*. The state of our knowledge of the North American bumblebees is partially reflected by the fact that these species, with one or two exceptions, are essentially from central and eastern North America. Maps are given to show the distribution of the species mentioned. Too great a reduction of the original maps has made it difficult in many instances to distinguish the known range from that indicated as probable range. Based upon an accumulation of data over a period of many years the writer cannot agree with some of the ranges indicated as "probable" on the maps.

The writer of this review has been studying bumblebees from one viewpoint or another for twenty-five years and is greatly pleased that we now have available for layman and scientist alike an attractive and authoritative book pertaining to these social insects, written in entertaining and non-technical style, well illustrated and excellently printed. "Bumblebees and Their Ways" is a credit to the publisher as well as to its author.
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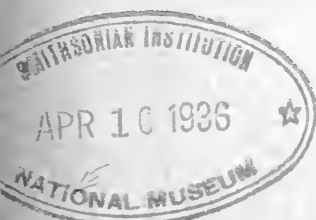
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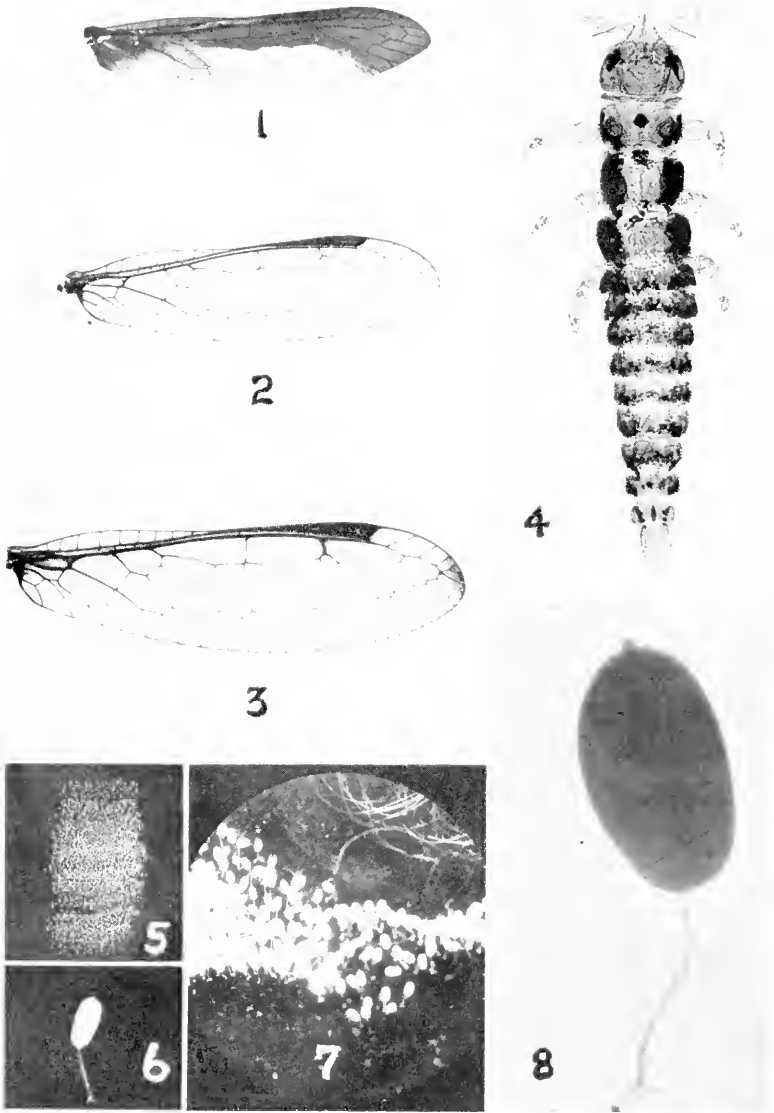
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MANTISPIDAE—HUNGERFORD

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No. 4

The Mantispidae of the Douglas Lake, Michigan, Region, With Some Biological Observations (Neurop.).

By H. B. HUNGERFORD, Lawrence, Kansas.

(Plate I.)

(Continued from page 72)

MATING OF *MANTISPA INTERRUPTA* SAY.

When a male and female are placed in a cage together, they always seem to be wary of each other. Even though they may live together for weeks, each is alert and on guard whenever the other is close by. Too close an approach from either one will result in a none too friendly strike by the other.

At the mating time the male lifts his wings nearly vertically to the long axis of his body and sidles up toward the female, the tip of his abdomen leading. If his overtures are repulsed, he will withdraw. Sometimes they will rest for hours facing each other, now and then making passes at each other with their fore legs. When at rest they usually have the tip of the abdomen turned to the right or left beyond the shelter of the wings. In one instance a pair, standing face to face, began a very gradual approach, then struck at each other and backed away. The female then raised her wings vertically, elevated her abdomen, and approached the male which struck at her. She then backed away, lowered her wings, and after making one turn around approached to be repulsed again. The following morning they were found side by side apparently in copula but soon parted. On two occasions I found females carrying a large white mass protruding at the tip of the abdomen. One of these was taken in the field. The other which had been in a cage with a male since July 9 had, at 7:40 A. M. on July 15, such a mass. This gradually became smaller and

disappeared entirely by the evening of July 16. Dr. Smith tells me he has observed nothing of the kind in the Chrysopidae.

It is certain that a single mating will supply considerable sperm for an isolated female deposited fertile eggs for 41 days. During this period she laid 4768 eggs.

OVIPOSITION OF *MANTISPA INTERRUPTA* SAY.

Oviposition by captive females was observed at various times of the day and night. The eggs were deposited on glass, on cellophaned wire, on tin, on cloth, on green cellophane, on white or blue and on black paper. The last five materials were used as lining to the cages so that the egg batches could be cut out and isolated.

When a female is engaged in egg laying, she is not easily disturbed and can be placed under the binocular and her operations studied. She begins with abdomen extended and deposits each egg on a short stalk, and one after another in a sweep across the arc from right to left then back again from left to right and so back and forth depositing the eggs in irregular rows until the top row is too close to her, whereupon she moves forward and starts again so that when the laying is concluded, the eggs appear in waves as shown in the photograph (Plate I, fig. 5). In this photograph at least ten distinct waves are shown. Usually there are only two or three waves. The width of the egg patch is limited by the sweep of the abdomen and is usually about 1.5 cm. across although it varies from 1 cm. to 1.8 cm. depending upon the individual. Each wave describes an arc. The largest single laying contained 2348 eggs. In spite of the fact that each egg is laid on a slender, clear, gelatinous stalk attached to the support, oviposition proceeds at a rather rapid even rate. Each operation involves a few little twitching movements of the tip of the abdomen, a touch to the surface, a slight lift of the abdomen and the egg comes out attached to its stalk, a downward press of the abdominal tip upon the egg and the operation is complete in from two to twenty seconds.

THE EGG OF *MANTISPA INTERRUPTA* SAY.

This freshly deposited egg is elongate oval, creamy white

(faintly greenish) in color with a chalky white micropyle at the upper end. Like the other Mantispid eggs described, the egg is attached to its support by a stalk. (See Plate I.) The egg is .4 mm. long (not counting the micropyle which is .02 mm. tall) and .2 mm. in diameter. Infertile eggs turn yellow in about a week, while the fertile ones gradually turn rosy to the unaided eye and under the binocular are gray, banded on the dorsal side with brown. In from seven to ten days the embryo shows plainly. The brown bands showing on the dorsal side are on the abdomen of the embryo which has both its anterior and posterior ends doubled back on its venter so that the dark eye spots are on the ventral side near the anterior end and the segmented caudal end extends forward about half way. The incubation period for 21 batches averaged 17.3 days. The shortest period was 14 days and the longest 21 days.

Only one specimen of *Climaciella brunnea* (Say) was taken in Michigan during 1934. Since *Mantispa sayi* Banks has been collected in Kansas and Ohio where *Mantispa interrupta* Say is found, *M. sayi* should occur at Douglas Lake, Michigan. The three species may be separated as follows:

1. Wings with anterior half at least, brown to dark brown,
Climaciella brunnea (Say).
 Wings transparent except on anterior margins.....2.
2. Pterostigma light brown joined behind by an infuscation on
 the second cross vein in cell R₁.
 Tip of wing usually infuscated...*Mantispa interrupta* Say.
 Pterostigma light brown; other markings on wing absent.
 (See Plate I)*Mantispa sayi* Banks.

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EXPLANATION OF PLATE I.

1. Front wing of *Climaciella brunnea* (Say) (Mag. \times 3.5).
 2. Front wing of *Mantispa sayi* Banks (Mag. \times 3.5).
 3. Front wing of *Mantispa interrupta* Say (Mag. \times 3.5).
 4. Newly hatched larva of *M. interrupta* Say (Mag. \times 85).
 5. Egg batch of *M. interrupta* Say showing ten waves (slightly reduced—the actual size of this batch was 2.8 cm. by 1.5 cm. and it contained more than 2300 eggs).
 6. Egg of *M. interrupta* Say (Mag. \times 17).
 7. Egg of *M. interrupta* Say (Mag. \times 5).
 8. Egg of *M. interrupta* Say (Mag. \times 85).
- Figures 1, 2, 3, 4 and 8 photographed by Doctor R. H. Beamer.
 Figures 6 and 7 photographed by Harold Peters.
 Figure 5 photographed by Doctor Frank Blanchard.

Homoptera of Porto Rico and the Virgin Islands.

Prof. Herbert Osborn has contributed a paper on the Homoptera (excepting the Sternorhynchi) to the Scientific Survey of this area in course of publication by the New York Academy of Sciences. It forms Part 2 of Volume XIV, occupies pages 111-260, is illustrated by 70 groups of text-figures and is dated 1935. Walcott, in 1923, listed 72 species of this group for Porto Rico. Prof. Osborn has added, from his own collecting, January 7 to March 20, 1929, 78 species, of which 23 appear to have been undescribed. The total of 150 species compares favorably with 102 for Jamaica and 180 for Cuba; 40 species are believed to be limited to Porto Rico.

A Summary of Insects Attracted to Liquid Baits.

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

(Continued from page 68)

MISCELLANEOUS INSECTS.

Several species of Chrysopidae, reported in an earlier paper,⁴ have been trapped in rather large numbers. The addition of certain attractants, especially sodium arsenite, amyl acetate, pinene and citrene, increased the catches noticeably.

A species of *Phryganca* (Trichoptera) came to baits in considerable numbers during June; 112 were taken in 1933. The presence of this species was conspicuous every season that baits were under observation.

Other insects such as Membracidae, Phymatidae, Jassidae and Hemerobiidae were taken in significant numbers. Twelve species of Membracidae, recovered from baits, were determined by Dr. W. D. Funkhouser. These were largely chance collections.

Spiders were also taken in noticeable numbers in many of the baits.

EXPLANATION OF THE TABLE.

For purposes of condensation in the following table, several species are indicated by their generic names: *Glischrochilus fasciatus*, *Euphoria inda* and *Synanthedon scitula*. The oriental fruit moth is designated as O. F. M. The first four tests of 1933 were conducted to determine the efficiency of different types of traps, using syrup 1-20 without an attractant. The first five tests of 1934 were conducted for the same purpose, but anethol was added to increase the catches.

⁴ Beneficial Insects Trapped in Bait Pails. ENT. NEWS 30: 153-157, 1927.

Insects taken in baits during 1933.

	COLEOPTERA			DIPTERA		
	Glischro- chilus	Euph- oria	Ceram- bycidae	Taban- idae	Syrph- idae	Ortal- idae
¼ inch screen	958	86	0	3	69	69
½ inch screen	772	64	5	5	60	92
With baffles	747	165	25	7	36	72
Quart glass	1106	17	30	2	80	45
Syrup 1-20	1200	286	17	16	53	68
Soap	1729	194	27	33	100	104
Sodium oleate	1267	128	15	40	77	72
Sodium arsenate	701	166	61	5	57	64
Methyl cinnamate	935	142	14	13	40	71
Methyl allephenol	1332	153	29	16	128	90
Formaldehyde	747	22	13	6	75	54
Amyl acetate	1059	581	32	16	96	113
Potassium cyanide	211	22	22	4	35	192
Citral	382	167	14	7	20	65
Acetone	298	42	13	1	19	56
Citric acid	457	27	18	16	57	161
Malic acid	238	10	13	10	75	201
Benzoic acid	27	0	5	5	38	6
Succinic acid	258	7	9	2	35	53
Salicylic acid	122	5	2	4	27	20
Tartaric acid	425	11	30	6	36	34
Butyric acid	171	0	4	8	31	23
Acetic acid	553	11	7	5	19	40
Formic acid	808	13	6	7	20	49
Boric acid	176	16	15	3	33	29
Oleic acid	157	28	11	26	31	21
Oxalic acid	79	3	3	3	22	21
Tanic acid	139	15	2	4	14	2
Picric acid	138	0	0	1	22	8
Carbolic acid	160	27	9	1	35	15
Lactic acid	81	4	5	5	22	13
Propionic acid	153	3	1	4	10	29
Gallic acid	80	2	2	2	20	15
Cinnamic acid	4	12	0	2	0*	3
Camphoric acid	71	13	4	35	2*	15
Chloric acid	37	19	7	5	1*	12
Arseneous acid	24	5	2	2	1*	8
Glycerine	120	10	13	0	57	14
Calcium carbonate	89	10	9	2	23	14
Saponin	194	7	11	1	7	28
Totals	18,208	2,493	505	333	1,583	2,061

* Missed the peak of emergence or of flight.

Insects taken in baits during 1933.

O.F.M.	LEPIDOPTERA			HYMENOPTERA			NEUROPTERA
	Noctu- idae	Synan- thelon	Peach borer	Honey bee	Vesp- ilac	Polis- t's	Chryso- pidae
465	104	25	1	1	14	6	21
202	272	77	12	1	39	21	27
1201	728	105	28	16	11	11	64
825	1256	78	58	19	66	32	48
206	431	41	7	11	13	15	33
1651	1633	136	17	18	41	31	69
1156	858	110	20	9	34	10	56
304	765	48	1	5	13	12	111
1881	1316	68	51	4	36	20	62
3917	1669	159	29	56	35	28	88
1104	1493	74	18	3	60	12	17
2097	2296	202	47	13	65	47	100
151	54	64	13	1	0	0	22
1962	325	40	11	46	1	1	100
64	25	57	1	0	0	1	8
853	670	165	18	4	18	9	26
495	779	168	6	5	13	8	26
220	78	75	0	0	2	1	4
1779	279	219	14	3	24	10	20
1269	258	48	6	2	12	8	11
1087	1411	185	8	3	27	23	34
151	199	28	0	3	16	4	6
934	729	75	1	5	45	10	21
870	1296	51	9	8	19	9	13
199	60	5	2	1	3	11	26
1534	196	25	5	1	4	4	20
743	226	11	5	1	3	11	15
584	208	17	2	2	16	15	31
845	158	9	7	4	11	10	8
492	237	16	3	0	10	7	9
698	116	19	3	0	2	7	22
418	171	1	2	1	6	6	6
691	391	5	1	1	3	7	9
66*	26*	1*	7	1	3	1	6*
942*	471*	4*	12	0	16	14	22*
370*	96*	2*	16	0	3	9	10*
27*	41*	0*	1	0	3	0	6*
369	161	19	0	1	1	4	9
78	53	8	2	1	1	3	15
115	37	3	2	0	6	2	23
33,018	21,572	2,443	446	250	695	440	1,224

Insects taken in baits during 1934.

	O.F.M.	Noctu- idae	Peach borer	Leaf roller	Bud Moth	Euph- oria	Honey bees	Chry- so- pidae
¼ inch screen	3990	441	0	6	6	12	4	96
½ inch screen	4450	668	6	11	5	24	8	140
With Baffles	5697	2033	10	23	12	85	9	225
Enamel traps	5629	2695	8	26	38	162	22	154
Quart glass *	2253	511	9	1	0	12	4	120
Syrup 1-20	2292	1506	9	29	4	81	1	107
Methyl allephenol	5162	1337	8	16	11	53	4	169
Cresol	480	754	3	0	10	381	10	96
Anisol	1587	1054	8	5	17	682	6	182
Thymol	1560	1573	4	1	5	195	5	153
Methyl cinnamate	2754	1701	2	9	7	183	2	136
Ethyl cinnamate	4365	1181	4	8	10	137	9	200
Propyl acetate	5735	1692	5	15	11	275	9	241
Terpinyl acetate	4798	578	3	5	14	329	1	170
Geranyl acetate	1131	822	2	10	9	195	2	191
Amyl acetate	5458	1733	3	11	20	313	3	264
Amyl valeriante	1804	1558	7	6	17	264	4	282
Amyl formate	1510	2190	6	17	29	170	9	191
Amyl salicylate	2397	2194	3	8	24	147	9	224
Benzyl aldehyde	1493	1224	3	14	14	115	2	62
Cinnamic aldehyde	1897	1183	2	22	14	30	10	46
Formaldehyde	3510	2567	5	1	24	75	5	76
Bromo styrene	1438	1247	3	37	17	268	6	108
Pinene	4383	1408	7	11	17	557	9	458
Citrene	2777	1009	6	6	24	141	9	440
Borneol	3296	1385	7	14	26	233	4	122
Piperonal	4191	2556	11	9	8	193	38	133
Citral	3869	951	2	10	16	164	107	214
Furfural	4699	1424	13	27	20	233	6	109
Safrol	6541	1660	7	11	29	243	6	383
Eucalyptol	2344	1431	4	25	15	351	1	172
Terpinol	3518	1824	5	12	10	81	6	263
Helmitol	2278	1124	4	21	5	99	5	58
Linalool	7165	1622	6	28	9	136	13	184
Geraniol	2786	807	2	4	17	122	8	257
Almond oil	3163	1625	4	7	25	80	3	85
Anise oil	4460	1352	2	5	13	92	18	239
Fennel seed oil	4983	1296	6	5	9	96	5	220
Rose geranium oil	1843	805	0	2	8	162	4	207
Lemon oil	1917	562	4	3	7	317	4	304
Orange oil	2176	668	2	7	9	224	7	343
Turpentine*	291	186	5	..	..	61	1	347
Eugenol *	728	197	..	..	..	18	3	206
Pine oil *	105	116	..	..	..	121	0	301
Linalool No syrup *	27	9	..	..	..	0	8	9
Totals	138,330	56,460	210	488	585	7,912	409	8,687

* Duration of these baits, 12 weeks. All others, 22 weeks.

Biological Notes on Some Solitary Wasps. (Hymenoptera : Sphecidae).

By KARL V. KROMBEIN, Cornell University, Ithaca, New York.

I. NESTING AND PREY RECORDS.

These observations were made during the summer of 1934 in an undeveloped section of the Forest Lawn Cemetery in Buffalo, New York.

I should like to thank the following gentlemen who have aided by determining some of the material: Professors O. A. Johannsen and H. A. Scullen, Dr. W. T. M. Forbes, Mr. V. S. L. Pate, Mr. Henry Dietrich and Mr. Derek H. Cross. I have placed their initials in parentheses after the species which they have determined. The other determinations are my own and have been checked with specimens in the Cornell University collection.

Many of the wasps were addicted to the curious habit of nesting in the sandy soil which surrounded the roots of several uprooted stumps. One such stump afforded nesting sites for *Oxybelus quadrinotatus* Say (V.S.L.P.) which burrowed in horizontal surfaces only, *Pemphredon tenax* Fox, *Crabro lentus* Fox, *Crabro sulcus* Fox, *Philanthus gibbosus* (Fabr.), *Philanthus bilunatus* Cresson and *Gorytes simillimus* (Smith) all of which burrowed in vertical surfaces.

Gorytes simillimus (Smith).

On July 6th a female of this species was taken with an adult Cicadellid, *Gypona octolineata* var. *striata* Burm., at the entrance to her burrow in the vertical surface of the sand-covered stump. As usual the venter of the bug was clasped to that of the wasp, but the prey was small enough so that the wasp had no difficulty in flying with it. The wasp escaped as she was being transferred from net to bottle, but returned in eight minutes with another adult *Gypona* of the same species.

In August another *simillimus* was observed provisioning with the same bug. This wasp is very active and difficult to get in the bottle; this particular one escaped twice, each time leaving a *Gypona* in the bottom of the net.

Heretofore, all records of the prey in this genus have been Membracids and the burrows have been started from a horizontal surface.

Philanthus gibbosus (Fabr.) and *P. verticalabris* (Fabr.).

These species are interesting in that each shows a distinct gregarious tendency in nesting, many individual burrows being closely grouped into a distinct colony and each burrow having several cells at its terminus. In Buffalo the males of these species begin to emerge during the middle of June, preceding the females by about a week as is common with most Sphecoid wasps. During this period before the females come out, the males are very shy and difficult to capture, the slightest shadow being enough to frighten them away from a flower head. One sunny afternoon while I was standing in the sand pit in which the colonies were established, a large cloud passed over the sun blotting out a considerable amount of light. Immediately the nearby flowers were deserted and the males speedily flew back into their burrows. Later in the summer after mating has taken place, this interesting behavior is lost, both sexes of each species visiting the flowers under cloudy skies as well as sunny.

Cerceris nigrescens Smith (H. A. S.).

This species was very common during the entire summer on flowers of *Achillea millefolium* and *Daucus carota* but it was not until September 21st that I discovered the nesting site of a colony of about fifty individuals. The burrows were in sandy soil having a horizontal surface, the entrance to each being partially concealed beneath a small tuft of grass. In approaching their burrows the wasps flew only about an inch from the ground in a peculiar wavering sort of flight. This species provisions with weevils and the eleven specimens captured with the wasps were identified as seven specimens of *Hypocrodes delumbis* Gyll. (H.D.) and four of *Sitona hispidula* Fabr. (H.D.), the clover-root curculio. The weevils are not killed outright but only paralyzed as these specimens showed reflex movements of their antennae and legs for several hours.

In regard to the Miltogrammine inquilines of this wasp, I

captured three *Senotainia trilineata* V.d.Wulp while they were "shadowing" the *Cerceris*, flying only an inch behind the wasps and following every turn and twist.

The Peckhams¹ devote several pages to observations on this same species of *Cerceris* but their notes differ markedly from mine. The *nigrescens* they observed was a solitary individual and was not associated with others to form a colony. The fifty individuals I observed were nesting in an area of approximately ten square feet. The adjacent areas were quite as well adapted to nesting so there can be no doubt of the formation of a colony. Evidently *nigrescens* is either very plastic in its nesting habits or else the two observations were made on different species. Professor Scullen writes that my specimens belong to a group which is much in need of study, but agree very well with specimens determined as *nigrescens* Sm. by Cresson.

Bembix spinolae Lep.

This wasp was not very common and I was able to dig up only one burrow on July 2nd. While excavating the burrow, the female approached carrying a Tachinid, and another untouched Tachinid was found in the cell with the *Bembix* larva and the remains of several *Lucilia caesar* Linn. The Tachinids were identified respectively as *Cuphocera stricklandi* Curran (D.H.C.) and *Pelateria confusa* Curran (D.H.C.). The former was alive for several hours after being pinned and showed reflex movements of the head, antennae and proboscis. The Bombyliid *Exoprosopa fasciipennis* Say (O.A.J.) was captured while ovipositing at the entrance to the burrow.

Solenius nigrifrons (Cress.).

One specimen was taken on July 16th carrying a paralyzed *Syrphus ribesii* Linn. (O.A.J.).

Orybelus quadrinotatus Say (V.S.L.P.).

Five specimens were taken from June 21st to July 16th carrying adult *Hylemyia cilicrura* Rond. (O.A.J.), the seed-corn maggot, impaled on their stings.

¹Peckham, G. W. and E. G. On the Instincts and Habits of the Solitary Wasps. Wisconsin Geol. and Nat. Hist. Surv. Bull. 2: pp. 116-117, 1898.

Podalonia violaccipennis (Lep.)²

This species was common but I found it nesting in only one situation—in little pockets of soil formed between two roots of several uprooted stumps. The surface of these pockets was usually inclined at an angle of 30° and the burrows ran down vertically for an inch, terminating in an ellipsoidal brood chamber off to one side.

On June 23rd at 10:50 A. M. a female was observed running nervously about on the surface of a pocket of soil, biting at the mud in different places but appearing dissatisfied with her examination. This behavior went on for six minutes when she suddenly flew off to another stump several feet away and perched on her prey, a cutworm larva, which she had placed in a fork in one of the roots. After reversing her position on the larva several times, as if to reassure herself that it was still satisfactory prey, she flew off and did not return until 10:58. Immediately she began to dig in the very place which had seemed so unsatisfactory several minutes earlier. The chunks of soil were bitten out vigorously and allowed to roll down the slope. As the burrow deepened she removed the loose soil with her mandibles and forelegs, backing out just to the entrance and letting gravity take care of the rest of the disposal. The buzzing of her wings was very pronounced during the actual excavation especially when she tugged at obstinate pebbles. In just eighteen and a half minutes the burrow was completely excavated and after a walking reconnaissance of one minute she flew to her caterpillar on the neighboring stump. She lifted it down from the fork using only her mandibles and then the larva was adjusted head foremost, with its venter closely clasped to her own, her mandibles about its neck and her second pair of legs around its thorax. The posterior end of the larva extended beyond the tip of the wasp's abdomen but her legs were so long that the entire forward end of the

²Citations of some of the previous observations published on this species are included in Hicks, Charles H. Notes on the prey and inquilines of *Podalonia violaccipennis* form *luctuosa* (F. Smith). Psyche 39: 150-154, 1932.

larva was lifted clear of the ground. The journey to the burrow was on foot requiring only two and a half minutes and the larva was left at the entrance while the wasp went in to investigate. Almost immediately she reappeared and seizing the larva by the neck, pulled it down into the burrow, and remained there for a minute ovipositing. At 11:20 she took a position one inch below the burrow with her head away from the opening, and elevating herself on the two posterior pairs of legs began to throw the loose soil back into the burrow with her forelegs. Occasionally she entered the burrow to pack down the loose soil. This was accomplished by bracing herself against the sides of the burrow with her legs and pressing the soil down with her head, the effectiveness of this pressure being increased by the rapid vibration of her wings. When the burrow was practically filled in she selected several larger pieces of soil about the size of a pea and after placing them in the burrow, repeated the pressing process with her head. The loose soil still remaining was then scattered over the surface so that all evidences of the burrow were obliterated, and the wasp flew away at 11:27 A. M.

I marked the site of the burrow with a match intending to dig up the larva later but upon returning in a few hours, this wasp or some other had already re-excavated and the larva was gone. This was really a problem as I had not interfered with her work and she gave all evidences of having completed the job. Possibly a sister *Podalonia* unearthed the larva and used it to stock her own burrow. Newcomer³ (pp. 557-558) cites such a circumstance but the wasp he observed using the other's prey knew where the latter wasp had constructed her burrow, whereas in this instance there were no other *Podalonia* females in sight during the excavation and filling-in. One Miltongrammine fly, *Mctopia leucocephala* (Rossi), took a great deal of interest in the wasp's work, but one could hardly accuse the fly of re-excavating the burrow and walking off with the larva.

³ Newcomer, E. L. Notes on the habits of a digger wasp and its inquiline flies. Ann. Ent. Soc. Am. 23: 552-563, pls. I-II, 1930.

On June 23rd I exhumed the larva with which another *Podalonia* had provisioned her burrow on June 21st. The cutworm was still alive although paralyzed and was determined as one of the trifid Noctuids, probably an Acronyctine (W.T.M.F.). From the pale color of the larva Dr. Forbes decided that it was one of the cutworms which burrows down in the soil during the day, so the wasps would have to dig for them. The wasp's egg was placed just above the left spiracle on the third abdominal segment and was attached at its head end only.

The prey of still a third *Podalonia* (burrow stocked June 22nd) was also exhumed on June 23rd. This cutworm was alive although paralyzed until June 26th and voided excrement on the 23rd and 24th. The wasp's egg evidently was injured in digging the caterpillar out as it shriveled up several days later.

II. FLOWER RECORDS.

The following records are based on thorough collecting throughout the summer of 1934 in the Forest Lawn Cemetery, Buffalo, New York.

ASTATA BICOLOR Say.—*Daucus carota*.

A. UNICOLOR Say.—*Daucus carota*, *Achillea millefolium* and *Solidago canadensis*.

LYRODA SUBITA Say.—*Daucus carota*.

TRYPOXYLON FRIGIDUM Smith.—*Solidago canadensis*.

CHLORION (PRIONONYX) ATRATUM (Lep.)—*Asclepias syriaca*.

C. (AMMOBIA) ICHNEUMONEUM (Linn.)—*Asclepias syriaca*.

SPIHEX PLACIDUS PLACIDUS (Smith)—*Solidago canadensis*.

S. URNARIUS (Dahlb.)—*Achillea millefolium* and *Melilotus alba*.

PODALONIA VIOLACEIPENNIS (Lep.)—*Solidago canadensis*.

GORYTES (PSEUDOPHISUS) PHALERATUS (Say)—*Daucus carota*.

G. (GORYTHES) ATRICORNIS Pack.—*Daucus carota*.

PHILANTHUS BILUNATUS Cress.—*Achillea millefolium* and its form *roseum*, *Daucus carota* and *Chrysanthemum leucanthemum*.

P. GIBBOSUS (Fabr.)—*Daucus carota*, *Achillea millefolium* and its form *roseum*, and *Solidago canadensis*.

P. SOLIVAGUS Say.—*Achillea millefolium* and *Solidago canadensis*.

- P. VERTILABRIS (Fabr.)—*Daucus carota*, *Achillea millefolium* and its form *roscum*, and *Solidago canadensis*.
- CERCERIS NIGRESCENS Smith—*Achillea millefolium*, *Daucus carota* and *Solidago canadensis*.
- BEMBIX SPINOLÆ Lep.—*Asclepias syriaca*.
- SOLENIUS INTERRUPTUS (Lep.)—*Achillea millefolium*, *Daucus carota* and *Solidago canadensis*.
- S. MONTANUS (Cress.)—*Daucus carota*, *Solidago canadensis* and *Achillea millefolium*.
- S. PRODUCTICOLLIS (Pack.)—*Achillea millefolium* and *Solidago canadensis*.
- S. TRIFASCIATUS (Say)—*Solidago canadensis*.
- OXYBELUS QUADRINOTATUS Say—*Achillea millefolium*, *Daucus carota* and *Solidago canadensis*.

Notes on *Somatochlora ozarkensis* Bird. (Odonata Libellulidae, Corduliinae).

By A. E. PRITCHARD, Oklahoma A. & M. College.

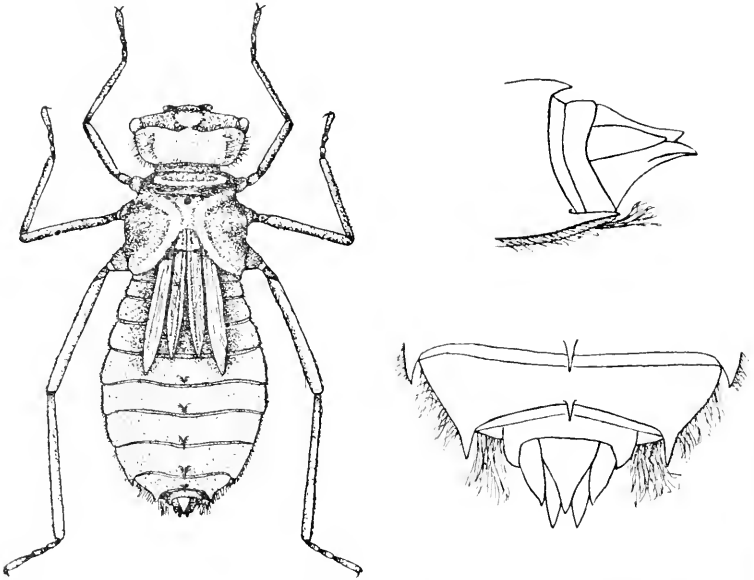
Somatochlora ozarkensis Bird was recently described (Occas. Papers Mus. Zool., Univ. Mich., No. 261, 1933) from mostly teneral specimens which were flushed from the willows along Cummeotubby Creek, north of Wilburton, Oklahoma. I have seen this species in numbers near the type locality, and have found it at several other places in eastern Oklahoma.

Near Fourche Moline Creek, north of Wilburton, I first found *ozarkensis*, flying above fields in large clearings from just after daybreak into the early morning. Its flight was quite irregular, but not as extensive as that of *Somatochlora linearis* which was present in equally large numbers. Although the smaller size and conspicuous white markings on *ozarkensis* easily separated these two species on the wing, one had such short notice for swinging his net that selective collecting was nearly impossible. Occasionally an equally flighty *Platycordulia xanthosoma* was caught, while *Pantala* and *Macromia* were rarely seen. Throughout the remainder of the day, *ozarkensis* was not encountered.

At Page, Oklahoma, however, *ozarkensis* and *linearis* were found flying only in the late evening, often with regular beats

across the road. *Cordulegaster obliquus* Say, and a single female *S. tenebrosa* were taken in their company. These two metallic fliers were also out in the late evening at Nashoba, Okla. Here, flight commenced a little earlier and was in the openings in contrast to the crepuscular *Boyeria vinosa* and *Platycordulia xanthosoma* which were found at the ripples along the creek.

Late one morning after a rain, a mud-encrusted naiad was taken from a tall sedge stem at the edge of a widened and quiet portion of the creek near Wilburton. Emergence followed several minutes later, and the imago turned out to be a female *ozarkensis*. The following description is taken from this exuvia, and another taken several miles downstream.



This nymph is separated from other known nymphs in the genus by the presence of dorsal hooks, low and acutely pointed, with the one on segment 9 not reaching the middle of 10.

Nymph—Dark brown, not very hairy. Head transverse, twice as wide as long, broadly curved behind the eyes to the slightly concave occiput; fringed at base of clypeus in a curved

line mesally from the center of each eye, dorso-posteriorly in a line just inside and behind each eye, and postero-laterally from each eye. Hinge of labium reaching a little beyond base of mesocoxae; mentum nearly as broad as long; mental setae 12-13, much smaller mesally; lateral setae 7-8; lateral lobes with 8 arcuate crenulations each of which is beset with a group of 5 or 6 close setae that successively lengthen to a couple near the end of the group which are nearly as long as the crenulation is.

Inner wing cases reaching base of abdominal segment 5, hind wing cases falling short of 6.

Abdomen oblong ovate; widest at 6; sparsely setiferous, and with a marginal fringe, very short on basal segments and increasing in length on 8, 9, and 10, but only long on the last segment. Dorsal hooks on 4-9 low, falciform, posteriorly directed and acute; on 4 small and high, on 5 and 6 falling short of the succeeding segment, on 7 and 8 just reaching the base of the next segment, on 9 projecting over one-third of 10. Lateral spines on 8 and 9 not divergent; the spine on 8 one-fifth as long as the margin of this segment; that on 9 one-third as long as the margin of segment 9 and reaching posteriorly to a line even with the lateral posterior margin of 10. Inferior appendages as long as 9 and 10, sharply acuminate; median appendages somewhat shorter, evenly tapering to a point; lateral appendages nearly as much shorter again, rather stout and abruptly pointed.

Length, 23 mm., length of abdomen, 13.5; width of abdomen, 8; width of head, 6; hind wing, 7; hind femur, 7; hind tibia, 8.

Six New Species of *Typhlocyba* from the United States. (Homoptera : Cicadellidae).

By DWIGHT M. DELONG and DOROTHY M. JOHNSON, Ohio State University.

***Typhlocyba surda* n. sp.** (Figs. 1, 1a, 1b).

Closely related to *T. unca* and *T. piscator* but with distinct genitalia. Length 3 mm.

Color yellow. Wings rather heavily marked with yellow and opaque to cross veins. Marked with pale brown both anterior to and posterior to cross veins. There are three dark brown spots on the margin. One where the first cross vein joins the costa and one where each of the inner and outer apical veins touch the margin. The intensity of the dusky areas along the cross veins will vary in different specimens.

Male style sickle-shaped at apex and thickened abruptly near

apex so the entire apical portion is enlarged. Oedagus with a pair of long processes arising near base and extending caudally. From the main stem of the oedagus near its apex, which is curved anteriorly, a pair of posterior and a single anterior process arise which extend dorsally. The anterior process is bifurcate at apex and curves posteriorly between the posterior pair at their apices.

Described from a series of one male and five female specimens collected at North East, PENNSYLVANIA, July 12, 1918, and July 18 and August 12, 1919, by the senior author. *Holotype* male, *allotype* female and female *paratypes* in collection of the senior author.

Typhlocyba crassa n. sp. (Figs. 2, 2a).

Resembling *pomaria* and *athene* in appearance but with distinct genitalia. Length 4 mm.

Pale yellow without definite color markings.

Male styles simple, strongly curved dorsally and gradually tapered to acute apices. Oedagus enlarged at base, anterior portion rather short, and fused. Posterior portion composed of paired proximal processes which are long, convexly rounded, curving anteriorly over anterior portion of oedagus. These are decidedly thickened at middle then tapered to long whip-like apices. A shorter process arises between these at base and extends about two-thirds the length of the posterior processes. Ninth segment of abdomen broadly rounded dorsally, a broad, heavy chitinous ridge along posterior margin which forms a black pointed toothed ventral posterior angle which protrudes beyond the ventral margin of the segment.

Described from a series of five specimens, one male and four females collected in the Hartstown Bog, Hartstown, PENNSYLVANIA, June 16 and Sept. 30, 1919, by Mrs. DeLong and the senior author. *Holotype* male, *allotype* female and *paratype* females in collection of the senior author.

Typhlocyba quadrata n. sp. (Figs. 3, 3a, 3b).

Closely related to *danae* and *curydice* but with distinct male genitalia. Length 3.5 mm.

Color pale yellow, apices of wings smoky. A band composed of three brown spots on either side just before cross veins. These are located between the sectors and there is none on the first or costal portion.

Male styles simple, rather long and curved. Oedagus in ventral view branched at base, processes strongly convexly curved until they become proximal then abruptly bent extending ven-

trally and tapered. The ninth segment of the abdomen is tapered to a curved somewhat infolded posterior margin. The inner side has a strongly produced spine-like portion dorsally, the margin is almost straight, set with three spines to the ventral edge where another sharp spine extends caudally.

Described from a single male specimen collected at Kane, PENNSYLVANIA, August 19, 1928, by the senior author. *Holotype* male in collection of the senior author.

Typhlocyba surcula n. sp. (Figs. 4, 4a, 4b).

Apparently closely related to *pomaria* but with distinct male genitalia. Length 3.5 mm.

Color white without definite markings.

Male styles broad at base but abruptly narrowed near base and produced to recurved rather hooked apices. Oedagus with a short broad postero-ventral portion which appears bifurcate. Posterior portion consisting of a rather heavy anterior process which is curved caudally at apex and extending between the longer paired posterior processes. The posterior margin of the ninth abdominal segment is unique in having a long caudally posteriorly directed spine on the dorsal curved portion of the segment. The spine is broad at base and sharply pointed at apex. The heavy chitinous ridge along the posterior margin protruding slightly at ventral end giving a slight indication of a spine.

Described from four male specimens collected at Wisconsin Rapids and Cramoor, WISCONSIN, July 27, 1931. *Holotype* male and *paratype* males in collection of the senior author.

Typhlocyba enascora n. sp. (Figs. 5, 5a).

Resembling *xanthippe* in size and form but with distinct male genitalia. Length 3.5 mm.

Color pale yellowish white without definite markings.

Male styles simple, gradually tapered to acute tips. Oedagus dorsally curved anteriorly, an anterior process arising from the concavity at about half its length and directed anteriorly. This process is about two-thirds the length of oedagus. Tip of oedagus with two pairs of processes. The pieces of one pair are proximal, directed anteriorly and curved upward on distal half. The other pair are shorter curving outwardly on each side and in lateral view appear as a prolongation of the main body of the oedagus.

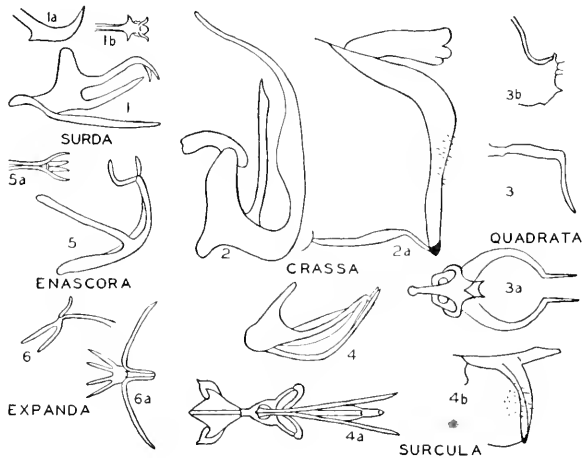
Described from a single male collected at Idaho Falls, IDAHO, July 27, 1930, by the senior author. Male *holotype* in collection of senior author.

Typhlocyba expanda n. sp. (Figs. 6, 6a).

Closely related to *xanthippe* and *ariadne* but with distinct male genitalia. Length 4.5 mm.

Color white, vertex and pronotum slightly tinged with yellow, elytra milky white.

Male oedagus resembling *enascora* in general form but with six long spines at apex. Four of these are directed anteriorly and in dorsal view appear widely separated. In lateral view two curve more ventrally than the other two. The remaining two of the six processes are directed laterally and are longer than the anterior processes. Female segment rather strongly produced, apex bluntly rounded.



Explanation of Text Figures.

1. *Surda*—lateral view of oedagus. 1a—foot of style. 1b—dorsal view of oedagus—main shaft.
2. *Crassa*—lateral view of oedagus. 2a—lateral view of 9th segment.
3. *Quadrata*—lateral view of lateral process of oedagus. 3a—ventral view of oedagus. 3b—upper posterior margin of 9th segment (inner side).
4. *Surcula*—lateral view of oedagus. 4a—ventral view of oedagus. 4b—lateral view posterior margin of 9th segment.
5. *Enascora*—lateral view of oedagus. 5a—ventral view of oedagus.
6. *Expanda*—lateral view, tip of oedagus. 6a—ventral view, tip of oedagus.

Described from a male and two female specimens collected at Estes Park, COLORADO, August 21 and 25, 1920, collected by Prof. H. C. Severin at an altitude of 8500 to 9350 feet. *Holotype* male, *allotype* female and female *paratype* in collection of senior author.

Five New Southwestern Coleoptera (Buprestidae and Cerambycidae).

By J. N. KNULL, Ohio State University, Columbus, Ohio.

(Continued from page 75)

Chrysobothris acaciae n. sp. (Buprestidae).

Resembling *C. axillaris* Horn in size and form; color dark bronze, with a faint greenish lustre, vertex, middle anterior portion of pronotum and a large humeral space on each elytron bright coppery red; beneath piceous.

♂.—Head with front somewhat flattened, bronze, closely punctate on lower portion, rugose on vertex, containing two small callosities, feeble chevron above; clypeus with moderately deep oval emargination; lower portion densely pubescent; antennae short, bright cupreous extending beyond middle of pronotum when laid along side margin, serrate from the fourth joint, third joint longer than second, or fourth. Scutellum small, triangular.

Pronotum nearly twice as wide as long, wider in front than in back, anterior margin slightly sinuate, base deeply emarginate at middle of each elytron; side margins subparallel, strongly arcuate anteriorly; disk convex, without depressions or callosities; surface sparsely punctate at middle, more densely toward lateral margins, becoming rugose at edge, slight median smooth line extending from scutellum to middle, another at each side at base, in middle of elytron.

Elytra much wider than pronotum; sides nearly parallel, constricted back of base, dilate back of middle, apices rounded; lateral margin serrulate on apical half; disk convex, basal fovea prominent; each elytron containing four indistinct costae, one parallel to side margin, others on disk; surface densely punctate.

Beneath densely clothed with recumbent white pubescence; ventral segments densely punctate, margins of segments smooth; side margin of terminal segment serrulate, apex broadly emarginate, prosternum distinctly lobed in front; anterior femur with large tooth, serrulate along its distal edge; anterior tibia arcuate, dilate at apex.

Length 6.5 mm.; width 2.7 mm.

♀.—Differs from the male in being slightly larger, front less shining, antennae bronze; pronotum broader; sides less parallel, emargination of last abdominal segment not as broad; anterior femur not dilate at tip.

Described from a small series collected on the branches of dying cat's claw (*Acacia constricta* Beuth) in the Davis Mountains, TEXAS, from May 25 to June 13, 1935, by the writer. *Holotype* male, *allotype* female and *paratypes* in author's collection, *paratypes* in collection of Ohio State University.

This species is in Horn's⁵ group I and runs to *C. axillaris* Horn. However the cupreous areas of the head and pronotum and lack of these areas in the fovea of the elytra will separate the two species. *C. axillaris* Horn. breeds in the branches of oak (*Quercus* sp.) in the Huachuca Mountains of Arizona.

This species is close to *C. cupreohumeralis* Van D., but it can be separated by the presence of frontal callosities and tooth on anterior femur.

Leptostylus monki n. sp. (Cerambycidae).

Size and form of *L. tuberculatus* Frol., rather densely clothed with greenish recumbent pubescence on pronotum and along sides of elytra, with green background, pubescence of central area of elytra light brown with brown background, elytra ornamented with irregularly placed tufts of black hairs, each elytron with an irregular piceous area near base and an oblique one back of middle enclosing area of light cinereous pubescence.

Head quadrate in front of antennal tubercles; surface finely densely punctate, densely clothed with cinereous pubescence; antennae slightly longer than body, first to fourth joints green, rest brown, joints three to eleven annulate at apex and base, scape stout, second joint slightly longer than wide, third joint longer than scape, joints four to eleven inclusive gradually decreasing in length, clothed with short cinerous pubescence.

Pronotum wider than long, base slightly wider than apex; sides feebly constricted at base; disk convex with anterior and posterior tubercle on median line and four lateral tubercles on each side; surface coarsely punctate at base, punctures on rest of area obscured by the recumbent pubescence. Scutellum triangular, densely pubescent.

Elytra about twice as long as broad; wider than pronotum at base; sides nearly parallel to apical third, then broadly arcuate to tips which are rounded; disk convex, humeri prominent, strongly elevated, a depression back of umbone, each elytron with four irregular costae, umbone and costae bearing irregularly placed tubercles, each tubercle containing groups of black hairs; surface coarsely punctured at base and along sides, punctures smaller toward middle near apices, recumbent pubescence dense.

⁵ G. H. Horn, Trans. Amer. Ent. Soc. 13, pp. 63-124, 1886.

Beneath finely densely punctate, sparsely clothed with cinereous pubescence; prosternal process two-thirds as wide as coxal cavity; femora strongly clavate.

Length 8 mm.; width 4 mm.

Described from two specimens collected at Donna, TEXAS, by J. W. Monk and named for the collector.

Holotype and *paratype* in writer's collection.

According to Leng and Hamilton's key⁶ this species would run to *Astylopsis (Leptostylus) guttatus* Say. However, it can be separated by the more prominent umbone, ground color and vestiture. In appearance it does not resemble any of our described forms.

***Leiopus imitans* n. sp.** (Cerambycidae).

Superficially resembling a member of the genus *Hyperplatys*, clothed above and below with recumbent cinereous pubescence, pronotum and elytra with dark markings.

Head closely punctate, cinereous pubescence concealing most of punctures, vestiture dark on vertex; eyes coarsely granulate; antennae with five joints extending beyond tips of elytra, scape stout, second joint longer than wide, third joint longer than first, joints four to eleven inclusive gradually decreasing in length; surface mottled, clothed with cinereous pubescence, apical and basal areas of joints two to eleven annulate at base and apex, eleventh joint dark.

Pronotum broader than long, wider at base than at apex; side margin broadly arcuate anteriorly, suddenly constricted at base, lateral acute tubercle back of middle; disk convex, surface densely punctate, clothed with cinereous pubescence, three areas of piceous pubescence on disk, one on median line at base and one on each side back of anterior margin, long flying hairs along side at base. Scutellum triangular, pubescent in the centre.

Elytra about three times as long as broad, sides parallel to apical third, broadly arcuate posteriorly, apices rounded; disk convex; surface coarsely densely punctate, punctures more or less concealed by the vestiture, each elytron with an irregular patch of slightly raised piceous pubescence on humeral angle, one along side margin in front of middle, another along suture back of middle, small round patches of the same type scattered over the entire surface, more closely placed at base.

Beneath densely punctate, clothed with cinereous pubescence; prosternal process slightly narrower than the anterior femur at base; femora clavate; legs mottled, clothed with cinereous pubescence.

⁶ C. W. Leng and J. Hamilton, Trans. Amer. Ent. Soc., 23, p. 116, 1896.

Length 6.5 mm.; width 2.5 mm.

Described from several specimens collected on the foliage of oak (*Quercus* sp.) in the Davis Mountains, TEXAS, June 13, 1935, by the writer. A *paratype* in the Wenzel Collection at Ohio State University labelled Davis Mountains, July, H. A. Wenzel collector. *Holotype* and *paratypes* in author's collection.

At first glance this species might be mistaken for a *Hyperplatys*, however the lack of the lateral carina on the elytron will exclude it from this genus. The vestiture and markings will easily separate it from any of our described forms.

The writer is indebted to Prof. H. C. Fall and Mr. W. S. Fisher for the comparison of material with types in their care.

Entomological Literature

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

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

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, left, &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.—Back & Cotton.—Industrial fumigation against insects. U. S. D. A. Circ. No. 369, 48 pp., illus. Balagny, C.—La question du mimetisme. [Bull. Soc. Sci. Nat. Ouest France] 5:179-192. Griffin, F. J.—On the Dates of Publication of Motschulsky (V. de), *Etudes Entomologiques*, 1-XI, 1853-1862. [75] 17: 256-257. Herrick, G. W.—Insect enemies of shade trees. Comstock Pub. Co. 417 pp. 1935. Lautner & Handschin.—Die Nomenklaturregeln

und der Ehrenkodex. [41] 16: 447-450. **Le Cerf, F.**—"Aberrationen" und die Nomenklatur. [14] 49: 491-495. **MacLagan & Dunn.**—The experimental analysis of the growth of an insect population. [Proc. R. Soc. Edinburgh] 55: 126-139, ill. **Marshal, J.**—The distribution and sampling of insect populations in the field with special reference to the American Bollworm, *Heliothis obsoleta*. [35] 23: 133-152. **Oliver, G. B.**—What is aberrational influence? [9] 69: 34-36. **Torre Bueno, J. R.**—Protection against *Anthrenus* and mould. [19] 31: 28. **Torre Bueno, J. R.**—Curious things. [19] 31: 30-31. **Wigglesworth, V. B.**—Insect physiology: London. 134 pp., ill. Methuen's Monog. Biol. Subj.

ANATOMY, PHYSIOLOGY, ETC.—**Blackwelder, R. E.**—Morphology of the Coleopterous family Staphylinidae. [Smithson. Misc. Coll.] 94, no. 13, 102 pp., illus. **Bodine & Boell.**—The effect of ultracentrifuging on the respiratory activity of developing and blocked embryonic cells (Orthoptera). [J. Cell. & Comp. Phys.] 7: 455-463. **Borchert, A.**—Untersuchungen ueber die Morphologie und Entwicklungsdauer der Larven der kleinen Wachsmotte (*Achroea grisella*) [89, Abt. Anat.] 61: 99-106, illus. **Canzanelli, A.**—Contributo alla embriologia e biologia del tarlo de tabacco (*Lasioderma serricorne*: Coleo.). [Boll. Lab. Zool. Agr. Bac. 1st. Sup. Agr. Milan] 4: 81-116, illus. **Canzanelli, A.**—Il *Dermestes lardarius*. [Boll. Lab. Zool. Agr. Bac 1st. Sup. Agr. Milan] 6: 19-65, illus. **Cappe de Baillon, P.**—L'organe antennaire des phasmes. [78] 70: 35, illus. **Drummond, M.**—The Germinal Layers concerned in the Formation of the Alimentary Canal and Malpighian Tubules of *Ephestia kühniella* (Lepid.). [53] 78: 533-542, illus. **Frolova, S. L.**—Structure of the nuclei in the salivary gland cells of *Drosophila*. [31] 137: 319, ill. **Giorgi, D.**—Studi sulla pebrina del *Bombyx mori*. [Boll. Lab. Zool. Agr. Bac. 1st. Sup. Agr. Milan] 6: 67-83, illus. **Giorgi, D.**—Studio sulle ghiandole mucipore del *Bombyx mori*. [Boll. Lab. Zool. Agr. Bac. Sup. Agr. Milan] 6: 85-91, illus. **Gueniat, E.**—Contribution a l'étude du développement et de la morphologie de quelques Elaterides (Coleop.) [41] 16: 167-298, illus. **Hamilton, A. G.**—The relation of humidity and temperature to the development of three species of African locusts—*Locusta m. migratorioides*, *Schistocerca gregaria*, *Nomadacris septemfasciata*. [36] 85: 1-60, illus. **Keir, W.**—The mechanism and manner of action of the sawfly terebrae. [9] 69: 25-31, illus. **Maki, Takadi.**—Ana-

tomical studies of alimentary canals and their appendages in Syrphid flies. [Trans. Nat. Hist. Soc. Sapporo] 25: 379-391, illus. **Mulijil, J. A.**—A Study of the Yolk (Y-granules) of the male germ cells. [53] 78: 513-531, illus. **Park, T.**—Studies in population physiology. V. The oxygen consumption of the flour beetle, *Tribolium confusum*. [J. Cell. & Comp. Phys.] 7: 313-323. **Payne, M. A.**—Intravital Studies on the Hemipteron, *Leptocoris trivittatus*. B. Description of the female reproductive organs. [89, Abt. Anat.] 61: 45-50, illus. **Pieta, S. della.**—Contributo all'embriologia della *Pieris brassicae*. [Boll. Lab. Zool. Agr. Bac. Sup. Agr. Milan] 6: 93-109, illus. **Schlusche, M.**—Ein Beitrag zur Kenntnis des Stachelapparates der Vespiden mit besonderer Berücksichtigung seiner Druesen. [89, Abt. Anat.] 61: 77-98, illus. **Thomas, A. J.**—The embryonic development of the stick insect, *Carausius morosus*. [53] 78: 487-511, ill. **Tsai Pang-hwa & Chang Yen-Nien.**—Experimental studies regarding the influence of temperature and relative humidity on the oviposition of the rice weevil (*Calandra oryzae*). [Agr. Sinica, Nanking] 1: 175-183. **Wiesmann, R.**—Untersuchungen ueber den weiblichen Genitalapparat, das Ei und die Embryonalentwicklung des Apfelwicklers *Carpocapsa (Cydia) pomonella* (Lepid.). [41] 16: 370-377, illus.

ARACHNIDA AND MYRIOPODA.—**Chamberlin, R. V.**—A new burrowing spider of the genus *Lycosa* from the Uintah Mts., Utah. [95] 49: 15-16, illus. **Field, H. M.**—A new locality for the black widow spider. [68] 83: 186. **Ivie & Barrows.**—Some new spiders from Florida. [Bull. Univ. Utah] 26, no. 6: 24 pp., ill. **Jacot, A. P.**—Spruce litter reduction. [4] 68: 31. **Jacot, A. P.**—New Mossmites, chiefly Midwestern. [Amer. Midl. Nat.] 17: 547-553, illus.

THE SMALLER ORDERS OF INSECTS.—**Alexander, C. P.**—A n. sp. of *Perlodes* from the White Mts. (Perlidae). [19] 31: 24-27. **Bagnall, R. S.**—Notes on Protura. [75] 17: 210-213. **Bourne & Shaw.**—A fungus infesting onion thrips. [19] 31: 15-16, illus. **Gloyd, L. K.**—Three new North American species of Gomphinae (Odonata). [114] no. 326, 18 pp., illus. **Harris, Drake & Tate.**—Observations on the Onion Thrips (*Thrips tabaci*). [Iowa St. Col. J. Sci.] 10: 155-166, illus. **McDunnough, J.**—A new arctic Baetid (Ephemeroptera). [4] 68: 33-34, illus.

HEMIPTERA.—**Ball, E. D.**—Some new species of Cicadellian Leafhoppers with food plant notes on others. [95] 49: 17-24. **Ball, E. D.**—Four new Arizona Leafhoppers.

[19] 31: 18-20. **Funkhouser, W. D.**—A new Membracid from Illinois. [19] 31: 21-22, illus. **Hottes, F. C.**—A primer for the Aphid hunter. [95] 49: 27-36.

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CONTRIBUTION TO A BIBLIOGRAPHY OF THE DESCRIBED IMMATURE STAGES OF NORTH AMERICAN COLEOPTERA. By **JOS. S. WADE**. U. S. Department of Agriculture Publication E 358. 114 pp. mimeogr. one side. Dated Sept., 1935. This work should find a well-frequented place on the shelves of the working coleopterist. Herein is compiled under each species, references to the literature on its immature stages. Unfortunately the species are listed under their latest generic names, instead of their more stable specific names. It is of course to be expected that all references are not noted, as it would require years of research to do so, but supplements can readily be issued to include these omissions and subsequent references. Similar contributions in other orders, particularly the Hyménoptera, Diptera and Hemiptera, would make a very useful series of reference works. The foundation for one on the Lepidoptera, by Henry Edwards, was published in 1889 as a Bulletin of the U. S. National Museum. The present work can be secured, as long as the edition lasts, from the U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, Washington, D. C.—**E. T. CRESSON, JR.**

OBITUARY

MR. FOSTER H. BENJAMIN, Associate Entomologist in the United States National Museum, died January 24, 1936.

MR. A. N. CAUPELL, of the Bureau of Entomology and Plant Quarantine, and Custodian of Orthoptera at the United States National Museum, died March 1, 1936, after an illness of several weeks. Sketches of both entomologists will appear in a later issue of Entomological News.

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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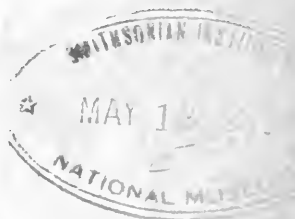
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ENTOMOLOGICAL NEWS

MAY, 1936

Vol. XLVII

No. 5



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ENTOMOLOGICAL NEWS

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Psocid Habits

By H. ELLIOTT McCLURE, University of Illinois, Urbana,
Illinois.

In 1932 a species of psocid was found in the Palm House of the University of Illinois feeding upon a sooty mold of the genus *Capnodium* growing on the leaflets of a palm, *Areca lutescens*. Specimens sent to Mr. Nathan Banks were determined as *Ectopsocus californicus* Banks, a native of California, having been described by Banks in 1903.

STRUCTURE AND FOOD.

The adult female, a typical psocid form, is nasus brown to cream, two to three millimeters long from front of head to tip of wings. The wings are hyaline, 1.5 to 2 millimeters in length and the antennae are 1.4 millimeters long. The mandibles are heavy, measuring approximately 0.15 millimeters long by 0.13 millimeters wide, with two or three blunt but strong teeth. The abdomen varies in size according to the maturity of the eggs in the ovaries and bears a tiny forked ovipositor or egg guide about 0.13 millimeters long. Under the conditions of the greenhouse, of an incubator, and even of a refrigerator, the insects produced no males in ten generations.

The insects are not generally active, but can run swiftly with an alert, cocky attitude and fly for short distances, six inches, with a quick, ragged flight. They are somewhat negative to light, preferring the undersides of leaves and are positive to smooth surfaces, seeking a smooth surface upon which to lay the eggs even in a bright light.

All stages spin a protective net of fine web above their daytime resting place. This net is not for protection from external enemies, but is to prevent the insects from falling away from the plant with a sudden gust of wind. This is particularly true of the females which upon sudden jarring lose mobility and

fall into the net from which they can extricate themselves upon returning responsiveness. The silk is spun from the mouth.

The labium is large and the labrum extensible so that, in feeding, the mouth parts are protruded around the mandibles which break off bits of the fungus and chew it long and thoroughly. As the food material is black, it can readily be seen in the intestinal tract which forms a large U-shaped curve on the left side of the abdomen. The females when starved will feed upon their own eggs and eat whatever silk has been spun. They regularly eat old egg shells and all stages devour exuviae. They are occasionally cannibalistic and the adults have been seen to attack and devour fungus mites. In one instance a mite 0.1 millimeter long, in crawling about a gravid female, touched one foot which she moved. Then, as it touched another foot, the psocid whirled and with a flirt of her antennae pounced upon the mite and devoured it avidly.

The sooty mold is a hard, dry, black surface growth on the leaves which, unless moist to a certain consistency, is inedible by the psocids. They live only under very closely balanced conditions of humidity. If the air is too dry, they shrivel and die. If the substratum is too moist, they drown and, if the sooty mold is too dry, they starve. If the air has been dry for a short time and then the leaf is moistened, the insects run to the moisture and drink by applying the extended mouth-parts to it and sucking. The adults and first instar nymphs are most susceptible to drying, while the eggs are the most resistant.

EGG-LAYING.

The length of life of all stages varies greatly, depending upon the external conditions. Adult life varies from 15 to 30 days. During this time the female lays consecutively for a period which varies from 9 to 18 days.

The female may begin laying eggs the day she becomes mature or she may wait several days, depending upon the condition of the ovaries and the external conditions. As the eggs in her ovaries mature, the abdomen becomes greatly distended and she is agitated to activity. She runs about, feeding on the mold, or rests at a spot which she has previously selected as satisfactory for her eggs. The chief prerequisite of such a

position is smoothness, although intensity of light may affect the choice slightly on the palm frond. In the rearing vials the eggs are generally laid on the glass.

Shortly before oviposition, long strands of silk are spun as protective guy wires over the location for the eggs. In spinning these the female attaches the silk to the substratum with a rotary motion of her labium and then runs several steps, for about a centimeter, holding her head high and attaches the other end. On the curved surface these taut lines form an open canopy and occasionally the insect stands on her hind four legs and reaches up into the canopy to attach another line. At least a hundred of these strands are laid down. As the time for oviposition draws near, the gravid insect becomes more nervous and irritable. If another female or a nymph approaches, she dashes at the intruder, who retreats. She walks about feeding and biting at anything present, including excrement, and is capable of returning to the same spot after extended wanderings.

At the moment of oviposition the tip of the abdomen is worked in and out, the legs are set well apart and strained. Gradually, after ten or fifteen seconds of working the egg to the vagina, the abdomen becomes quiet and then with a sudden convulsion it forces a large drop of fluid including much waste material from the anus. With this drop hanging upon the tip of the abdomen, the egg is partially forced into it and pressed to the substratum. At half extrusion the insect vibrates its whole body with a convulsion as violent as that of a dog shaking a rat. The body almost rears upon the tip of the abdomen and very little weight is put on the front feet during this movement. As the two little tips or fingers of the ovipositor grasp the egg on the sides and undersurface, they are brought into play during this violent vibration and work the egg out of the body. The motion of the insect during this vibration is so rapid that the body looks blurred, making it impossible to count the movements made in the second required. Without the egg guides releasing their hold on the egg, the fluids that preceded it and flowed over the substratum, having a viscosity slightly less than water, are pumped back into the body by a muscular

action about the cloaca or hind intestine. The rectal material in the liquid is deposited about and covers the egg and the residue from the fluid acts as an adhesive, holding the egg in place.

After the strenuous process of oviposition the female rests about five minutes and then returns to her cruising, biting at this and that, spinning a few guy wires. She is very nervous, scraping the tip of her abdomen on the substratum, quivering and straining. Then, alongside her previous egg, she begins the final stage of pulsing which heralds another.

It takes about ten minutes between eggs, depending upon the maturity of the forthcoming ova and a minute for the actual laying, so that about an hour and a quarter is necessary for the deposition of a group of six.

SPINNING DANCE.

Almost immediately after the sixth egg is laid, what may be called the spinning dance begins. Fine silk strands are spun back and forth across the eggs to a diameter of about two millimeters, almost the length of the insect. Slowly at first begins the dance as each of the foundation threads is firmly attached at its ends to the substratum by a pressing and rotary motion of the labium. Gradually, after the first few are attached, the dance quickens until the dancer's feet are fairly flashing. She pivots and backs, turns and steps forward, after each movement pressing her lips to the surface until she is laying over ninety strands a minute and the eggs are crossed and recrossed hundreds of times. She never doubles a strand, but always changes her position so that the eggs are finally covered with a blanket of fine white silk extending over them as a canopy and not directly attached to them. This spinning to cover the eggs takes about half an hour, 31 minutes more or less, depending on the female, during which she lays down as many as 2,829 strands of silk. The amount of silk necessary for one group of eggs is 5.5 to 6 meters and as a female is capable of laying 18 groups of eggs she must be able to spin 100 meters or approximately 115 yards of silk. This is remarkable for an insect only 2.5 millimeters long and it does not constitute all the spinning that she does. If all this silk

were woven into a mesh it would make a piece of silk one inch square and a little more than one micron thick, as the strands are about one micron in thickness.

The acts of oviposition are not yet complete. After a rest of a minute or two, the female turns around and, dragging the tip of her abdomen in strokes of about 0.5 millimeters across the silk covering, deposits a liquid from the anus which is probably the same material as that which precedes an egg. The liquid contains bits of food material and is painted on in several strokes after intervals of rest, making a total of about 100 strokes, requiring ten or fifteen minutes. This granular anal liquid is painted on the mat so as to stick the threads together and make the silk hard and brittle and easy to tear. It does not waterproof the silk nor does it cover the entire surface, but remains in streaks and blotches as the strokes of the female's abdomen left it.

The oviposition of six eggs takes about two hours with the first hour for laying and the second for spinning and painting.

Eggs.

The eggs are ovoid, 0.4 to 0.5 millimeters long by 0.2 to 0.25 millimeters wide and pearly white, semi-transparent, with a smooth unetched chorion. As they ripen the eggs darken from pale cream to yellow with the outlines of the embryo distinguishable.

The common number of eggs to a group is six. Practically never is the number greater, for in more than a thousand groups only two contained seven and none more than seven. A smaller number may be laid, depending upon the age of the female and the condition of her ovaries. Unless the adult is well fed she does not lay at all, while one well-fed female produced 17 groups in 18 days, it taking about 24 hours to mature each group. Here again there is variability, for a young fresh female is capable of producing a group every twelve hours for a short time. By actual count of 309 groups of eggs, 90.9 per cent were laid with six eggs, 5.8 per cent with 5, while the remaining 3.3 per cent were divided into two groups of four eggs, two or three, two of seven, one of two and one of ten eggs. The group containing the ten eggs was laid by one female

over a period of two days and constitutes two groups with but one silken covering.

The ovaries work together and each matures three eggs which apparently are laid alternately.

(To be continued)

Descriptions of Seven New Western Ants. (Hymenop.: Formicidae).

By A. C. COLE, JR., P. O. Box 623, Lansing, Michigan.

MYRMECOCYSTUS MELLIGER subsp. *MIMICUS* Whlr. var. *californicus* var. nov.

Worker—Length, 4.5 mm. Differing from the worker of the typical *mimicus* as follows: Entire body hairy and shining. Clypeus, cheeks, mandibles, and legs, except tibiae and tarsi, of a deep reddish brown. Antennae, tibiae, and tarsi much lighter. Mandibular teeth, thorax, and petiole dark brown; gaster black.

Described from numerous workers collected from a single nest by the author at Weed, CALIFORNIA. The *holotype* is in the author's collection and *paratypes* are to be deposited in the collections of the U. S. National Museum and Dr. C. H. Kennedy.

MYRMECOCYSTUS MEXICANUS Wesm. subsp. *idahoensis* subsp. nov.

Worker—Length, 3-6.5 mm. Differing from the worker of the typical *mexicanus* as follows: Head, including mandibles, only slightly longer than broad. Scapes of antennae only sparsely hairy. Mandibles 7-toothed; apical tooth pronouncedly curved; remaining teeth rather indistinct, their tips straight or only slightly curved. Thorax compressed, more robust than that of *mexicanus* or its variety *horti-deorum*. Declivity of epinotum decidedly rounded, base more flattened. Legs comparatively shorter. Petiole convex, its apex rather blunt but without a median impression; apex hairy. Gaster only slightly longer than broad, less elongate than in *mexicanus* or *horti-deorum*.

Hairs of gaster short on dorsum, longer on venter, fewer on antennal funiculi. Surface somewhat shining, thinly pubescent, less hairy than that of *horti-deorum*. Thorax and legs a uniform light tan, head slightly darker; mandibular teeth dark brown to black; gaster fuscous.

Female—Length, 9 mm. Differing from the typical *mexicanus* in the following characters: Head, excluding mandibles, slightly broader than long. Last joint of maxillary palpus about half as long as the penultimate joint. Thorax very broad and robust. Petiole rather blunt. Wings 10 mm. in length, veins light brown, stigma darker; hind wings distinctly iridescent. Gaster longer than thorax.

Head and mandibles, except teeth, reddish brown; mandibular teeth black; thorax shiny yellow-brown, darker than gaster; legs and antennae uniformly dull yellow; venter of gaster and head lighter than dorsum.

Male—Length, 6 mm. Head small, including mandibles, as broad as long. Mandibles with 1 to 3 minute and uneven teeth, in addition to the apical tooth, which is small, pointed, thick, and only slightly curved. Thorax robust, greatly compressed, much broader than head, thicker than gaster. Wings hyaline, discoidal cell large and distinct. Petiole thick, blunt, and unnotched. Gaster strongly elliptical.

Pilosity and pubescence as in worker. Surface shining. Head and thorax, with exception of pronotum, black; pronotum dark reddish brown. Gaster dark brown, slightly lighter ventrally. Femora and tibiae dark ash-grey, tarsi light yellow. Veins and stigmatae of wings light brown.

Described from numerous workers, males and females, collected by the writer at Hollister, IDAHO. Additional localities are Rogerson, Indian Cove, Hagerman, and Twin Falls, Idaho. The *holotype*, a worker, from Hollister, is in the author's collection and *paratypes* are to be deposited in the collections of the U. S. National Museum and Dr. C. H. Kennedy.

MYRMECOCYSTUS MELLIGER subsp. SEMIRUFUS Emery var. **kennedyi** var. nov.

Worker—Length, 3-5 mm. Much the same as the worker of the typical *semirufus*, with the following exceptions: Head and gaster more hairy than thorax; pubescence on gaster slight or absent; erect hairs long and rather abundant, uniformly distributed. Surface shining, gaster more so than head and thorax. Head and thorax tan, gaster jet black.

Female—Length, 8.5 mm. Head, excluding mandibles, broader than long. Mandibles 7-toothed; apical tooth pronounced, sharp, only slightly curved. Discoidal cell of wings large and distinct. Petiole rather acute, deeply notched and hairy. Gaster globular; hairs suberect and short; pubescence scant.

Surface, especially of mesonotum, shining. Head and thorax light brown; apical tooth black. Gaster silky black, its sutures and genitalia light brown.

Male—Length, 5 mm. Neck shorter and more robust than in males of related forms. Apical tooth of mandibles short and rather blunt; other teeth lacking. Discoidal cell of wings present but recurrent vein faint; stigma faint.

Surface shining, gaster more so than head or thorax. Head, except antennal funiculi, black; funiculi yellow. Thorax, except mesonotum, and legs, except tarsi, brown; mesonotum black; tarsi dusty yellow; gaster black.

Described from a series of 150 workers, 20 females and 75 males, collected by the writer from small crater nests (about 11 cm. in diameter) at Indian Cove, IDAHO. I name this variety in honor of my friend and teacher, Dr. C. H. Kennedy. The *holotype*, a worker, is retained in the author's collection, and *paratypes* are to be deposited in the collection of the U. S. National Museum and that of Dr. C. H. Kennedy.

MYRMECOCYSTUS MELLIGER subsp. SEMIRUFUS Emery var. **romainei** var. nov.

Worker—Length, 4.5 mm. Same as worker of the typical *semirufus* except that the vertex of the head, antennal funiculi, thorax, petiole, and legs are of a dark reddish brown.

Described from a series of 54 workers taken by Miss Marjorie Romaine, at Cameron, ARIZONA. The *holotype* is in the author's collection, and *paratypes* are to be deposited in the collections of the U. S. National Museum and of Dr. C. H. Kennedy.

DORYMYRMEX PYRAMICUS Roger var. **smithi** var. nov.

Worker—Length, 3.5-5 mm. Larger and more shining than worker of the typical *pyramicus*. Head, legs, and petiole reddish brown; gaster black.

Described from a series of 27 workers collected by the writer at North Platte, NEBRASKA. This variety has been named for Dr. M. R. Smith whose helpful criticisms and suggestions are so much appreciated by the author. The *holotype* is in the author's collection and *paratypes* are to be deposited in the U. S. National Museum.

POGONOMYRMEX BARBATUS F. Smith subsp. **curvispinosus** subsp. nov.

Worker—Length, 7-7.5 mm. Differing from workers of described forms of *barbatus* as follows: Epinotal spines long and rather strongly curved forward. Head and mandibular teeth black; mandibles, antennae, thorax, legs, petiole, and post-petiole light to dark reddish brown; gaster very dark reddish brown, lighter anteriorly and posteriorly; femora infuscated.

Described from a series of 20 workers collected by the author 36 miles south of Prescott, ARIZONA. The ants inhabited a large flat mound of pebbles along U. S. highway 89. The workers were deep within the ground at mid-day so that it was only with extreme difficulty that a series, significant of the subspecies, was obtainable from the rocky soil.

The *holotype* is in the author's collection, and *paratypes* are to be deposited in the collections of the U. S. National Museum and of Dr. C. H. Kennedy.

IRIDOMYRMEX PRUINOSUS Roger var. *testaceus* var. nov.

Worker—Length, 2-2.3. Same as workers of *pruinus* but lighter in color, being testaceous with vertex of the head darker, tip of gaster infuscated, and legs and anterior portion of gaster lemon yellow to testaceous.

Female (deälate)—Length, 5 mm. Dark brown, with testaceous mandibles, cheeks, and legs.

Described from a series of 50 workers and 1 deälated female collected by the author at Twin Falls, Idaho. Other localities: Hagerman, Buhl, and Hollister, IDAHO.

The *holotype*, a worker, from Twin Falls, is in the writer's collection, and *paratypes* are to be deposited in the collections of Dr. C. H. Kennedy and the U. S. National Museum.

Three New Butterfly Races (Lepid.: Nymphalidae, Lycaenidae).

By WILLIAM D. FIELD, Lawrence, Kansas.

NYPHALIS* CALIFORNICA Bdv. new race *herri*.

This is a northern race and it differs from typical *californica* Bdv. in having the ground color of the upper side of both primaries and secondaries more of a burnt orange. Typical *californica* as described by Boisduval is fulvous. The yellow markings of *californica*, which are located on the outer side of all the black spots in the discal and limbal areas, are in this new race less yellowish and more mixed with the ground color. Thus this race appears on the whole darker-colored than does *californica*.

Underneath. On the whole darker than in typical *californica*. This is especially noticeable in the area bordering the outer side

* The generic names used in this article were adopted from Francis Hemming, "The Generic Names Of The Holarctic Butterflies", vol. 1, 1934.

of the dark, angular, transverse band which runs through the discal part of primaries and secondaries. In typical *californica* this area is light-colored, almost white. In *herri* this area is nearly as dark as the rest of the limbal area.

Data: *Holotype* ♂, expanse 49 mm.; Buckhorn Mountains, WASHINGTON, July 25, 1934. *Allotype* ♀, expanse 50 mm.; same locality and date. *Paratype* ♀, expanse 54 mm.; Excelsior, Washington, July 20, 1934. Twelve *paratypes* ♂, Priest River, IDAHO, various dates in July, 1930, C. W. Herr. Types in author's collection and collection of C. W. Herr. Named for C. W. Herr, a well-known collector, of Woodburn, Oregon.

Note. Compared with specimens from San Gabriel Mountains, California, June 20, 1932, collected by Berkley Powell, and with specimens from Sonoma County, California, June, 1931, collected by J. W. Tilden. Also compared with the original description by Boisduval and with figures given in John Adams Comstock's book, "Butterflies of California." These latter are of specimens taken on Mt. Wilson, Los Angeles County, California. All of the above specimens were found to be typical *californica*.

LYCAENA EDITHA Mead new race **montana**.

♂. Upper side. Not different from typical *editha* Mead, except that the anal angle and margin of secondaries have no indication of orange scales or patches.

Under side. Primaries; Mead says of *editha* in the original description, "Under side of fore wings gray inclining to fuscous, cinereous on the disc. . . ." In this new race the ground color is much more of a yellowish grey than in *editha*. Secondaries; it is here we find the greatest distinguishing character of *montana*. Ground color much darker, especially toward the base of the wings. The spots of discal and basal areas, which in typical *editha* are "pale gray fuscous edged with black and surrounded by white," are in this new race a darker brownish grey and are of a uniform color throughout, or at least they are not edged with black. Moreover, they are surrounded by a more distinct circle of white than is found in typical *editha*. The spots of the discal and basal areas are much enlarged in this new race, many of the pairs being almost connected.

♀. Upper side. As in typical *editha* there is present a small fulvous or ochraceous cloud upon the fore wing disc and a similarly colored streak on the inner angle.

Under side. Differs from typical *editha* in the same ways that the male of *montana* differs from males of *editha*.

Data: *Holotype* ♂, expanse 27 mm.; Broadwater County, MONTANA, July 30, 1930. *Allotype* ♀, expanse 27 mm.; same locality and date as holotype. Seven male and two female *paratypes*, same locality and date. One male *paratype*, Yellowstone Park, July 16, 1934. All types in author's collection.

Note. Compared with a series of typical *editha* from El Dorado County, California, near the type locality, Lake Tahoe. LYCAENA HETERONEA Bdv. new race **klotsi**.

This race oddly combines some of the characters of the three other races of this species. On the upper surface the male has the violet blue color of *clara* Hy. Edw. with narrower black margins than in *heteronea* Bdv. *Heteronea* is metallic blue above. On the characters of the under side of the male, typical *Klotsi* cannot be separated from typical *heteronea* Bdv.

The author would be inclined to believe that this is only a color form of *heteronea*, if it were not for the series of females taken with the males. They are of a lighter color above than typical *heteronea* or *gravenotata* Klots and, like the females of the latter, they lack the marginal row of orange brown lunules found on the upper side of secondaries of typical *heteronea*. The under side is not different from typical *heteronea*, as before stated.

Briefly one might characterize this race as follows: the under side of male and female are like the under side of *heteronea*, the upper side of male is similar to *clara* Hy. Edw. and the upper side of *klotsi* female is similar to *gravenotata* Klots, in lacking orange brown lunules on the margin of secondaries, but is lighter in color than *gravenotata*. The ground color is greyish brown.

External genitalia. The holotype and paratype males, in addition to two other specimens of typical *klotsi*, were dissected for study. A series of four males of typical *heteronea* from El Dorado County, California, and one male of the race *gravenotata* from Estes Park, Colorado, were also dissected for study. It was found that the harpes of the Montana race were generally broader throughout their length and noticeably shorter than were the harpes of the other two races. *Heteronea* seemed to have the narrowest and longest harpes. The most constant difference between these races is found in the pair of hooks which are connected to the base of the uncus. In *klotsi* the ends of these hooks point more toward their base and make a little less than a curved right angle bend. In *heteronea* the

hooks make a gradually curved right angle bend. In *grave-notata* these hooks make a more sharply curved right angle bend and are somewhat longer.

Data: *Holotype* ♂, expanse 30 mm.; Broadwater County, MONTANA, July 30, 1930. *Allotype* ♀, expanse 31 mm.; same locality and date. Five male and five female *paratypes*, same locality and date. One male *paratype*, Albany County, WYOMING, July 25, 1928. Types in the author's collection. One pair of paratypes to be presented to Dr. Alexander B. Klots for whom this new race is named. One pair of paratypes to be presented to the Los Angeles Museum in care of Dr. J. A. Comstock.

Taxonomic Problems in Lepidoptera.

By G. F. FERRIS and MICHAEL DOUDOROFF, Stanford University.

This paper is a synthesis of the views of its authors, of whom one—the junior—is a student and collector of the diurnal Lepidoptera and the other is interested in the general problems of systematic work and not at all in the butterflies. It is called forth as a protest, from both points of view, against certain practices which are current especially among Lepidopterists. It is presented as an expression of the belief that systematic work has as its function something more significant than the mere furnishing of names which may be attached to a few specimens in a cabinet.

It would seem reasonable to expect that before undertaking to do systematic work the student should have a clear conception of the purpose and significance of such work and of the function and limitations of the nomenclatorial procedure employed. Whatever the aims of systematic work may be, ranging from the philosophical ideal of "charting the course of evolution" to the purely practical purpose of permitting the identification of species, it would seem clear that the function of the associated nomenclatorial system is that of indexing the biological facts which are revealed in the course of systematic studies. Nomenclature is not synonymous with systematics. It is but

a tool of the systematist and as a tool it should be kept as trenchant as possible.

If we thus regard our nomenclatorial system as a means of indexing a body of fact, it is evident that it should be kept as simple as is consistent with its function. Furthermore, it must be realized that the method of indexing may be varied at certain stages just as—for example—in preparing a bibliography we may index first by subject, then by author and then chronologically.

In our system of taxonomic nomenclature we are but little troubled by complexities of indexing the higher categories. As a matter of fact, our system of naming these is naively simple, certainly far too simple adequately to express the facts. But when we come to the species we get into difficulties. These difficulties arise from two sources. One source is the complexity of the biological situations involved. The other is the purely nomenclatorial problem of how to index these situations.

It should be evident that an index can not be completed before the book is written. In other words, no very satisfactory nomenclatorial arrangement intended to index the body of fact involved in connection with a species can be designed until we are fairly clear about species themselves. To name sub-species, varieties, formae, races, transition forms, aberrations and the like when we can not even define what we mean by species is an absurdity. And at this point we have a serious difficulty involved in the rule that "specific and sub-specific names . . . are of the same value." The term "sub-specific" as here used is generally interpreted to mean any scientific name applied to a category less than the species. Here, at the point of greatest confusion in our thinking, where systematists argue even as to the reality of species, is also the point of greatest confusion in nomenclature. Formal scientific names in Latin form, required by our nomenclatorial code to be recognized if properly published, are applied indiscriminately to categories of undefined status and significance by authors who have little realization of what their activity is all about.

Two things seem to us to be desirable. First, the development of a clearer concept of the meaning of the word species. Second, a change in the method of indexing—that is in the

nomenclatorial procedure—at the point where we begin to deal with categories less than the species.

We can not here develop at length our argument concerning the definition of species. We simply state that the term is conceived of by us as properly covering "a population the members of which form an inter-linked genetic complex." As thus conceived the species is a broad group involving perhaps in some cases hundreds of minor groups of many degrees of difference from each other.

To make clear our meaning, let us consider the species *Drosophila melanogaster* upon which so much experimental work has been done. Here is a population—occurring out of doors as well as in bottles—the members of which differ among themselves to such an extent that something more than four hundred genetically fixed forms have been segregated, all of which are genetically compatible with each other and form a genetically inter-linked complex having a genetic constitution such that the population as a whole is definitely separated from other species populations of the genus *Drosophila*.

This is a species. Its name, *Drosophila melanogaster*, stands as the key index symbol for an enormous body of fact that has been accumulated concerning the species. And at this point the geneticists have wisely abandoned the method of index symbolism employed in our formal scientific nomenclature and have adopted a different system. Instead of formal scientific names they have employed a series of "nicknames" which adequately meet their needs. We may be grateful to them that they have not proposed 400 or more names in Latin form for these sub-species or varieties or formae or whatever they may be with the resulting necessity of listing these names in our catalogues and establishing their validity and priority. The nomenclatorial system remains simple and the biological situations are adequately indexed.

Systematists might well profit by this example. True, in some cases the situation is more complex than in *Drosophila*, since we may have to deal with regional forms, seasonal forms, color phases and the like as well as with possible mutations, and yet it is not fundamentally different. It can be met essentially as it has been met by the geneticists.

We are inclined somewhat to doubt that any formal scientific name should be given to any category less than the species. A case can be made out for the naming of the sub-species as understood by mammalogists and ornithologists, to whom it implies a form genetically fixed and geographically circumscribed and generally regarded as perhaps the most probable material from which distinct species may arise. But certainly the formal naming of every recognizably different specimen, of every mutation, aberration, seasonal form, altitudinal form, color phase and the like is uncalled for. Certainly some other method of referring to such material can be developed.

Among the aphids, for example, there may be a quite elaborate sequence of seasonal forms, differing materially from each other. Yet students of this group do not find it necessary to assign formal names to each member of the sequence. Stem mother, apterae, alatae, sexuparae, migrantes and the like adequately index their position under the specific name.

All of this applies with special force to the systematics of the diurnal Lepidoptera. Butterflies are usually highly localized by climatic conditions and host plants so that it is often impossible to determine from collecting records and from specimens alone what the status of a form may be. Until breeding experiments have been carried out, or definite inter-gradation with its implication of genetic compatibility has been shown, such geographical groups are perhaps best set off as species, lest in recoiling from the extremes of over-zealous splitters we become gross lumpers. Thus, Gunder's lumping of the American species of the genus *Euphydryas* into five species can hardly be justified by similarities of genitalia alone.¹

There are also among the butterflies genetic and environmental forms occurring in company with the normal, which have been named and to whose names collectors have clung tenaciously. The genetic forms, such as polymorphic sexual forms, some albinos, and mutants (not so-called transition forms) may be compared to such variants of the human species as blue-eyed or haemophilic individuals. The environmental

¹Doudoroff, M.—*Pan-Pacific Entomologist*, Vol. 11, p. 144. 1935.

forms include seasonal and some altitudinal forms, most dwarfs, almost all aberrations and "transition forms," injured specimens, chrysalis burns and the like which may appear in collections and whose latinized and formally validated names are appearing in greater and greater numbers. Hundreds of names have appeared for "transition forms," individuals supposedly forecasting or reminiscent of fashions in butterfly attire but as shown by numerous investigators actually freaks easily produced in the laboratory and having no genetic significance. (Feldotto² and Prochnow.³)

As far as the formal scientific nomenclature, subject to the established nomenclatorial code, is concerned, these forms should be disregarded. They can properly be recorded in some other way. The junior author, as a student of the Lepidoptera, pleads with his colleagues to abandon the orgy of indiscriminate naming, to straighten out the synonymic lists by discarding superfluous names and to spare the butterflies the nomenclatorial disrepute arising from the situation that is developing. And the senior author, not at all interested in butterflies beyond being amused by the vagaries of their devotees, clings to the hope that systematic workers in other fields may eventually escape from the fog that envelopes much of their work and develop a system more soundly grounded upon biological knowledge and less concerned with the validation of names.

A New Species of *Anomiopsyllus* from Montana (Siphonaptera)

By BENJAMIN J. COLLINS, National Institute of Health,
U. S. Public Health Service.

Material recently placed at our disposal through the kindness of Drs. Adolph Rümreich and Carroll Fox, together with specimens of a hitherto undescribed species which have been in our collection for some time, enables us to give the following notes on the species of *Siphonaptera* which constitute the Nearctic genus *Anomiopsyllus* Baker, 1904.

² Feldotto, W.—*Archiv für Entwicklungs—Mechanik der Organismen*, Bd. 128, pp. 299-341. 1933.

³ Prochnow, O.—Schröder's *Handbuch der Entomologie*, Bd. 2, pp. 430-572. 1929.

Anomiopsyllus montanus spec. nov. (figs. 1-2).

Anomiopsyllus nudatus Dunn & Parker, 1923 (nec Baker, err. determ.), Public Health Repts., v. 38 (47), 2774, 2775 (Canyon Creek, W. of Hamilton, Mont., on *Bubo virginianus occidentalis*).

Distinguished from *A. nudatus* (Baker, 1898) and *A. falsicalifornicus* Fox, 1929, by the modified abdominal segments.

♂. 1st abdominal tergite with 7 apical teeth on the 2 sides

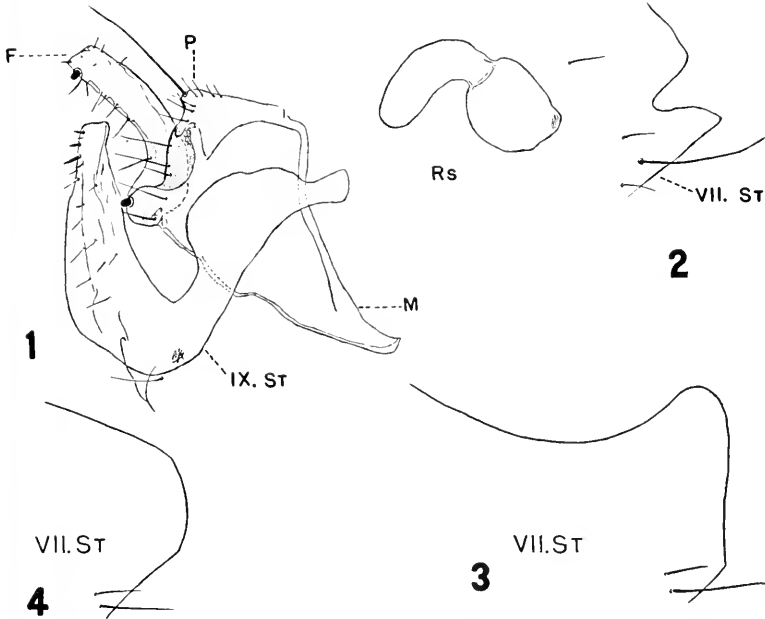


Fig. 1.—Genitalia of *Anomiopsyllus montanus* n. sp., ♂. F Exopodite, IX. St. Ninth sternite, M Manubrium, P Immoveable process.

Fig. 2.—*Anomiopsyllus montanus* n. sp., ♀. Rs Receptaculum seminis, VII. St. Seventh sternite.

Fig. 3.—Seventh sternite of *Anomiopsyllus nudatus*, ♀.

Fig. 4.—Seventh sternite of *Anomiopsyllus falsicalifornicus*, ♀.

together. Exopodite F (fig. 1) finger-like, of nearly even width, the truncated apex directed posteriorly. On posterior margin, a small, subapical, bluntly rounded spiniform. Below the spiniform a row of 6 weak bristles in the apical half. At the insertion of exopodite on the postero-ventral angle of clasper another spiniform, above this a single bristle in the basal half. Process P of clasper shorter than in *A. nudatus*, its posterior margin incurved for a short distance below apex. Apical bristle

of process P not so long as antepygidial bristle. A row of 8 (including acetabular) bristles on posterior margin of clasper, the upper 3 somewhat submarginal. In addition, 3 or 4 bristles on dorsal margin anterior to apical bristle. Horizontal arm of IX sternite broadest below middle, narrowing toward apex, the anterior margin membranous in the apical half. On posterior margin below truncated apex, 3 stout and several weak bristles. Vertical arm of IX sternite of same general shape as in *A. nudatus*, but the apex more dilated.

♀. Differs from the other known species of the genus as follows: Maxillae not pointed at apex. VII sternite (fig. 2) with a sinus of medium depth, the lobes of about equal length, the lower more pointed than upper. Head of spermatheca subglobular, slightly flattened on one side, shorter than tail; tail more strongly ventricose. Anal sternite angulate ventrally.

Holotype (♂) and *allotype* (♀) Nat. Inst. Health Cat. No. 11984, are two of the eight specimens recorded by Dunn & Parker, *loc. cit.*

ANOMIOPSYLLUS NUDATUS (Baker, 1898) (fig. 3).

Typhlopsylla nudata Baker, 1898, J. N. Y. Ent. Soc., v. 6(1), 56 (♀, Tucson, Ariz., on *Nicotoma albigula*).

Anomiopsyllus nudatus (Baker); Baker, 1904, Proc. U. S. Nat. Mus., v. 27(1361), 426 (♀); Fox, 1914, Hyg. Lab. Bull. No. 97, pl. 19, fig. 53(spermatheca); Jord. & Roths., 1915, Ectopar., v. 1(1), 45, fig. 48 (♂).

Anomiopsyllus californicus Baker, 1904, Invert. Pacifica, v. 1, 39-40 (♀, Claremont, Calif., on *Spilogale phcnar*); Jord. & Roths., 1915, Ectopar., v. 1(1), 45 (= *nudatus*).

♀. The VII abdominal sternite not having been illustrated, we take the opportunity of giving a figure of that sclerite for comparison. The figure, prepared in collaboration with Dr. H. E. Ewing, is based on the type specimen in the U. S. Nat. Mus. The dorsal margin of the segment is strongly incurved, with the posterior dorsal angle evenly rounded; posterior margin almost straight.

ANOMIOPSYLLUS FALSICALIFORNICUS Fox, 1929 (fig. 4).

Anomiopsyllus californicus Fox, 1926 (nec Baker, err. determ.), Pan-Pacific Ent., v. 2(4), 183-184, figs. 5, 9 (♂ ♀, Los Angeles Co., Calif.); Wagner, 1930, Mag. d. Parasitol., v. 1, 135, pl. 12, fig. 76 (♂).

Anomiopsyllus falsicalifornicus Fox, 1929, ENT. NEWS, v. 40 (7), 218 (♂ ♀).

♀. We figure the outline of the VII sternite from a paratype kindly loaned by Dr. Carroll Fox. The sclerite (fig. 4) is produced into a broad lobe, evenly rounded posteriorly.

**A new Pecan Sawfly, *Megaxyela langstoni* n. sp.
(Hymenoptera : Xyelidae)**

By HERBERT H. ROSS, Illinois State Natural History Survey,
Urbana, Ill.

During the last few years Mr. J. M. Langston of the Mississippi Agricultural Experiment Station has reared several sawflies from the pecan. Among these was a series of adults representing a new species, *Megaxyela langstoni*.

The larva of this species was recorded by Dyar in 1898 and Yuasa in 1923 as *major*. Mr. Langston and I, however, believe that the larva keyed out by Yuasa as *Megaxyela* sp. 1 may prove to be true *major*. The larva of *langstoni* has a large dark area on the pronotum and penultimate abdominal segment, whereas Yuasa's "species 1" has these areas replaced by pairs of black spots. This latter species appears to be a solitary feeder on pecan and some other hickories; *langstoni* is gregarious.

***Megaxyela langstoni* n. sp.**

Megaxyela major Dyar (*nec.* Cresson), Can. Ent., vol. 30, no. 7, July, 1898, p. 175; Yuasa (*nec.* Cresson), Ill. Biol. Monographs, vol. 7, no. 4, Feb. 9, 1923.

This species runs easily to *M. major* (Cresson) in existing keys to members of the genus. It is readily separated from *major*, however, in having the abdominal dorsum chestnut instead of mostly black, a black area at the base of the stigma, and much less yellow at the base of the hind femora and tibiae.

♀.—Length 10 mm. Color uniformly chestnut brown with the following exceptions: head below antennae, tegulae, alar sclerites, margins of all sternal portions of abdominal sclerites, extreme apex of coxae, all trochanters, base and apex of front and middle femora, all but apex of front and middle tibiae, a very narrow ring at base and apex of hind femora, basal fifth or less of hind tibiae, and hind tarsi, *yellow*; front and middle tibiae varied yellow and chestnut; a spot at base of each antenna, extreme upper corner of mesepisternum, sometimes spots on anterior margin of mesonotum and spots on ventral portion of tergites 5, 6 and 7, *black*; wings slightly smoky, especially below stigma, veins mostly dark brown, stigma clear chestnut with antero-proximal area (constituting one-third to one-half of the total) almost black.

Structure almost identical with all other members of the genus in regard to mouthparts, punctuation, venation, etc. Head and thorax dull with very fine striate shagreening. Abdomen shining. Sheath flat and broad, typical of genus, differing from that of *major* in being distinctly shorter than the hind basitarsus rather than distinctly longer.

♂.—Length 9 mm. Similar in color and structure to female, except for genitalia, which are similar to other members of the genus.

Holotype: ♀; State College, MISSISSIPPI, April 7, 1932, coll. J. M. Langston, reared from pecan (*Carya pecan* A. & G.). Deposited in the collection of the Illinois State Natural History Survey. *Allotype*: ♂; same data. *Paratypes*: 6 ♀ ♀, same data as holotype; 1 ♀, same data but coll. Mar. 24, 1932; 1 ♂, 1 ♀, Lucedale, Miss., reared from pecan, emerged Mar. 28 and Apr. 2, 1931, respectively, coll. H. Dietrich. In the collections of the Mississippi Agricultural Experiment Station and the Illinois State Natural History Survey.

The Silphidae of Nebraska (Coleoptera).

By F. G. Meserve, University of Nebraska, Lincoln, Nebraska.

The purpose of this paper is to list the Silphidae that occur in Nebraska, to show their geographic and seasonal distribution and their relative abundance. The material studied is in the permanent collection of the Department of Entomology of the University of Nebraska. The nomenclature is that of Leng's "Catalogue of the Coleoptera of North America, North of Mexico." The writer wishes to acknowledge suggestions and assistance given him by the following: Professors M. H. Swenk, D. B. Whelan and Raymond Roberts of the University of Nebraska, Mr. C. A. Frost of Framingham, Massachusetts, Mr. J. W. Angell of New York City, and Mr. A. J. Mutchler of the New York Museum.

1. *NECROPHORUS CAROLINUS* Linn. Scarce. Throughout the state; Valentine, Mitchell, Dewey Lake in Cherry Co., Haigler, Imperial, Bloomington. One at Lincoln. 28 spms. V, 27 to VII, 21.

2. *N. AMERICANUS* Oliv. Scarce. Only four in the collection. One at Neligh, Antelope Co. without date. Three at Lincoln VI., VII. + IX, 21.

3. *N. ORBICOLLIS* Say. Rather scarce at scattered points in the eastern, north-central and extreme western parts of the state; at Carns, South Bend, Clearwater, Hogan's Bridge in Rock Co., Lincoln, West Point, Valentine, and War Bonnet Canyon in Sioux County. 8 spmns. V. 17 to VIII.

4. *N. MARGINATUS* Fab. Abundant throughout the state. Mitchell, Dewey Lake, Spencer, Niobrara, Maskell, Concord, South Sioux City, West Point, David City, Lincoln, Fairmont, Valentine, Curtis, Bloomington, Elm Creek, Reynolds, Haigler, Glen, Monroe Canyon and War Bonnet Canyon in Sioux County. Collected "at dead mice" at Glen. 104 spmns. V. 27 to X. 22.

5. *N. OBSCURUS* Kby. Scarce. In eastern, northern and extreme northwestern parts of the state. Mitchell, Pine Ridge, Carns, West Point, Harrison and Lincoln. 6 spmns. VII. to IX. 27.

6. *N. GUTTULA* Mots. Scarce. In the extreme eastern and northwestern parts of the state. West Point, Pine Ridge, War Bonnet Canyon. 4 spmns. VI. + VII.

7. *N. GUTTULA HECTATE* Bland. Scarce. Only in the extreme northwestern and north-central portions of the state. Taken at Mitchell, Glen, War Bonnet Canyon and Valentine. 11 spmns. V. 22 to VIII. 17.

8. *N. PUSTULATUS NIGRITUS* Mann. Two specimens in the collection. Lincoln, without date.

9. *N. TOMENTOSUS* Web. Rather common in eastern, northern and extreme northwestern parts of the state. None in central and southwestern portions. Monroe Canyon, Glen, Fairmont, West Point, Omaha, Carns, Spencer, and eleven at Lincoln. 49 spmns., VI. 10 to IX. 22.

10. *PHILAS TRUNCATA* Say. One specimen from Haigler, Dundy County. Collected by J. T. Zimmer, VII. 8, 1911.

11. *SILPHA SURINAMENSIS* Fab. Common in eastern part of state. Also in north and south-central portions, none from extreme west. Carns, Spencer, Omaha, Nebraska City, Fairmont, McCook, DeWitt, Cortland, Ashland, and 28 from Lincoln. Fifteen of the total of 48 spmns. were "collected at electric light." IV. 7 to X. 7. Common in June and July.

12. *S. LAPPONICA* Hbst. Throughout the state. Scarce in the east but abundant in the extreme northwestern part. Ravenna, War Bonnet Canyon and Monroe Canyon, Pine Ridge, Dewey Lake in Cherry Co., Halsey, Glen, Concord, West Point, Valentine, one at Haigler, and nineteen at Mitchell. 68 spmns. V. 6 to X. 28, mostly VI.

13. *S. INAEQUALIS* Fab. Common in eastern, none in central and western parts of the state. Neligh, West Point,

Omaha, South Bend, two at Bellevue "under dead turtle," thirteen at Lincoln. 32 spms. IV. 11 to VI. 25.

14. *S. NOVEBORACENSIS* Forst. Scarce. In eastern and extreme northwestern parts of state. One from Lincoln, without date. One labelled "Neb," seven from Monroe Canyon, one from War Bonnet Canyon and three from Cedar Bluffs. 13 spms. IV. to VIII. 26.

15. *S. AMERICANA* Linn. Rather scarce. Omaha, West Point, Valentine, Dewey Lake. 11 spms. V. 27 to VII. 10.

16. *S. RAMOSA* Say. Scarce. Hackberry Lake, Trout Lake and Valentine in Cherry Co., Mitchell, and one at Lincoln, without date. 9 spms. VI. 16 to VII. 22.

17. *S. OPACA* Linn. The Department of Entomology has a record of one specimen sent in by Ricksecker. No record is given except that it was taken in Nebraska. The specimen is missing.

18. *CHOLEVA TERMINANS* Lec. Only one specimen. Taken by Henry F. Wickham at West Point in Cuming County, April, 1888.

19. *COLENIS IMPUNCTATA* Lec. One specimen. Cedar Bluffs in Sarpy Co. in April. Collected and identified by H. F. Wickham.

20. *AGATHIDIUM EXIGUUM* Melsh. One specimen, taken at Pine Ridge in July. Collected and identified by H. F. Wickham.

21. *AGLYPTINUS LAEVIS* Lec. Two specimens; both from Ashland, without date. Collected and identified by H. F. Wickham.

INSECT ENEMIES OF SHADE-TREES. By GLENN W. HERRICK, Professor of Economic Entomology in Cornell University. Ithaca, New York, Comstock Publishing Co., Inc. 1935. 8vo, pp. xi, 417, 321 figs. \$5.00.—This book is intended for all persons interested in preserving shade trees. The first chapter therefore appropriately discusses the value of shade-trees and general methods of protection from insect attack. Two lists indicate the comparative value of 26 shade-trees; one by the author shows their susceptibility to insect attack, the other, from Fernow, is founded on several characters of each tree which contribute to its general worth (pp. 4, 5). The positions in the two lists of the same tree are mostly very different. Spraying apparatus, insecticides and the treatment of weakened trees occupy Chapters II and III. Chapters IV-XXVII treat of the insect enemies of twenty-four chief shade-trees whose names are arranged in alphabetical order, XXVIII of those of smaller trees and shrubs, XXIX of those of evergreens other than pines, while XXX is devoted to some miscel-

laneous insect enemies of trees and shrubs. Judging from the two indexes which close the volume, about 230 species of trees and shrubs and about 700 species of insects and mites are mentioned in more or less detail. Taking Chapter XIX, Insect Enemies of the Oak, as a sample of the book, after briefly discussing the chief species of eastern American oaks, 8 beetles, 15 moths, 12 galls, 3 scales and 1 walking stick are described in their various stages and the means of destroying each are given. To the account of each species, or group of species, references to recent literature are appended. Names only of 8 other beetles, 4 more moths and 3 additional scales and aphids "which may attack oaks" are listed. Most of the illustrations are good and clear. For the text the jacket claims that "only that material is presented which is pertinent to the questions of injury by and control of the insects." This describes well the reading matter. The book appears to be a useful compendium of its subject.—P. P. CALVERT.

Entomological Literature

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

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

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.—Parks, T. H.—Insects on elms. [Ohio St. Univ. Agr. Ext. Serv.] Bull. 172, 32 pp., ill. Uichanco, L. B.—Ourselves as Gullivers in the lilliputian world of insects. [Philip. Agriculturist] 24: 805-810. Warnecke, G.—Über die Konstanz der ökologischen Valenz einer Tierart als Voraussetzung für geographische Untersuchungen. Eine literarhistorische Studie. [17] 53: 203-206.

- ANATOMY, PHYSIOLOGY, ETC.**—**Bialaszewicz, K.**—Recherches sur le metabolisme chimique et energetique pendant le developpement des Insectes. [Kosmos] 58: 21-33. **Blackwelder, R. E.**—Morphology of the coleopterous family Staphylinidae. [Smiths. Misc. Coll.] 94, No. 13: 102, pp., ill. **Bowen, M. F.**—A biometrical study of two morphologically similar species of Trichogramma. [7] 29: 119-125, ill. **Butt, F. H.**—The early embryological development of the parthenogenetic alfalfa snout beetle, *Brachyrhinus ligustici*. [7] 29: 1-10, illus. **Friedl, A.**—Beitrag zur Morphologie von *Caliroa annulipes* (Hymen: Tenthredinidae). [56] 14: 311-317, illus. **Goetze, H.**—*Hemeroampa leucostigma*. Eine Aufzucht aus dem Ei. [18] 49: 515-518. **Herfs, A.**—Oekologisch-physiologische studien an *Anthrenus fasciatus*. [Zoologica, Stuttgart] 34. hft. 90. 95 pp., ill. **Key, K. H. L.**—Observations on rate of growth, coloration, and the abnormal six-instar life-cycle in *Locusta m. migratorioides* (Orthop: Acridid.). [22] 27: 77-85. **Landis, B. J.**—Alimentary canal and malphigian tubules of *Ceratomegilla fuscilabris* (Coleo: Coccinellid.). [7] 29: 15-28, ill. **Lindgren, D. L.**—The respiration of insects in relation to the heating and fumigation of grain [Univ. Minn. Agr. Exp. Sta.] Tech. Bull. 109, 32 pp., ill. **Miller, F. E.**—A histological study of the eye and brain of a one-eyed bee. [7] 29: 66-69, ill. **Nielsen, A.**—Das Eierlegen der Laich und die Larven des 1. Stadiums von *Oligoplectron maculatum* (Trichoptera). [34] 113: 255-266, ill. **Prüffer, J.**—Contribution a la connaissance de l'attraction des males par les femelles chez *Lymantria dispar*. [Kosmos] 58: 157-173, ill. **Raffy, A.**—Les échanges respiratoires des Lepidoptères. Les échanges pendant le vol. Role des ailes et des organes de la circulation. [Ann. Phys. & Physiochim. Biol., Paris] 12: 1-12. **Roonwal, M. L.**—The growth-changes and structure of the egg of the African migratory locust, *Locusta m. migratorioides* (Orthop: Acridid.). [22] 27: 1-14, illus. **Sassuchin, D.**—Zur Morphologie und Dynamik der Entwicklung von *Nuttalia ninense*. [34] 113: 219-226, ill. **Simonetti, V.**—Sul pigmento clorofilloide degli Ortoteri. [Boll. Zool., Turin] 7: 78. **Strelnikov, I. D.**—Effect of the solar radiation and the micro-climate upon the body temperature and behaviour of the larvae of *Locusta migratoria* [Russian]. [Trav. Inst. Zool. Ac. Sci. USSR] 2: 637-733. **Strohl & Köhler.**—Wesen und Bedeutung der Pleiotrope oder Polyphaenie. [Verh. Schweiz. Naturforsch. Ges.] 116: 351-355. **Tate & Vincent.**—The biology of autogenous and anautogenous races of *Culex pipiens*. (Diptera). [116] 28: 115-145. **Tauber & Yeager.**—On the total hemo-

lymph (blood) cell counts of insects. II. Neuroptera, Coleoptera, Lepidoptera and Hymenoptera. [7] 29: 112-118. **Tulloch, G. S.**—The metasternal glands of the ant, *Myrmica rubra*, with special reference to the Golgi bodies and the intracellular canaliculi. [7] 29: 81-84, ill. **Uvarov & Hamilton.**—Phase variation and rate of development in the Algerian race of the migratory locust (*Locusta migratoria*: Orthop: Acridid.). [22] 27: 87-90. **Zurngiebl, L.**—Ueber Missbildungen bei Blattwespen. [Veröff. Deutsch. Kolon. u. Uebersee Mus. Bremen] 1: 199-201, ill.

ARACHNIDA AND MYRIOPODA.—**Chamberlin and Ivie.**—Nearctic spiders of the genus *Wubana*. [7] 29: 85-98, ill. (*). **Viets, K.**—Weitere brasilianische Wassermilben aus dem Staate Pernambuco. [34] 113: 203-218 ill. (*). **Roewer, C. F.**—Zwei myrmecophile Spinnen-Arten Brasiliens. [Veröff. Deutsch. Kolon. u. Uebersee Mus. Bremen] 1: 193-196, ill. (*).

THE SMALLER ORDERS OF INSECTS.—**Bohart, R. M.**—A preliminary study of the genus *Stylops* in California (Strepsiptera). [55] 12: 9-18, illus. (*). **Buxton, P. A.**—Studies on populations on headlice (*Pediculus humanus capitis*) [116] 28: 92-97. **da Costa Lima, A.**—Um novo Tisanoptero praga do abacaxi. [O Campo] Aug., 1935: 43, illus. (S). **Fraser, F. C.**—*Anax imperator* copulating with *Cordulegaster boltoni* (Odonata). [J. Soc. Brit. Ent.] 1: 117. **Gentil, K.**—Die Entstehung der Schillerfarben bei *Chrysopa perla*. [17] 53: 173-175, illus. **Jordan, K.**—Some Siphonaptera from South America. [71] 39: 305-310, ill. (*). **Kennedy, C. H.**—*Epigomphus crepidus* a new Dragonfly from Nayarit, Mexico, with notes on the genus. [7] 29: 126-135, ill. **Kimmins, D. E.**—Synonymic notes on the genera *Chloroperla*, *Isopteryx* and *Isoperla* (Plecoptera). [J. Soc. Brit. Ent.] 1: 121-124, ill. **Mosely, M. E.**—Imaginal Trichoptera apparently feeding. [9] 69: 63. **Pearman, J. V.**—The Taxonomy of the Psocoptera: Preliminary Sketch. [107 B] 5: 58-62.

ORTHOPTERA.—**Bernard, F.**—La ponte et l'eclosion des Ameles. [25] 41: 42-44, illus. **Hubbell, T. H.**—A monographic revision of the genus *Ceutophilus* (Gryllacrididae: Rhabdophorinae). [Univ. Florida Publ., Biol. Ser.] 2: 1-551, ill. (*). **Wakeland & Shull.**—The Mormon Cricket with suggestions for its control. [Univ. Idaho, Coll. Agr. Ext.] Bull. no. 100, 30 pp., ill.

HEMIPTERA.—**Auten and Johnson.**—Some *Erythro-neura* of the obliqua group from Decatur, Georgia. (Cica-

dellid.) [7] 29: 61-65, ill. (*). **Beamer, R. H.**—Two new *Dikraneura* from the southwest. [55] 12: 7-8. **Beamer, R. H.**—The genus *Dicyphonia* (Cicadellid). [103] 9: 66-71, ill. (*). **da Costa Lima, A.**—Um novo "frade," praga do arroz, no Rio Grande do Sul (Pentatomid). [O Campo] Oct., 1935: 16, illus. **DeLong and Caldwell.**—A new genus—Forcipata—and nine new species of Typhlocybinae leafhoppers closely allied to *Dikraneura*. [7] 29: 70-77, ill. **Jaczewski, T.**—Notes on Corixidae. [107 B] 5: 34-43, illus. **McKenzie, H. L.**—Say's Plant Bug, *Chlorochroa sayi* on beets in California. [55] 12: 18. **Ossiannisson, F.**—A new North American species of *Typhlocyba* (Cicadellid.) [28] 57: 10-11, illus. **Swain, R. B.**—An annotated list of the type Cicadellid material in the collections of the Colorado State College, Ft. Collins, Colorado. [103] 9: 49-58.

LEPIDOPTERA.—**Biedermann, R.**—Une forme nouvelle de *Morpho hecuba*. [25] 41: 46-48 (S). **Boy, H. C.**—Eine merkwürdige *Morpho*. [17] 53: 228-230. **da Costa Lima, A.**—"Iscadia Montei," novo noctuideo brasileiro. [O Campo] Jan., 1936: 44-45, illus. **Cristobal, U. L.**—*Laspeyresia molesta* y sus parasitos argentinos. [Rev. Fac. Agr. Univ. La Plata] 20: 140-169, ill. **Evans, W. H.**—Description of a new genus of American Hesperiidæ. [107 B] 5: 55. **Gehlen, B.**—Zwei interessante Sphingiden. [Veröff. Deutsch. Kolon. Uebersee Mus. Bremen] 1: 304, (*). **Heming, F.**—The type of the genus *Actinote* Hubner. (1819) (Lepidoptera Nymphalidæ)—A case for consideration by the International Commission on Zoological Nomenclature. [107 B] 5: 56-57. **Kotzsch, H.**—Ein neuer *Heliconius*. [17] 53: 198-199, illus. **Maheux, G.**—Sur l'introduction recente en Gaspésie de la pyrale des pois. [98] 63: 73-77. **Stichel, H.**—Neue Namen für neotropische Rhopalocera. [Mitt. Deutsch. Ent. Ges.] 6: 63-65.

DIPTERA.—**Borgmeier, T.**—Sobre o cyclo evolutivo de *Chonocephalus*, e uma nova especie de *Melaloncha*, endoparasitica de Abelhas (Phorid.). [30] 2: 255-265, ill. **Chagnon, G.**—Note sur un nouveau Diptere Acalyptere pour Quebec, *Agromyza affinis*. [98] 63: 92. **da Costa Lima, A.**—Um novo parasito endofago de *Mormidea poecila* (Tachinid). [O Campo] June, 1935: 21-22, illus. **Fluke, C. L.**—New Syrphidae from Brazil and Cuba. [103] 9: 59-65, ill. **Hering, M.**—Neue sudamerikanische Bohrfliegen aus dem Stettiner Museum. [60] 96: 225-229, illus. **Maneval, H.**—Renseignements nouveaux sur le genre *Chionea*. (Tipulidæ). [25] 41: 40-42. **de Sousa Lopez, H.**—Um novo gen-

ero de Diptera Acalyptratae e considerações sobre a família Ctenostylidae. [30] 2: 247-253, ill. (S). **Thienemann, A.**—Chironomiden-Metamorphosen. X.—Orthocladius-Dactylocladius. [60] 96: 201-224, illus.

COLEOPTERA.—**da Costa Lima, A.**—Dois novos rincorfas brasileiros. [O Campo] Nov., 1935: 25-26, illus. **Darlington, P. J.**—The species of *Stenomorphus* (Carabid.), with data on heterogony in *S. californicus*. [55] 12: 33-44, illus. (*). **Darlington, P. J.**—Variation and atrophy of flying wings of some Carabid beetles. [7] 29: 136-179, ill. **Gunther, K.**—Notizen über Russelkafer aus Costa Rica. [17] 53: 190-192, illus. (*). **Hinton, H. E.**—Synonymical and other notes on the Dryopidae. [8] 72: 54-58, illus. (*). **Hoffmann, F.**—Beitrag zur Lepidopterenfauna von Sta. Catharina. [17] 53: 206-207; 221-224. **Hopping, R.**—A revision of the genus *Macropogon*. [55] 12: 45-48 (*). **Horn, W.**—Über die erste australische *Prothyma*-Art sowie über die Fauna von Haiti. [2] 32: 22-24, illus. (*). **Hustache, A.**—*Piazurus* nouveaux (Curculionidae). [25] 41: 21-24 (S). **Jordan, K.**—Anthribidae from South America and Africa. [71] 39: 326-339 (*). **Melzer, J.**—Novo Cerambyceidos do Brasil, da Argentina e de Costa Rica. [30] 2: 173-205. **Picard, F.**—Sur un cas d'allotrophie chez *Galerucella nymphaea* [25] 41: 45-46. **Schedl, K. E.**—New Platypodiidae from French Guyana. [Rev. Franc. Ent.] 2: 224-251. **Schmidt, G.**—Beiträge zur Biologie der Aphodinae (Scarabaeid). [60] 96: 293-350. **Seitz, A.**—*Leptinotarsa decemlineata*. [17] 53: 161-166. **Spaeth, F.**—Mitteilungen über neue oder bemerkenswerte Cassidinen aus dem Senckenberg-Museum. [17] 53: 138-140; 170-173; 213-216, illus. **Van Dyke, E. C.**—New species of North American weevils in the family Curculionidae, subfamily Brachyrhinae. [55] 12: 19-32. **Van Dyke, E. C.**—Swarming of *Haltica bimarginata*. [55] 12: 44. **van Emden, F.**—Die Gattungsunterschiede der Hirschaferlarven, ein Beitrag zum natürlichen System der Familie (Lucanid). [60] 96: 178-200, illus. **van Emden, F.**—Bemerkungen zur Klassifikation der Carabidae: Carabini und Harpalinae piliferae. [2] 32: 12-17. **Voris, R.**—The rapid spread of an European Staphylinid in North America. [7] 29: 78-80. **Voss, E.**—Monographie der Rhynchitinen-Tribus Auletini [60] 96: 229-241. (*). **Williams, F. X.**—Two water beetles that lay their eggs in the frothy egg masses of a frog or tree toad. [55] 12: 6-7.

HYMENOPTERA.—**Cockerell, T. D. A.**—Records of western Bees. [40] no. 831, 6 pp. (*). **da Costa Lima, A.**—Novo ichneumonideo parasito de *Papilio anchisiades*. [O Campo] June, 1935: 20-21, illus. **Gussakovskij, V. V.**—

Faune de l'URSS. Insectes Hyménoptères. Chalastogastrea. [Inst. Zool. Acad. Sci. URSS.] (N. S.) no. 1, 453 pp., ill. **Hedicke, H.**—Hyménoptérorum Catalogus, Pars. I: Tiphiidae. 32 p. **Jeannel, R.**—Homochromie et mimétisme. [Rev. Franc. Ent.] 11: 181-186. **Mickel, C. E.**—New species and records of Nearctic Mutillid wasps of the genus *Dasyntilla*. [7] 29: 29-60, ill. **Roman, A.**—The Linnean Ichneumon types of the Stockholm Museum. [28] 57: 1-5, illus. **Ross, H. H.**—The ancestry and wing venation of the Hyménoptera. [7] 29: 99-111, ill. **de Santis, L.**—Un Himénoptero, parasito de la Cochinilla de los citrus, nuevo para la fauna argentina (*Aphytis chrysomphali*). [Rev. Fac. Agr. Univ. Nac. La Plata] 20: 262-271, ill. **Williams, F. X.**—Notes on two Oxybelid wasps in San Francisco, California (Sphecid). [55] 12: 1-6, illus.

SPECIAL NOTICES.—**Animalium cavernarum** catalogus. Ed. B. Wolf. Pub. by W. Junk., Pars. 1-4. Includes cave insects [See Ent. News XLVI, p. 229].

THE BIOLOGY OF MAYFLIES WITH A SYSTEMATIC ACCOUNT OF NORTH AMERICAN SPECIES, by JAMES G. NEEDHAM, JAY R. TRAVER, YIN-CHI HSU, 1st ed., 8 vo., cloth, 759 pp., 40 plates, 1 color plate, 168 figs. Comstock Publishing Co., Ithaca, N. Y., 1935. \$7.50.—The last 25 years have seen a goodly amount of work on the American species of the order Ephemeroptera. Most of it has been of a systematic nature, although there have been a few biological papers. It has been done by relatively few people, most of whom have either ceased their endeavors or now look upon the mayflies as a side-line. Apparently few people have the tenacity to work with a group so difficult to collect, preserve and handle. Throughout this period, Dr. Needham and his students have been faithfully and continuously working with the group, and it is fitting that they should produce the first comprehensive work in mayflies since Eaton's *Revisional Monograph of Recent Ephemeridae or Mayflies* was issued in 1883-87.

The present book consists of two distinct parts: a biological section of 232 pages and a much larger taxonomic section of 527 pages. A more accurate title for the book might have been *The Biology and Taxonomy of the Mayflies*.

The 18 chapters of the biological section are concerned with (1) historical aspects of research on mayflies in North America, (2) life cycle, (3) anatomy and morphology of nymphs and adults, (4) post-embryonic development, (5) eggs and egg-laying habits, (6) taxonomic characters and their significance,

(7) the mayfly thorax and its musculature, (8) adaptations of the nymphs, (9) phylogeny, (10) parasites and other enemies, (11) values and uses, (12) methods of collecting, preserving and rearing. In reality this section represents the work of 5 people. In addition to those parts written by Drs. Needham and Traver, Dr. Osgood Smith contributed the chapter on eggs and egg-laying habits; Dr. Velma Knox wrote the two chapters dealing with the thorax and thoracic musculature of *Hexagenia recurvata*, and Dr. Hsu contributed 6 chapters on anatomy, morphology, and post-embryonic development, using several species of *Heptageniidae*. As is usual when several people contribute to a book, there is great difficulty in achieving a uniform narrative and style. This has been accentuated in the present instance by the fact that Hsu and Knox were working with specific forms, while the others were concerned with the group as a whole.

The sections on taxonomic characters and phylogeny appeal especially to the reviewer, although he does not always agree with the authors. There is a good resumé and discussion of the questions of wing venation and tracheation. The system of names used for venation is a modification of the Comstock-Needham system which the writers feel was in error in locating the median vein and all following veins one triad too far forward in the wing. The triad thus vacated by the median is considered as part of the radial sector. There is now general agreement as to what veins in the wing shall be designated as anals and cubitals. Thus the only debatable point left in mayfly venational nomenclature is that of the name of the triad, which the present authors term the outer fork of the radial sector and which Tillyard and other workers consider to be the anterior median.

Concerning phylogeny, the conclusions reached are that the mayflies are steadily falling behind in their race for survival, and that in their own ways they are specialized far beyond any other group of insects. Needham's theory that the mayflies are not closely related to the Odonata is substantiated by Knox's work on the body wall and musculature of the thorax. She concludes that there is a similarity between the mayflies and certain Neuroptera, the Trichoptera, and the Lepidoptera. It is to be hoped that she will continue her work with other forms such as those of the more generalized genera *Siphonurus* and *Isonychia*.

The taxonomic section, which makes up two-thirds of the book, is primarily the work of Dr. Traver. The order, so far as extant forms are concerned, is divided into 3 families and 17 subfamilies. Geographically North America north of Mexico has been included in this section. Of the 17 subfamilies

only 3 have not at the time of the writing of this book been recorded from this area. Only one subfamily is unique to North America. Forty-seven genera and 507 species are recognized, of which 48 are new. It is interesting to note that in 1907 Banks listed 102 species in his *Catalogue of Neuropteroid Insects*.

Keys are given for families, subfamilies, genera and species. Wherever sufficient information has been available, keys are given for both nymphs and adults. As is to be expected, considerably more is known about the adults than about the immature stages.

Detailed verification tables for the various categories are given and also a complete synonymy for each genus and species. The descriptions of new and redescriptions of old species are well drawn and complete. If any criticisms are to be levelled at this section, they are of omission rather than of commission. One receives the impression that the nymphs have been neglected, especially in the description of the species. Although the type locality is given for new species, it is not included for the old. For each species there is given a list of localities from which specimens have been seen, and the collector's name, but *without* the date of collection. This is a serious omission. Consider the fact that many species have two broods or more per year, that the number of broods probably varies from north to south, that some species emerge in "waves," that some spread out their emergence period over several weeks or months (so far as we know), and that some emerge during only a few days each year, and it can be readily understood why future workers, in trying to untangle complex distributional and taxonomic puzzles, will sorely need the collection dates. Since mayflies live only a couple of days at best, the date of collection also gives the investigator the emergence date.

These criticisms, however, do not detract seriously from the enormous value of the book. Here for the first time the names, descriptions and known distribution of all North American species, along with a clear delineation of the genera, have been brought together into one volume. Anyone that has ever tried to identify mayfly species will fully comprehend the value and worth of such an undertaking. It is also patent that an almost incredible amount of toil and pains has gone into its preparation.

The book is well illustrated with a color plate frontispiece, the pictures of H. A. Hagen, B. D. Walsh, Thomas Say, A. E. Eaton, and A. Vayssiere, 40 text plates and 168 text figures. There is also a complete index and bibliography.—HERMAN T. SPIETH.

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 Cocoons of *Actias luna* and *Automeris io*. Exchange considered. Eggs in season. Virginia Weaver, 822 S. College Ave., Tulsa, Okla.

Geometers Wanted from all parts of United States, for cash or exchange. Edward Guedet, P. O. Box 305, Napa, California.

Wanted—Tabanidae (Horseflies and Deerflies). Exchange, purchase, or for determination. G. B. Fairchild, P. O. Box 272, Mounticello, Fla.

Exchange.—Lepidoptera of the Western United States for rare American or tropical specimens. C. W. Herr, Woodburn, Ore. R-3.

Wanted—Insects in exchange for Japanese insects or to buy. Tell me your wishes. Hiromu Yamamoto, Matsuo-Kozan. Iwategun Iwateken, Japan.

Would like to exchange Southern California insects for any North American Mutillidae (wingless wasps or velvety ants). Curtis Brown, 2950 G St., San Diego, California.

Wanted.—To get in touch with Specialists who will make determinations for a share of our duplicates. We have many undetermined specimens from all parts of Iowa.—H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Wanted.—Communication with anyone who has or is collecting Lepidoptera in Burlington County, New Jersey. Also anyone having a microscope for sale.—E. P. Darlington, New Lisbon, N. J.

Wanted for Cash or Exchange.—North American Butterflies in series especially from type localities and remote places. C. F. dos Passos, Mendham, New Jersey.

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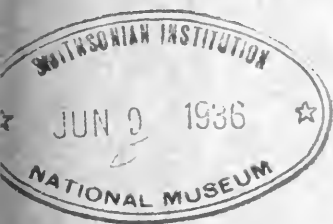
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ENTOMOLOGICAL NEWS

JUNE, 1936

Vol. XLVII

No. 6



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Psocid Habits.

By H. ELLIOTT McCLURE, University of Illinois, Urbana,
Illinois.

(Continued from page 118.)

VARIATIONS IN EGG LAYING.

The insects are capable of changing their methods of laying, but the sequence may not be broken. A female may walk about while laying a group and, although she may encounter other unfinished groups of eggs, she returns to hers with unerring accuracy. The presence of other insects of her kind in the vicinity does not interfere with the sequence, but should something unusual happen or should she become angered or frightened, the sequence is disturbed and freak groups of eggs result. For example: one female laid six eggs, four in one group and two in another. She completely covered the four with the usual silk, making the mat 1.5 millimeters in diameter. The other two were untouched, no silk having been spun over them. Evidently the two eggs laid apart were not the last two eggs laid for if they had been, she probably would have spun over them. In her wanderings during oviposition she must have lost the original eggs and laid the first, or possibly both, of the two. Then she discovered the others and finished laying and spinning over them. Sometimes the eggs are laid on the rough sooty mold, but preferably they must have a smooth surface. Occasionally a female goes crazy and sprays her eggs about, spinning no web whatsoever over any of them.

A still more unusual variation occurred in the laying of one female. After depositing two eggs she began clearing her alimentary canal by a series of excretions totalling twelve in two hours, during which time she took no food. Later the group was finished normally.

Apparently the stimulus which incites the female to spin over the eggs originates in the ovaries. Very seldom are there more than six eggs mature enough to be laid, so that when these are deposited the ovaries or connecting glands stimulate the silk glands to the enormous production necessary for the spinning. This seems to be true, for the aged adults will lay but one egg, or two, or three, thus exhausting their ovaries and then spin the usual mat over the one, two or three. If, however, an adult lays the full quota of six in two groups, only one receives the silk and the other is not covered. Some adults even when fresh are capable of laying only five at a time and do so consistently throughout their lives. Such bizarre exceptions as the one mentioned above wherein the female spreads her eggs and does not spin are not explicable except on the supposition that the adult was completely worn out.

If the adult is rudely interrupted in her spinning dance, she is incapable of resuming the work where she left off, but leaves the eggs partially covered. The insect is so delicate that to disturb it without fear of injury a drop of water was dropped upon it. In this way females could be interrupted during their spinning exercise without injury to themselves and in no case were they able to return to the spinning and finish it.

The embryonic period is from 5 to 9 days, depending upon the external conditions which apparently greatly affect the development.

FURTHER BIOLOGICAL NOTES.

Embryological development, hatching, growth, ecdysis and further biological information on *Ectopsocus* are comprehensively discussed by Miss Wachter (1925), Pearman (1928) and Weber (1931), so that only details and variations will be discussed here.

The oviruptor is borne on the vertex of the head of the embryo. It is colorless, transparent, nearly semicircular in outline and bears 35 to 40 teeth on the outer edge. The most ventral end is slightly knobbed and bears teeth on the side. The structure is about 60 microns long and 12 microns wide at the widest part. On either side is a brace which extends across

the face and down to the eyes. Miss Wachter of California (1925) has followed the hatching of this insect very closely.

The accompanying Table 1 gives the sizes and growth of the nymphs and lengths of the instars. There are from five to six instars depending upon the amount of food available and other conditions. The nymphal life is from 14 to 40 days. Young nymphs are clumsy-footed and gambol among the adults as lambs among the sheep. They trip and bump into their mothers, who do not seem to mind it in the least. The slightest disturbance sends them scurrying pell mell in all directions. The nymphs have the same bulging foreheads as the adults which, with their rather immobile antennae, give them a ram-like appearance.

Table 1. The life cycle of the psocid, *Ectopsocus californicus* Banks, including the duration of the various stages, the sizes and growth of the nymphs and other details.

Stage	Size		Duration
	Length in Millimeters	Width in Millimeters	
Adult	2.4	0.7	15-30 days
Egg-laying period			9-18 days
Laying one egg mass			2 hours
Egg	0.5	0.2	6-9 days
Hatching and shedding of Pronymphal Exuvia			20-40 minutes
1st. instar	0.6	0.2	2-10 days
2nd. Ecdysis			5-10 minutes
2nd. instar	0.8	0.3	2-18 days
3rd. Ecdysis			5-10 minutes
3rd. instar	1.0	0.5	2-7 days
4th. Ecdysis			5-10 minutes
4th. instar	1.2	0.5	2-5 days
5th. Ecdysis			5-10 minutes
5th. instar	1.4 to 1.6	0.6 to 0.65	2-5 days
6th. Ecdysis			5-15 minutes
6th. instar *	1.8	0.7	2-5 days
7th. Ecdysis			12-15 minutes
Adult	2.4	0.7	15-30 days
Nymphs			14-40 days
Life Cycle			30-50 days

* The sixth instar may, in some cases, be the adult, in others an instar immediately preceding the adult. This variation depends upon the individual and the external conditions.

All stages are fastidious, but they can clean their antennae only by stepping on them with a front tarsus and then pulling them out. It is physically impossible for the insects to direct their antennae forward, but they carry them curved to the side or up and back. The feet and legs are cleaned by bending the head under and grasping far up on the femur. Then the leg is drawn through the mandibles as the head is moved forward so that the appendage is thoroughly cleaned with saliva. The adult does not dust the wings.

After each ecdysis there is a reduction in size of the insect, but this is soon regained by feeding. The nymphs are very resistant and can live thirty days without development.

The life cycle of these insects is completed in 30 to 50 days and there are 10 or 12 generations a year in the greenhouse. Under laboratory conditions ten generations were produced in a year, but these conditions were not always favorable to development. Furthermore, during the year the psocids spread in the palm house from a few hundred feeding on the sooty mold on the *Arca* to several thousand feeding on 20 species of plants bearing the mold. Under these conditions the biotic potential of this species about 10^{22} .

No parasites were noted attacking any stage of the psocids.

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Rhectognathus, A New Group in the Lindenius Complex (Hymenoptera: Sphecidae: Crabronini)

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

There is before me a short series of small Crabronine wasps which represent a new group closely allied to the old world *Encopognathus*. They are particularly interesting in that they exhibit certain features that parallel in some measure those possessed by the more primitive members of the Oxybelini and while probably not ancestral to this group, nevertheless, offer a suggestion as to what that original and probably now extinct stock may have been like.

RHECTOGNATHUS¹ new subgenus.

Head with mandibles simple and acute apically, strongly excised beneath, internally bidentate on basal half; eyes naked; antennal sockets distant, the distance between them almost twice the distance between them and the nearest eye margin; antennae of both sexes 12-segmented, the pedicel and the first and second flagellar segments subequal in length, scapes compressed and evenly, arcuately, inwardly bowed—strongly so in the male, weakly in female; ocelli arranged in a very flat triangle; maxillary palpi 6-segmented, labial 4-segmented. Females with a well developed psammophore.

Thorax subtly punctured; mesopleura rounded anteriorly, not sharply margined (i.e. without an epicnemium), smooth, shining, and finely punctate; mesepisterna without a precoxal carina before the middle coxae; suture between the mesonotum and the scutellum simple, not dilated laterally; middle tibiae with one small calcaria apically.

Wings with the marginal cell of the fore wing rather long, squarely truncate apically, the transverse cubital vein distinctly angulate, perpendicular above, sharply inclined basad below to cubitus, joining the radius about middle of marginal cell, recurrent vein joining cubitus about middle and not causing it to be appreciably angled backward; first discoidal cell trapezoidal. Anal lobe of hind wings not longer than the submedian cell.

Abdomen depressed; first and second segments broadly sessile; first and second tergites with a sharp edge laterally as in *Belomicrus* and somewhat inflexed, remaining tergites inflexed

¹ ῥηκτος, broken + νπαθος, jaw, in allusion to the structure of the mandibles.

but without sharp margins laterally; pygidial area present in both sexes; first three sternites flatly convex, remainder flatly concave.

Genotype: *Encopognathus* (*Rhectognathus*) *pectinatus* new species.

Encopognathus (**Rhectognathus**) **pectinatus** new species.

♂. Length 5 mm. Black with a nigrocaeruleous tinge particularly on face; the following light yellow: scapes, pedicel and flagellum anteriorly and beneath, save the last segment of the last which is abruptly entirely black; pronotal tubercles; post-scutellum; fore femora with a stripe beneath, middle femora with a stripe anteriorly, all tibiae and tarsi. Abdomen with the first two segments black basally, apical half orange-rufous, remainder of abdomen orange-rufous. Clypeus and lower part of the front with appressed silvery pubescence; upper portion of face and vertex with very short, erect, rather sparse pile. Thorax with short sparse, suberect pubescence. Abdomen with sparse decumbent aeneous pubescence longer than that of thorax. Wings hyaline with a fuscons tinge; veins brown.

Head shining, finely, subtly punctured; clypeus medio-apically truncate and with a very flat, transverse, triangular, shining, impunctate bevel; scapes strongly compressed, strongly and evenly bowed inwardly, anteriorly with a longitudinal keel; pedicel and flagellum strongly compressed, the pedicel and the first flagellar segment strongly pectinate apically, the pedicel and the first and second flagellar articles subequal in length, the last flagellar segment strongly flattened and subspatulate; a short median longitudinal impressed line from the anterior ocellus; ocellar line about one and one-half times the length of the ocellular line.

Thorax shining, with fine subtle puncturation; pronotum rounded anteriorly, not carinate, dorsally with a narrow, transverse shallow groove, semicircularly excised medially; mesonotum with puncturation similar to front but closer; mesopleura shining, anteriorly with sparse, fine puncturation, posteriorly along with the metapleura highly polished and impunctate; scutellum finely striato-punctate; postscutellum strongly convex, anterior margin strongly concave. Propodeum finely, irregularly, clathrately rugulose throughout, with the dorsal triangular area poorly defined, posterior face with a distinct pyriform median fovea which is smooth and shining within. Anterior tarsi with the first segment as long or longer than the remaining segments and somewhat flattened and distorted; middle tarsi with the first segment strongly bowed, subequal in length to the remaining

segments; hind tarsi with the first segment thickened and subequal in length to the remaining segments; middle and hind tibiae thickened apically and minutely spinose externally.

Abdomen depressed, cordiform, shining, with very fine, well separated, regularly disposed punctures; pygidium flat, subtriangular, the apex broadly rounded, beset with coarse, scattered punctures; second and third sternites flatly convex, remainder shallowly concave, the lateral margins of the tergites folded under to the ventral surface and imbricate with the lateral margins of the sternites.

♀. Length 6.5 mm. Black; the following light yellow: scapes, pedicel and flagellum beneath; pronotum dorsally on each side of the median excision with a short, narrow, transverse line, the tubercles; tegulae anteriorly and the axillary sclerites; posterior margin of the scutellum with a narrow line interrupted medially; postscutellum; fourth abdominal tergite with a narrow, indistinct, preapical fascia; fifth tergite with a broader, distinct preapical fascia; last tergite entirely, inflexed ventral portions of the fourth and fifth tergites; all tibiae and tarsi; fore femora save posterior basal half, middle and hind femora apically. The following fulvofuscous: mandibles medially; clypeus discally; pedicel and flagellum above; apical margins of the first three abdominal tergites. Clypeus except the triangular bevelate area, and the lower part of the front with appressed silvery pubescence; upper half of face and vertex with short, dark, erect, pubescence; abdomen with decumbent, rather sparse, aeneous pile.

Head with the face, save for the nitidous antennal scrobes, subopaque, and finely, semiconfluently acupunctate, temples aciculate; the scape not as strongly bowed as in the male, the anterior longitudinal keel very weak, pedicel but not the flagellum compressed as in the male, the pedicel and the first flagellar article simple, not pectinate: clypeus discally to apex with an equilateral triangular, shining, highly polished, impunctate bevelate area, medioapically truncate and 7-dentate; mandibular and temporal amochætæ well developed.

Thorax similar to that of the male, the puncturation of the mesonotum, however, closer, and the scutellum aciculate; humeral, trochanteral, femoral and tibial amochætæ well developed, the tibiae with a series on the fore as well as on the hind margin; a short tarsal comb present on fore tarsi which are flattened. Propodeum with the dorsal, posterior and caudal portion of the lateral faces shining and transversely, finely striate, the triangular dorsal enclosure and the median fovea of

the posterior face obsolescent. Legs similar to male but the spination of the middle and hind tibiae stronger.

Abdomen similar to male; pygidium triangular, the apex acute, beset with coarse scattered punctures.

Holotype.—♂, Claremont, CALIFORNIA (C. F. Baker) [Cornell University Type No. 1405]. *Allotype*.—♀, (same data as type). *Paratypes*.—3 ♂♂, Bryson, CALIFORNIA, April 25, 1917 (E. P. Van Duzee).

The closest allies of *Rhctognathus* are to be found in the old world Mediterranean and Æthiopian *Encopognathus* group with which it agrees in the characteristic venation of the fore wing and the naked eyes, but differs in possessing subtle puncturation and sculpture and in lacking an epicnemium and a precoxal carina on the mesepisterna before the middle coxae. Specimens of *Encopognathus* are very rare in collections and while a number of species have been described, these are known mainly only from the females. Kohl, however, in his monograph of the Palearctic Crabrones, notes the fact that he has before him a male² of an undescribed Indian species but does not state how many segments it has in the antennae, and I have consequently assumed that the males of *Encopognathus* possess the normal number of thirteen. In the Nearctic species before me, *Rhctognathus pectinatus*, the males have only twelve segments in the antennae, which will further serve to differentiate the *Rhctognathus* group from *Encopognathus*.

Kohl and various other authors consider *Entomognathus* and *Encopognathus* as merely subgenera of *Lindenius*. However, I believe that those groups in which the mandibles are excised beneath should be accorded a rank co-ordinate with that of *Lindenius*. Moreover, at present, I consider that the group with hairy eyes—*Entomognathus*—should be ranked as a genus distinct from those with naked eyes—*Encopognathus* and *Entomocrabro*. An unique female from the Putomayo or Rio Pachitea district of Peru before me agrees very well with Kohl's descriptions and figures of *Entomocrabro*,³ save that the first discoidal cell has a tendency to be trapezoidal rather than

² Ann. k. k. naturhist. Hofmus. Wien, 1915, xxix: 320.

rhomboidal. Until I have had an opportunity, consequently, to see more material of this group, particularly of the males, I regard it tentatively as a distinct genus closely allied to *Rhectognathus* and somewhat annectant between it and *Entomognathus*. I have seen no material of *Encopognathus* and know it only from the descriptions and figures of Kohl⁴ and Arnold,⁵ but as indicated above, it is indubitably very closely allied to *Rhectognathus* which may best be considered as only a subgenus of it.

At first glance, *Karossia* described by Arnold⁶ for a unique female from South Africa might be thought to belong to this group. However, Arnold states that the middle tibiae have two calcaria apically and I therefore think that because of this and certain other features it exhibits that it should be accorded tribal rank. The Karossiini apparently are rather generalized forms and no doubt represent a surviving remnant of that primitive stock from which have arisen two divergent lines, the Crabronines proper and the Oxybelines.

Nothing is known of the ethology of either *Encopognathus* or *Rhectognathus*, but from the well developed psammophore of the female in the latter, this group probably build their nests in sandy soil or dry ground, excavating their burrows in a manner similar to that of *Belomicrus* and *Anacrabro*.

Until further material is forthcoming, the following key will serve to distinguish the various groups of this complex.

A. Middle tibiae with two apical spurs; mandibles excised beneath; South African forms,

KAROSSINI: *Karossia* Arnold.

—Middle tibiae with one or no apical spurs. . . . CRABRONINI: 1.

1. Abdominal tergites abruptly flexed under at the sides so that the ventral and dorsal portions of the tergites form a sharp edge at their junction; sternites flat or concave; New World forms. *Anacrabro* Packard.

—Abdominal tergites not abruptly flexed under at the sides, at most with only the first two with a sharp edge laterally;

³Verh. Zool. Bot. Ges. Wien, 1905, iv: 356.

⁴Ann. k. k. naturhist. Hofmus, Wien, 1896, xi: 486.

⁵Ann. Transvaal Mus. 1926, xi: 345.

⁶Ann. Transvaal Mus. 1929, xiii: 409.

- sternites more or less convex.....2.
2. Mandibles simple and acute apically; ocelli arranged in a flat triangle; a distinct pygidial area present in both sexes.3.
- Mandibles bidentate, tridentate, or blunt and obliquely truncate apically; ocelli usually not arranged in quite so flat a triangle; a distinct pygidial area usually not present in the males*Crabroncs ceteri*.
3. Mandibles entire beneath; eyes naked; mesepisterna without a precoxal carina before the middle coxae,
- Lindenius* Le Peletier.
- Mandibles excised beneath4.
4. Eyes hairy; mesepisterna without a precoxal carina before the middle coxae; marginal cell of the fore wing elongate, the transverse cubital vein straight and inclined, the recurrent vein joining the cubitus distinctly beyond the middle and not causing it to be angled appreciably backward; anal lobe of the hind wing longer than the short submedian cell; abdominal tergites 2-5 (and 6 in the males) basally with a transverse furrow which curves caudad laterally and runs parallel to the lateral margins, basal portion covered by the preceding tergite, the lateral portions visible.....*Entomognathus* Dahlbom.
- Eyes naked; anal lobe of the hind wing shorter than the submedian cell; abdominal tergites not so constructed...5.
5. Marginal cell of fore wing short, the transverse cubital vein straight and inclined, joining the radial vein distinctly before the middle of the marginal cell; recurrent vein joining the cubitus distinctly before the middle and causing it to be appreciably angled backward; first discoidal cell rhomboidal; mesepisterna without a precoxal carina before the middle coxae and with a horizontal longitudinal foveolate furrow from the foveolate episternal suture to meso-metapleural suture just above the middle coxae; eyes at the level of the antennal sockets close together, sculpture and puncturation fine; Neotropical forms*Entomocrabro* Kohl.
- Marginal cell of fore wing longer, the transverse cubital vein distinctly angulate, the upper portion perpendicular, the lower part sharply inclined to cubitus, joining the radius about the middle of marginal cell; recurrent vein joining cubitus about at middle and not causing it to be appreciably angled backward; first discoidal cell trapezoidal;

eyes not so close together at the level of the antennal sockets *Encopognathus* Kohl.

Subgenera of *Encopognathus*.

Head and thorax coarsely sculptured; mesepisterna sharply margined anteriorly (i.e. with an epinenium), and with a precoxal carina before the middle coxae; males with 13-segmented antennae; Old World forms,

Encopognathus Kohl.

Head and thorax subtly punctured at most; mesepisterna rounded anteriorly, without a sharp margin, and without a precoxal carina before the middle coxae; males with 12-segmented antennae; females with a psammophore; New World forms..... *Rhctognathus* new subgenus.

New Organization for Amateur Entomologists.

In the March issue of *Hobbies* magazine appeared an extensive article on butterflies, by Frank Clay Cross, together with an advertisement announcing the formation of a new organization for amateur entomologists. The aims of the new group, which is known as the Entomologists' Exchange Association, are as follows:

1. To foster a more scientific attitude toward the study of butterflies, moths, beetles and other insects by amateur collectors throughout boreal America, and to encourage more persons to become purposeful collectors, to the end that our knowledge of the various species may be extended by more widespread and intensive research.

2. To assist amateur collectors with appropriate information, and in the identification of specimens.

3. To facilitate the exchange of entomological specimens among collectors, both amateur and professional, in various parts of North America.

While the Entomologists' Exchange Association is primarily to help amateur collectors, professional entomologists are also invited to participate in its activities, and to cooperate with its organizers in accomplishing the aims which have been set for it. It is a purely non-profit organization. Inquiries and offers of assistance should be addressed to Frank C. Cross, 1362 Race Street, Denver, Colorado.

Some Notes and Records of Minnesota Orthoptera.

By WM. C. STEHR, Ohio University, Athens, Ohio.

During the late summer of both 1934 and 1935 the writer made some observations and collections of Orthoptera in western and northern Minnesota which are perhaps worth recording. In 1934 five weeks were spent in Odessa and Artichoke Townships, in Big Stone County, where the extreme drought had practically ruined all crops. The chief vegetation in the fields and pastures in August and September was Russian thistle, *Salsola kali* var. *tenuifolia* G. F. W. Mey. Prairie grasses were present only in areas that had not been cultivated for years or had never been brought into cultivation. Other weeds and grasses were evident only near runs and depressions where slightly more moisture was available. Small grains had been cut or pastured and corn was a complete failure. In most places half or less of the soil surface was covered by vegetation. Orthoptera, principally Acrididae, were abundant. After each trip into the field notes were made as to the species encountered and their relative abundance. Examination of these notes shows that the following were the commonest species. They are listed in order of their abundance: *Melanoplus gladstoni* (Scudder), *Ageneotettix deorum deorum* (Scudder), *Melanoplus mexicanus mexicanus* Saussure, *Trachyrachis kiozwa kiozwa* (Thomas), *Camnula pellucida* (Scudder). Eighteen other species of Orthoptera were present but none of them were so generally widespread over the areas examined.

In 1935 five weeks were again spent in this area at approximately the same time of year. Much more rain had fallen during the preceding months although a six-week drought in the latter part of July and the first three weeks of August had injured crops and other vegetation severely in the region. However Russian thistle had been replaced to a large degree by rag-weeds and other plants which normally take possession of more or less barren areas of roadsides and pastures and of stubble fields. The Orthoptera were not as abundant as in the preced-

¹ Paper No. 10, from the Department of Biology, Ohio University, Athens, Ohio.

ing year, but more species were encountered. They were evidently somewhat later in reaching maturity, since many more nymphs were noted in the fields. *Melanoplus gladstoni* (Scudder) was still the most abundant species present, but the order of abundance of other species had changed considerably. *Melanoplus mexicanus mexicanus* Saussure and *Melanoplus femur-rubrum femur-rubrum* (DeGeer) were both widespread and very abundant. *Arphia pseudonictana pseudonictana* (Thomas), *Ageneotettix deorum deorum* (Scudder), *Orphulella speciosa* Scudder, and *Spharagemon collaris* (Scudder) followed in abundance in the order named. *Trachyrachis kiozca kiozca* (Thomas) was much less numerous and of *Cannula pellucida* (Scudder) only five individuals were seen in the area in 1935. Two species of Tettigoniidae, *Conocephalus fasciatus fasciatus* (DeGeer) and *Conocephalus saltans* (Scudder) were found in small numbers. *Gryllus assimilis* Fabr. and several species of *Occanthus* were more numerous than in 1934. Altogether 32 species were collected in 1935, including all but one of those found in 1934. The records of the two seasons show that the less xeric species had fared much better in 1935 than in 1934 and that the opposite is true of at least some of the truly xeric species. The changes in the Orthopteran fauna of these townships from 1934 to 1935 emphasize the importance of changing weather conditions upon populations of these insects.

In 1935 a few collections were also made in northern Minnesota. Altogether 49 of the 129 species and races recorded by Hebard ('32) for Minnesota were taken in the areas visited. It is not worth while to publish all of the records in detail, but the following may be of interest for one or more of the reasons here given: new records for the state, rarity in Minnesota, paucity of published records, extension of range in the state, or filling of gaps in published records of the range.

PHASMIDAE.

Diapheromera velici velici Walsh. Odessa township, Big Stone County, 1 ♂ 8-28-28.

ACRIDIDAE.

ACRYDIUM ARENOSUM ANGUSTUM (Hancock). Big Falls 3 ♂, 3 ♀ 8-30-'35, and Little Fork, 3 ♂, 3 ♀ 8-30-'35 in Koo-

chiching County. With the exception of Somes' ('14) record from Warroad, these records are far north of others published for the state.

PSEUDOPOMALA BRACHYPTERA (Scudder). Artichoke Township, Big Stone County, 3 ♂ 9-7-'35, 5 ♂, 5 ♀ 9-12-'35. These are the first records for this region since 1900.

OPEIA OBSCURA (Thomas). Odessa and Artichoke Twmps., Big Stone Co., 19 ♂, 20 ♀ 8-17 to 9-13, '34 and '35. This Great Plains species is not abundant but is met with frequently in places where the finer native prairie grasses remain.

NEOPODISMOPSIS ABDOMINALIS (Thomas). Bemidji 7 ♂, 4 ♀ 8-29-'35; Park Rapids 4 ♂, 3 ♀ 8-28-'35; Laurel, Koochiching Co. 1 ♀ 8-30-'35. One male and some nymphs reported from Bemidji by Somes and a juv. male recorded from Greenbush by Hebard are the only other records from Minnesota. The Park Rapids record extends the range southward about 50 miles and the Laurel record extends it eastward in the state about 100 miles.

AGENEOTETIX DEORUM DEORUM (Scudder). Park Rapids 2 ♂ 8-28-'35. This extends the range eastward in this latitude.

ENCOPTOLOPHUS SORDIDUS COSTALIS (Scudder). Odessa Twp. Big Stone Co. 1 ♀ 8-17-'35, 1 ♀ 9-13-'35; Artichoke Twp. Big Stone Co. 2 ♂ 9-5-'35; 1 ♀ 8-19-'35. Only six specimens of this species have been recorded from the state previously, half of them from Beardsley and Brown's Valley, both in Big Stone Co. These specimens are perfectly distinct from *E. sordidus sordidus* (Burm.) which is quite common in this area. The smoother appearance, more distinct and more solid maculation of the tegmina, and very bluish tibiae make them readily recognizable when placed beside a series of that race.

PARDALOPHORA HALDEMANNII (Scudder). Anoka County (sand), 1 ♂ 5-28-'28; Odessa Twp. Big Stone Co. 1 ♀ 8-16-'34. The latter specimen was an exhausted female barely able to crawl and very badly worn when captured, evidently a rather late survivor.

SPHARAGEMON COLLARE (Scudder). Big Falls, Koochiching Co. 1 ♂ 8-30-'35; Park Rapids 4 ♂, 4 ♀ 8-28-'35. Cass Lake is the only other record from the north central woods area.

MELANOPLUS MANCUS ISLANDICUS Blatchley. Little Fork 3 ♂, 7 ♀ 8-30-'35, and Big Falls 1 ♀ 8-30-'35, in Koochiching County. These records extend the range westward in northern Minnesota.

M. DIFFERENTIALIS (Thomas). This species was common among the rank vegetation of glacial depressions in Big Stone

Co. in 1935. A melanistic form sometimes occurs with the typical form. The following are records of females entirely black except for two yellowish bars on each femur. Odessa Twnp. 1 ♀ 9-4-'35; Artichoke Twnp. 1 ♀ 9-12-'35.

M. DAWSONI (Scudder). The brachypterous form is common in western Minnesota but macropterous individuals are rare. Odessa Twnp. Big Stone Co. 1 mac. ♂ 8-19-'35, 1 mac. ♀ 9-13-'35.

M. INFANTILIS Scudder. This species is rare in Minnesota. Odessa Twnp., 1 ♀ 8-19-'35, and Artichoke Twnp., 1 ♀ 9-5-'35, in Big Stone County.

M. BRUNERI Scudder. Park Rapids 3 ♂, 4 ♀ 8-28-'35; Bemidji 2 ♂ 8-29-'35; Big Falls 1 ♂ 8-30-'35, and Laurel 1 ♂ 8-30-'35 in Koochiching County; Midland, Crow Wing Co. 1 ♀ 8-31-'35. These records show that Hebard's prediction that this species should be found over nearly all of the northern coniferous area of Minnesota is correct.

M. KEELERI LURIDUS (Dodge). Park Rapids 9 ♂, 12 ♀ 8-28-'35; Bemidji 3 ♂, 7 ♀ 8-29-'35; Big Falls 1 ♀ 8-30-'35; Little Fork 1 ♀ 8-30-'35, and Laurel 1 ♂, 3 ♀ 8-30-'35, Koochiching County. These records extend the range of this species practically to the Canadian border in north central Minnesota.

M. PACKARDII Scudder. This species occurs only in extreme western Minnesota and is rather rare there. Odessa Twnp., 1 ♂, 2 ♀ 8-23-'34, 1 ♂, 1 ♀ 8-17-'35, 1 ♂, 2 ♀ 8-26-'35, and Artichoke Twnp. 1 ♀ 8-27-'34, Big Stone County.

PHOETALIOTES NEBRASCENSIS (Thomas). Odessa Twnp. Big Stone Co. 3 macropterous ♂ 9-13-'35. Macropterous individuals are rare in Minnesota although the brachypterous form is rather common.

GRYLLIDAE.

NEMOBIUS CAROLINUS BREVICAUDUS Bruner. Odessa Twnp., 1 ♀ 8-18-'34, 2 ♂, 3 ♀ 8-21-'34, 1 ♀ 8-23-'34, 1 juv. ♂, 2 juv. ♀, 4 ♀ 8-26-'35, 4 ♀ 8-27-'35, and Artichoke Twnp. 2 ♂, 2 ♀ 9-4-'35; 2 ♂, 1 juv. ♀, 4 ♀ 9-5-'35, Big Stone County. These are the first records of this western cricket from Minnesota. The author is indebted to Mr. E. S. Thomas of Columbus, Ohio, and to Dr. B. B. Fulton of North Carolina State College for assistance in the identification of this species. One of the Odessa Twnp. specimens (♀) is macropterous.

OECANTHUS NIGRICORNIS NIGRICORNIS F. Walker. Artichoke Twnp. Big Stone Co. 1 ♀ 9-5-'35. This is a westward extension of the range of the species in Minnesota.

OE. NIGRICORNIS ARGENTINUS Saussure. This species was

recently reported from Minnesota for the first time by Hebard ('32). Odessa and Artichoke Twmps. Big Stone Co. 9 ♂, 15 ♀ 8-20 to 9-5, '34 and '35.

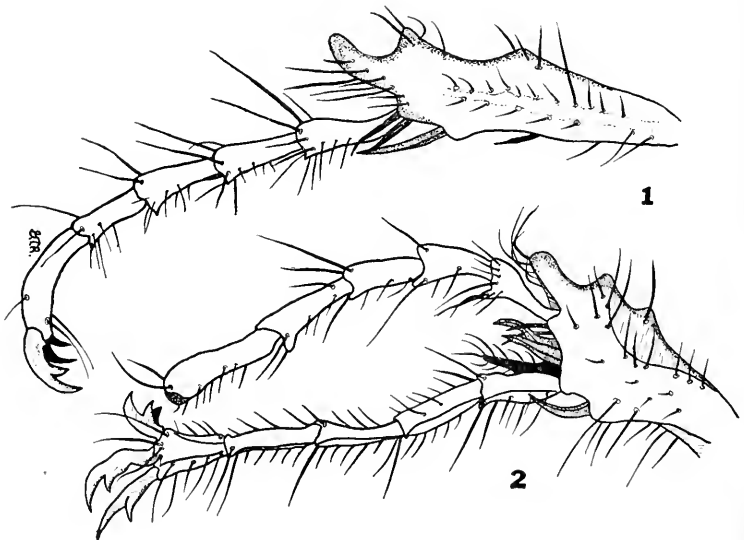
OE. NIGRICORNIS QUADRIPUNCTATUS Beutenmüller. Big Falls, Koochiching Co., 1 ♂ 8-30-'35. This record is far north of the previously published records for the state.

An Insect with Seven Tarsi (Coleop.: Scarabaeidae).

Monstrosities among insects are one of the rewards of the student who examines large numbers of specimens. The accompanying figures illustrate a peculiar condition of this kind, figure 1 showing the normal tarsus of this species and figure 2 the monstrosity.

A male specimen of *Phyllophaga futilis* Lec. with an abnormally developed right front leg was taken with others of the same genus near lights in State Park 47, Western Springs, Illinois, during the last week of June, 1935.

The tibia of the deformed leg is shorter than normal, and twisted. It has three tibial spurs instead of one. Two tarsi of the normal number of five segments are borne on this right front leg (Fig. 2). One tarsus has three tarsal claws instead of two, the third one bearing an extra point. There are no claws on the other tarsus.—GARLAND T. RIEGEL, Champaign, Illinois.



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

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annales Sci. Naturelles, Zoologie, Paris.
4. Canadian Entomologist. London, Canada.
5. Pysche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
15. Annales Academia Brasileira de Ciencias. Rio de Janeiro.
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 Lab. di Zool. gen. e agraria della Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
26. Entomologischer Anzeiger, hersg. Adolf Hoffmann. Wien, Austria.
27. Bollettino della Societa Entomologica Italiana. Genova.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. Archivos do Instituto de Biologia Vegetal, R. d. Janeiro.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janeiro. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles.
34. Zoologischer Anzeiger, hrsrg. v. E. Korschelt. Leipzig.
35. The Annals of Applied Biology. Cambridge, England.
36. Trans. Royal Entomological Society, London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chilena 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, hrsrg. 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". Dresden.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
66. Report of the Proceedings of the Entomological Meeting. Pusa, India.
67. **University of California Publications, Entomology.** Berkeley, Cal.
68. Science. New York.
69. Physis. Revista Soc. Argentina Cien. Nat. Buenos Aires.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
73. Mem. Instituto Butantan. Sao Paulo, Brazil.
74. Sbornik entomolog. národního musea v Praze. Prague, Czechoslovakia.
75. Annals and Magazine of Natural History. London.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
80. Lepidopterologische Rundschau, hrsg. Adolf Hoffmann. Wien.
82. **Bulletin, Division of the Natural History Survey.** Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. **Ecology. Brooklyn.**
85. Genetics. Princeton, New Jersey.
87. Archiv für Entwicklungsmechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
96. Biologisches Zentralblatt. Leipzig.
97. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
99. Mélanges exotico-entomologiques, Par Maurice Pic. Moulins, France.
100. Bulletin Intern., Acad. Polonaise Sci. et Lett. Cracovic.
101. Tijdschrift voor entomologie. Nederland. Ent. Ver., Amsterdam.
102. Entomologiske Meddelelser, Entomologisk Forening, Copenhagen.
103. Journal of the Kansas Entomological Society, Lawrence, Kansas
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista Entomologia, Sao Paulo, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Proc., Royal Entomological Society, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten über morpholog. und taxonom. ent. aus Berlin-Dahlem.
110. Arbeiten über physiolog. u. angewandte ent. aus Berlin-Dahlem.
111. Memórias do Instituto Oswaldo Cruz. Rio de Janeiro.
112. Anales del Instituto de Biologia Mexico.
113. Entomologische Beihefte aus Berlin Dahlem.
114. Occasional Papers of the Museum of Zoology, University of Michigan.
115. Memórias de la Soc. Cubana de Hist. Nat. Havana, Cuba.
116. Parasitology. Ed. Keilin and Hindle. London.

Entomological Literature

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

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

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.—**Benjamin, F. H.**—Obituary by Muesebeck & Heinrich. [10] 38: 25-26, ill. Obituary by G. P. Englehardt. [19] 31: 48. **Caudell, A.**—In Memoriam by Howard & Busck. [10] 38: 33-47, ill. **Englehardt, G. P.**—The desert in bloom. [19] 31: 49-56. **Frost, S. W.**—Ancient Artizans. The Wonders of the Insect World. Van Press, Boston, 1936. 295 pp., ill. **Harkema, R.**—The parasites of some N. Carolina rodents. [Ecol. Mon.] 6: 153-218. **Neave, S. A.**—The Relations between mankind and the insect world. [107 A] 10: 112-121. **Samson, E.**—Étalage des papillons avec des presses en verre. [Bul. Soc. Linn. Lyon] 4: 61-64, ill. **de la Torre Bueno, J. R.**—Nationalistic science. [19] 31: 78.

ANATOMY, PHYSIOLOGY, ETC.—**Abbott, C. E.**—On the olfactory powers of a necrophilous beetle (Staphy.). [19] 31: 73-75. **Abercrombie, W. F.**—Studies on cell number and the progression factor in the growth of Japanese beetle larvae (*Popillia japonica*). [Journ. Morph.] 59: 91-112, ill. **Ahrens, W.**—Monographie des weiblichen geschlechtsapparates der termiten. [Jenais. Zeit. Naturw.] 70: 223-306, ill. **Alpatov, W. W.**—Contribution to the study of the variation in the honeybee. IV. The Egyptian honeybee and its position among other bees. [Bull. Soc. Nat. Moscow] (Biol.). 44: 290-292. **Becker & Roudabush.**—Brief directions in histological technique. Collegiate Press,

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SPECIAL NOTICES.—Revision der Australischen Acridiideen. 2. Monographie von Y. Sjostedt. [K. Sven. Vet. Akad. Handl.] (3). xv. No. 2, 191 pp., ill. Ward's *Entomological Bulletin*. Vol. 3, nos. 6-7. Contains articles on: Type specimens: How to make acetate mounts; Pin labels, A killing light trap, A killing box, New prices on equipment and supplies and other notes.

A MONOGRAPHIC REVISION OF THE GENUS *CEUTHOPHILUS* by T. H. HUBBELL, University of Florida Publications, Biological Societies Ser., II, pp. 1-551, 39 plates.—This superb study of the second largest North American genus of the Orthoptera appeared on January 25th, 1936. It is, in my opinion, easily

one of the most complete and accurate of the larger monographs which have been published for the Order. Such is largely due to the deliberate and thorough manner in which the work has been done.

The great majority of the species of *Ceuthophilus* occur in the United States and southern Canada, only a very few being known from northern Mexico. Sixteen years have elapsed since the author began assembling and studying the 17430 specimens, among which he finds that 89 species and races are represented. During this time he was able to accomplish much difficult and intensive field work in the southern and eastern United States. All the members of the genus are soberly colored, flightless, make no sound and are nocturnal, hiding during the day and being consequently much more difficult to secure when general collecting is being done (except by trapping) than most forms of the Orthoptera. As a result the author frankly states that "Eventually the genus *Ceuthophilus* may be increased to half again or even twice its present size." The fact remains that he has so thoroughly characterized so large a number of species and races there should henceforward be no uncertainty as to the identity of material or at least as to its nearest known relatives. Hitherto identification of material from the literature has been always difficult, sometimes impossible.

Scudder in 1894 revised the genus, recognizing 57 species, many of which have been proved, or are now shown, to be synonymous. This was largely due to his reliance on unreliable characters, failure to recognize immatures as such, very poorly preserved material and the fact that, at that time, the very great importance of genitalic specialization was unrecognized. The resultant situation was so chaotic that, until now, it has been impossible to bring much order out of the existing confusion.

Hubbell's discovery of the distinctive specialization of the male pseudosternite is of primary importance. Though dissection is usually necessary, this organ shows diagnostic characters for the great majority of the species and is here for the first time thoroughly discussed and figured in all cases where this has been possible. Next in importance are the characters found in the male terminal tergites and subgenital plate and these have also been studied and illustrated in a most satisfactory manner. The descriptions of general structure and coloration are splendidly supplemented by discussions of individual variation. These analyses are particularly important in distinguishing females, the genitalia of which though also very fully discussed and figured, are vastly less valuable for diagnostic purposes than those of the opposite sex.

Maps showing the known distribution for each species appear on twelve plates. In a genus which includes so many species, they aid greatly in forming a general concept of the distributional factor, the importance of which has so often been undervalued. Keys for both sexes have been furnished, but in so large an aggregation of species, many of which are decidedly variable, no specimen should be determined from them without recourse to all other data.

The general discussion of the genus is masterly, the related North and Central American genera of the Rhaphidophorinae are carefully analyzed as well as the tribes of that subfamily and also the subfamilies of the Gryllacrididae.

The differentiation between "spines," "spurs" and "calcars" is clear. We would have preferred "moveable spines" for the second category and "spurs" for the third and we further agree with Caudell that three pairs of distal spurs (or calcars) should be recognized. In our opinion the use of "neotype," "plesio-type" and "plesiallotype" is not advisable, "specimen here described" being sufficient and self-explanatory.

Having for several years had the privilege of using the preliminary manuscript of this splendid work, we can state with certainty that it will prove to be of enormous value to all interested in the subject.

MORGAN HEBARD.

AN ABRIDGED CATALOGUE OF CERTAIN SCUTELLEROIDEA (PLATASPIDAE, SCUTELLERIDAE, AND PENTATOMIDAE) OF CHINA, CHOSEN, INDO-CHINA, AND TAIWAN, BY WILLIAM E. HOFFMANN. Lingnan University Science Bulletin, No. 7, 294 pp., Canton, China, issued August 21, 1935. Price \$1.50 Mexican. —Designed as a supplement to Kirkaldy's "Catalogue of the Hemiptera" 1909, one finds the style reminiscent of that noted contribution. The form of citations for synonymy and distribution, with brief notes, is a distinct improvement over the older work and provides a model which later cataloguers would do well to follow. The present work catalogues 448 species and 32 varieties placed in 153 genera of the families Plataspidae, Scutelleridae and Pentatomidae. Of this number eleven genera and 86 species represent new forms described since the appearance of Kirkaldy's catalogue. Included is an annotated bibliography of 540 titles which should prove useful to students with limited library facilities. Appendix I deals with the faunal subregions of Eastern Asia, includes a sketch map, also discussion of distribution with species grouped in tabular form; likewise notes on the zoogeographical status of the Provinces of Greater

China and neighboring lands. Appendix II provides an alphabetical list of some 600 place-names in Eastern Asia from which collections have been recorded, with their classification into faunal subregions. An index to genera and species completes the work. The catalogue should be very useful to students of Asiatic Hemiptera and will doubtless stimulate further interest in this group of insects.—HARRY H. KNIGHT, Iowa State College, Ames.

OBITUARY

Professor ANTON HANDLIRSCH, world-renowned for his publications on fossil insects and for his encyclopedic knowledge of insects in general, died at Vienna, August 28, 1935. A recent number of *Konowia* (Band XIV, Heft 4) contains his portrait and an obituary notice by Dr. Max Beier, from which we take much of the following. Anton Handlirsch was born in Vienna January 20, 1865. At the wish of his father, Peter Handlirsch, he studied pharmacy and in 1883 obtained the diploma of Master of Pharmacy. His interest in this subject was very slight and, attaching himself to Friedrich Brauer, he became successively scientific helper, Assistant (1892), Adjunct Custodian (1899), Custodian of the second class (1906), Custodian of the first class (1918) and Director (1922) of the Natural History Museum of his native city. As he was pensioned in the last-named year, his activities as Director were short-lived.

His earliest scientific work was concerned with the Hymenoptera and reached its climax in a Monograph of the digging wasps related to *Nysson* and *Bembex* (1887-1894).

Taking charge of the Hemiptera at the Museum, he greatly increased them by the purchase of the Signoret collection. His most important work on this group was a monograph of the Phymatidae (1897).

Turning his attention to fossil insects, he published in 1906-08 his enormous *Die fossilen Insekten und die Phylogenie der rezenten Formen*, 1433 pages, 51 plates. This work enumerated or described all the fossil insects known to the date of

publication, grouped stratigraphically, summarized the paleontological results, gave a chronological summary of the most important classifications and genealogical trees of insects from 300 B.C. to 1905 A.D., and drew phylogenetic conclusions on which he based a new classification (presented in an early part of the book), followed by theoretical evolutionary considerations occupying nearly 40 pages. Salient features of his new classification were the division of insects into four classes: Collembola, Campodeoidea, Thysanura and Pterygogenea, the last-named embracing eleven subclasses (Orthopteroidea, Blattaeformia, Hymenopteroidea, Coleopteroidea, Embidaria, Perloidea, Libelluloidea, Ephemeroidea, Neuropteroidea, Panorpoidea and Hemipteroidea). He modified this classification in the two later comprehensive works mentioned below.

He contributed the third volume, 1201 pages, 1040 figures, on paleontology and classification of insects to Schroeder's *Handbuch der Entomologie* (1925), the introductions to arthropods and to insects and sections on many of the lower insectan orders to Kükenthal's *Handbuch der Zoologie* (1926-1935), having become unable to complete the account of the entire class. A list of Handlirsch's works, 100 titles from 1886 to 1935, is given by Dr. Beier.

Recognition of his accomplished work came from the Academy of Sciences of Vienna and the Universities of Vienna and of Graz. The entomological societies in Berlin, Zürich, Stockholm, Amsterdam, Madrid, Moscow and Philadelphia elected him honorary or corresponding member. P. P. CALVERT.

Nephrocyte Cells and their Function in the Aphididae. (Homoptera).

By FORREST W. MILLER, Amherst College, Amherst,
Massachusetts.

The specific excretory organs to be found, generally, in insects are the Malpighian tubules. It has been known, since the internal anatomy of aphids was first studied in detail (Witlaezil, 1882), that aphids lack these structures of excretion. It has never been known definitely, what cells or groups of cells assume the function of excretion in this family of insects.

Most insects, as a rule, have in addition to the Malpighian tubules, free cells having the property of absorbing ammonia carmine which has been injected into the haemolymph. These cells retain, in the cytoplasm, a precipitate of carmine, being in effect storage or excretory cells (Kowalevsky, 1892).

A solution of ammonia carmine injected into the body of an aphid will show cells which have a similar property; absorbing ammonia carmine and retaining the carmine in the cytoplasm. These cells are spherical in shape, hyaline, with large nucleus, and are of a diameter of 0.01 mm. They show acid reaction to methyl red.

These cells are distributed generally throughout the body fluids but collect in large numbers in the cornicles. Sectioned material of the cornicles show these cells, in addition to trophocyte cells, in various stages of disintegration. At the same time diffusion to the outside takes place through the thin chitinous wall of the cornicle. This may be seen through a microscopic examination of a cornicle of a live aphid placed under a cover slip in a weak saline solution. After a time small globules of fluid may be seen collecting on the cornicle along the entire length.

It is believed that these cells are the active excretory cells of the aphididae because of:

- (a) Property of absorbing and retaining carmine in the cytoplasm.
- (b) High acidity of the cell.
- (c) Accumulation and subsequent disintegration of these cells within the cornicles.
- (d) Part diffusion of the cell cytoplasm through the cornicle wall.

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Congres Internat. Zool. (Moscow) vol. 1; pp. 187-235.
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Arb. Zoologischen Inst. Univ. Wien., Bd. 4; pp. 379-441.

Errata

The running head of the even-numbered pages 30-56 of the present volume of the NEWS should read "Feb., 1936" instead of "Jan., 1936."

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 Cocoons of *Actias luna* and *Automeris io*. Exchange considered. Eggs in season. Virginia Weaver, 822 S. College Ave., Tulsa, Okla.

Geometers Wanted from all parts of United States, for cash or exchange. Edward Guedet, P. O. Box 305, Napa, California.

Wanted—Tabanidae (Horseflies and Deerflies). Exchange, purchase, or for determination. G. B. Fairchild, P. O. Box 272, Monticello, Fla.

Exchange.—Lepidoptera of the Western United States for rare American or tropical specimens. C. W. Herr, Woodburn, Ore. R-3.

Wanted—Insects in exchange for Japanese insects or to buy. Tell me your wishes. Hiromu Yamamoto, Matsuo-Kozan, Iwategun Iwateken, Japan.

Would like to exchange Southern California insects for any North American Mutillidae (wingless wasps or velvety ants). Curtis Brown, 2950 G St., San Diego, California.

Wanted.—To get in touch with Specialists who will make determinations for a share of our duplicates. We have many undetermined specimens from all parts of Iowa.—H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Wanted.—Communication with anyone who has or is collecting Lepidoptera in Burlington County, New Jersey. Also anyone having a microscope for sale.—E. P. Darlington, New Lisbon, N. J.

Wanted for Cash or Exchange.—North American Butterflies in series especially from type localities and remote places. C. F. dos Passos, Mendham, New Jersey.

Wanted—Specimens of North American **Cephidae**. Will make determinations and exchanges for purposes of revising the group. Donald T. Ries, Department of Entomology, Cornell University, Ithaca, N. Y.

Wanted—Collectors desiring living pupae with cocoon attached to natural food plant of Michigan, *Samia*, Columbia or hybrid with *S. cecropia*, write W. S. McAlpine, 575 Townsend St., Birmingham, Mich.

Wanted—North American Chrysididae for exchange or determination, with privilege of retaining duplicates. W. G. Bodenstern, Department of Entomology, Cornell University, Ithaca, New York.

Wanted—Chloropidae (Oscinidae) of the world. Study, determination or exchange. C. W. Sabrosky, Entomology Dept., Michigan State College, East Lansing, Mich.

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- 1008.—**Hull** (F. M.).—Descriptions of n. sps. of the genus *Sphingina*, with a key to those known from North America (Syrphidae). (Trans., 61, 373-382, 1 pl., 1935) .20
- 1011.—**James** (M. T.).—A proposed classification of the Nearctic Stratiomyinae (Stratiomyidae). (Trans., 62, 31-35, 1936) .20

HYMENOPTERA

- 1009.—**Mickel** (C. E.).—Description and records of mutillid-wasps of the genus *Myrmilloides* and *Pseudomethoca* (Mutillidae). (Trans., 61, 383-398, 1935) .35
- 1013.—**Pate** (V. S. L.).—Studies in the nyssonine wasps. I. Species of *Psamma'etes*, a n. subg. of *Hoplisoides* (Sphecidae). (Trans., 62, 49-56, 1936) .20

LEPIDOPTERA

- 1012.—**Querci** (O.).—Notes on *Pontia protodice* (Pieridae). (Trans., 62, 37-47, 1936) .20

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- 1006.—**Frison** (T. H.).—New North American species of the genus *Alloperla* (Plecoptera: Chloroperlidae). (Trans., 61, 331-344, 4 pls., 1935) .45

ORTHOPTERA

- 1004.—**Hebard** (M.).—Studies in the Orthoptera of Arizona. III. List of the Dermaptera and Orthoptera, with new records. (Trans., 61, 269-316, 1935) .85
- 1005.—**Rehn** (J. A. G.).—On certain Mexican and Central American species of *Melliera* and *Stagmomantis* (Mantidae). (Trans., 61, 317-329, 1 pl., 1935) .30
- 1010.—**Rehn & Rehn**.—On new or redefined genera of Nearctic *Melanopli* (Acrididae). (Trans., 62, 1-30, 2 pls., 1936) .65

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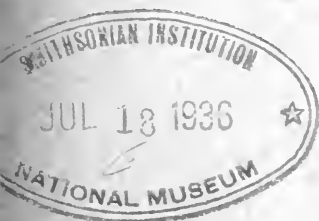
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JULY, 1936

Vol. XLVII

No. 7



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1837-1911.

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Contributions toward the Biology of *Strumigenys pergandei*: A New Food Relationship among Ants. (Hymen.: Formicidae).

By LAURENCE G. WESSON, JR., Haverford College, Penna.

Because of their small size, dull coloration, and hypogaecic habits the ants of the genus *Strumigenys* have been but little studied. Very little is known concerning them aside from the fact that they are sometimes found associated with other species of ants. This association has led some authors to assume that the *Strumigenys* are guests or thieves in the nests of other ants; but this does not explain many of the peculiarities of the genus such as their unusual pilosity, elongate mandibles, produced inner lobes of the maxillae and petiolar pads. In the present paper an apparently unique food relationship is described which, together with the morphological peculiarities, is explained directly by the basic biology of *Strumigenys*.

During the summer of 1935 I was able to find over 20 colonies of *S. pergandei* in the sandstone hills around Jackson, Ohio. These colonies were found under a wide range of conditions, but since eight were taken on a sandstone bluff only 30 yards long, and since most of the other colonies were found under similar conditions, this locality is described as typical. The soil consisted of two or three inches of pine duff on a shallow layer of clay resting on bed rock. The vegetation consisted of large patches of reindeer moss, *Cladonia rangiferina*, a few scattered weeds and grass tufts, and numerous small pines, *Pinus echinata*. The nature of the bed rock, and the insulating character of the moss assured constant moisture.

The *Strumigenys* were to be found by turning over the reindeer moss and carefully examining the pine needles beneath; but no colony was found which was not in, or in very close

proximity to, the nest of another larger ant. Specifically, one nest was found in a dead root in clay near a colony of *Lasius brevicornis*; another was found in clay in the midst of a nest of *Formica fusca subsericea* under a large flat rock; a third nest was found in the pine duff close to a colony of *Aphaenogaster fulva fulva*; a fourth was found in a small dead pine stump together with a colony of *Aphaenogaster fulva fulva*. All the other colonies were found very near nests of *A. fulva*.

In order to study *S. pergandei*, an artificial nest was constructed attempting to duplicate the natural conditions as nearly as possible. A modified Fielde nest was divided into three chambers such that a colony of *Strumigenys*, consisting of about 60 workers, lived in one chamber, a colony of *Aphaenogaster* lived in another chamber, and both species had access to the third, the forage chamber. The *Strumigenys* chamber was separated from the rest of the nest by a slit through which the little ants could pass but the *Aphaenogaster* could not. The *Strumigenys* were given clay and dead wood in which to excavate and the other two chambers were filled with dirt and pine needles.

From the beginning the *Strumigenys* showed no fear of the *Aphaenogaster*, but wandered freely among them. The *Aphaenogaster* were aware of their presence and smelled them cautiously, but on only a few occasions did they show any resentment: a worker would pick up a *Strumigenys*, which feigned death, then would carry her to the edge of the chamber and drop her; whereupon the little ant would uncurl unharmed and re-enter the chamber. Over a period of ten months not a single *Strumigenys* was injured by an *Aphaenogaster*. The *Strumigenys* as a rule paid no attention to the other ants, but when an *Aphaenogaster* worker once broke into their nest they pulled fiercely at her legs.

At first the *Strumigenys* did not thrive. They occasionally nibbled at the food given to the *Aphaenogaster*, and drank some honey which had been spilled on the dirt. But their restlessness showed that they were not doing well. Then, on examining a wild colony, I captured a worker carrying in her mandibles a small white object, which, on closer examination was found to

be a springtail, *Podurid*. With this hint, I proceeded to examine more closely the wild colonies of *Aphacnogaster*, and found that in and around most of them were swarms of springtails. A great many springtails were then collected and introduced to the artificial nest. To my surprise and gratification, the *Strumigenys* captured over a dozen springtails in the nest in two hours. They appeared perfectly content thereafter as long as an ample supply of springtails was present, but when during the winter the supply became small, they showed their restlessness again, and began to devour their brood. I have not been able to make them take any other kind of small insect.

To hunt the springtails, the *Strumigenys* either lie in wait in some nook, or they explore in crannies and crevices in search of their prey. In either case the method of capture is the same. The moment the worker scents the springtail, which is one to four mm. away, depending on its size, she stops suddenly, slowly exploring with her antennae in its direction. Having waited for a few minutes, she moves by slow advances to within 1 mm. of it. Then she folds her antennae, lowers her head to the ground, and moves imperceptibly in the direction of the springtail until her mandibles almost touch it. She then waits until the springtail *moves* against her mandibles. When this happens, she strikes, seizing the springtail in her mandibles, piercing it with her sharp maxillary lobes; then drawing it back and stinging it. If, on the other hand, the springtail fails to move, she arouses it by vibrating her antennae around it. If the springtail moves away without touching her mandibles, she again repeats her approach. The source and species of the springtail make no apparent difference to the *Strumigenys*.

Concerning the nest life of *Strumigenys*, a number of interesting observations were made. The *Strumigenys* use their mandibles to excavate the nest, tend the brood and carry other workers to a new nesting site. The larvae are fed by being placed on top of whole springtails. The workers regurgitate to each other by approximating the under sides of their heads. The largest nest found contained 120 workers. All the nests consisted of a large irregular cavity, 2 to 10 cc. in volume, entered by a narrow tunnel.

The basic biology of *Strumigenys* may then be outlined. *Strumigenys pergandei* is an independent ant feeding almost exclusively on springtails. Springtails occur in large numbers in and around the nests of many species of ants. Consequently the *Strumigenys* gain access to these nests in order to reach their prey. Thus a loose form of symbiosis has developed, further evidenced by the nonhostile attitude of the host ant toward the *Strumigenys*. The *Strumigenys* are not restricted to any definite type of springtail, nesting site, or species of host ant. They may even be found living unassociated with any other species of ant in a locality naturally abounding in springtails. Almost all the morphological peculiarities noted are adaptations to this diet: the elongate mandibles and the produced maxillary lobes provide a suitable apparatus to capture and hold the slippery springtails; the extraordinary development of the pilosity on scape and funiculus probably indicates a corresponding development of the sense of smell. The small size of the *Strumigenys* colonies may be due to the fact that springtails do not usually occur in numbers sufficient to support a large colony; no instance was recorded where there was more than one colony in the same host nest. The petiolar pads and the large size of the nest cavity excavated by these little ants are also probably adaptations to this specialized diet.

The Scoloparia of *Melanoplus differentialis* (Orthoptera Acrididae).

By ELEANOR H. SLIFER, Department of Zoology, State University of Iowa, Iowa City.

Scolopale-bearing organs have been described not only from many parts of the insect body and its appendages but also from a great variety of insect species. In no one insect, however, have scoloparia been found in all locations in which they have been reported for insects in general. *Melanoplus differentialis*, the present account will show, does possess (with one possible exception) scoloparia in all those parts where they have been found in other species, as well as in several where none have been found before.

The scoloparia of the grasshopper are well formed before the young insect leaves the egg and since many of these struc-

tures are extremely small, even when fully developed, their location in the adult is made immeasurably easier by their location first in the advanced embryo. Eggs as well as adults, consequently, were used in the work to be reported here. Methods of fixing, sectioning and staining this material were described in an earlier paper (Slifer, 1935).

The exact number of scolopalia present in any organ is very difficult to determine. The numbers given in the following list should, therefore, be regarded as close approximations, which are of value, chiefly, to the reader who wishes to compare the relative sizes of different scoloparia. It should be noted, moreover, that the scolopale counts given are actually end-knob counts.

The scolopalia of the grasshopper exhibit great diversity. Some are large and conspicuous and possess well-developed basal and middle ring-zones; others are extremely minute and little detail, aside from the end-knob, can be distinguished in them; still others are intermediate in size and complexity of structure. Scolopalia of the first type may be seen in the tympanal organs; those of the second are present in many of the abdominal scoloparia; while representatives of the third type occur in the thorax. Not infrequently scolopalia of several different kinds may be found in a single scoloparium.

All of the scoloparia known to exist in *Melanoplus differentialis* are listed below. Those which have been reported in earlier papers, either for this or for other species of Acrididae, are so indicated. The reference given in each such case is one which contains a satisfactory description of the organ under consideration.

A LIST OF THE SCOLOPARIA OF MELANOPLUS DIFFERENTIALIS.

Head and its appendages.

Antenna—(1) 1st joint (scape), ventral. 8 scolopalia, distal to sensory cytons. Cyton ends of this and following scoloparium associated. (Eggers, 1924.)

(2) 1st joint, ventral to scoloparium described above. 4 scolopalia, distal to cytons. (Eggers, 1924.)

(3) 2nd joint (pedicel), Johnston's organ. 4 scolopalia, distal to cytons. (Eggers, 1924.)

(4) Tip. 1 scolopale, distal to cyton.

Maxilla—(5) 1st joint of palpus. 4 scolopalia, distal to cytons.

(6) Tip of palpus. 1 scolopale, distal to cyton.

(7) Base of lacinia. 4 scolopalia, distal to cytons. Cyton ends of this and following scoloparium associated.

(8) Base of lacinia. 2 scolopalia, distal and mesial to cytons.

Labium—(9) 2nd joint of palpus. 1 scolopale, distal to cyton.

(10) Tip of palpus. 1 scolopale, distal to cyton.

(11) Tip of paraglossa. 2 scolopalia, mesial to cytons.

Other parts of head—(12) Latero-ventral; anterior to cervicum. 6 scolopalia, anterior and lateral to cytons.

Thorax.

Prothorax—(13) Ventro-mesial; below anterior edge of ganglion and extending into prosternal spine. 15 scolopalia, ventral to cytons.

(14) Ventro-mesial; anterior to ganglion. 20 scolopalia, anterior and slightly mesial to cytons.

(15) Ventro-lateral; anterior to ganglion. 10 scolopalia, posterior to cytons.

(16) Ventro-mesial; posterior to ganglion and runs along inner edge of furca. 2 scolopalia, dorsal to cytons.

(17) Dorso-lateral; near posterior edge of prothorax. 26 scolopalia, posterior, dorsal and slightly mesial to cytons.

Mesothorax—(18) Ventro-mesial; lateral and anterior to ganglion. 15 scolopalia, ventral to cytons.

(19) Ventro-mesial; lateral to ganglion. 6 scolopalia, posterior and slightly lateral to cytons. Cyton ends of this and two following scoloparia associated.

(20) Ventro-mesial; lateral to ganglion. 10 scolopalia, posterior and distinctly lateral to cytons.

(21) Ventro-mesial; lateral to ganglion. 19 scolopalia, anterior and slightly mesial to cytons.

(22) Ventro-mesial; posterior to ganglion and runs along inner edge of furca. 3 scolopalia, dorsal to cytons.

(23) Ventro-lateral; attached to membrane anterior to leg. 12 scolopalia, dorsal to cytons.

(24) Dorso-lateral; near posterior border of mesothorax. Extends into base of tegmen. 12 scolopalia, lateral and slightly dorsal to cytons.

Metathorax—(25) Ventro-mesial; lateral to anterior edge of ganglion. 23 scolopalia, anterior and slightly mesial to cytons.

(26) Ventro-mesial; lateral to middle of ganglion. 24 scolopalia, posterior and mesial to cytons.

(27) Ventro-mesial; lateral to posterior portions of ganglion. 17 scolopalia, posterior and lateral to cytons.

(28) Ventro-mesial; lateral to posterior end of ganglion and mesial to furca. 8 scolopalia, posterior to cytons.

(29) Ventro-lateral; attached to membrane anterior to leg. 17 scolopalia, anterior to cytons.

(30) Dorso-lateral; near posterior border of metathorax. Extends into base of wing. 12 scolopalia, posterior and slightly lateral to cytons.

Abdomen.

Segment 1—(31) Tympanal organ. 95 scolopalia. (Schwabe, 1906.)

(32) Lateral; near membrane of leg. 2 scolopalia, dorsal and anterior to cytons.

Segment 2—(33) Ventro-lateral; posterior to spiracle. 5 scolopalia, posterior and lateral to cytons.

(34) Ventro-lateral; mesial to scoloparium described above. 2 scolopalia, posterior and slightly mesial to cytons.

(35) Ventro-mesial; ventral and lateral to connectives between metathoracic and 1st abdominal ganglia. 3 scolopalia, anterior to cytons.

Segment 3—(36) Ventro-lateral; posterior to spiracle. 4 scolopalia, posterior and lateral to cytons.

(37) Ventro-lateral; mesial to scoloparium described above. 1 scolopale, posterior and slightly mesial to cyton.

(38) Ventro-mesial; lateral to 1st abdominal ganglion. 5 scolopalia, anterior to cytons.

Segment 4—(39) Ventro-lateral; posterior to spiracle. 5 scolopalia, posterior and lateral to cytons.

(40) Ventro-lateral; mesial to scoloparium described above. 3 scolopalia, posterior and slightly mesial to cytons.

(41) Ventro-mesial; anterior to 2nd abdominal ganglion. 1 scolopale, anterior to cyton.

Segment 5—(42) Ventro-lateral; posterior to spiracle. 5 scolopalia, posterior and lateral to cytons.

(43) Ventro-lateral; mesial to scoloparium described above. 1 scolopale, posterior and slightly mesial to cyton.

(44) Ventro-mesial; lateral to connectives between 2nd and 3rd abdominal ganglia. 2 scolopalia, anterior and slightly mesial to cytons.

Segment 6—(45) Ventro-lateral; posterior to spiracle. 6 scolopalia, posterior and lateral to cytons.

(46) Ventro-lateral; mesial to scoloparium described above. 3 scolopalia, posterior and slightly mesial to cytons.

(47) Ventro-mesial; lateral and slightly anterior to 3rd abdominal ganglion. 2 scolopalia, anterior and slightly lateral to cytons.

Segment 7—(48) Ventro-lateral; posterior to spiracle. 6 scolopalia, posterior and lateral to cytons.

(49) Ventro-lateral; mesial to scoloparium described above. 1 scolopale, posterior and slightly mesial to cyton.

(50) Ventro-mesial; lateral and anterior to 4th abdominal ganglion. 3 scolopalia, anterior to cytons.

Segment 8—(51) Ventro-lateral; posterior to spiracle. 4 scolopalia, posterior and slightly lateral to cytons.

(52) Ventro-lateral; mesial to scoloparium described above. 3 scolopalia, posterior and slightly lateral to cytons.

(53) Ventro-mesial; lateral and anterior to 5th abdominal ganglion. 4 scolopalia, anterior and slightly lateral to cytons.

Segment 9—(54) Ventro-lateral. 6 scolopalia, dorsal to cytons

Segment 11—(55) Posterior tip of both ♂ and ♀ cercus, outer surface. 2 scolopalia, dorsal to cytons.

Prothoracic leg.

Femur—(56) Anterior, proximal surface. 310 scolopalia, distal to cytons. (Slifer, 1935.)

(57) Mesial and distal to scoloparium described above. 28 scolopalia, distal to cytons. (Slifer, 1935.)

Tibia—(58) Subgenual organ. Anterior, proximal surface. 15 scolopalia, distal and mesial to cytons. (Friedrich, 1929.)

(59) Distal organ. Distal to scoloparium described above. 7 scolopalia, distal to cytons. (Friedrich, 1929.)

(60) Distal end of tibia. 7 scolopalia, distal to cytons.

Tarsus—(61) 5th tarsomere, distal. 2 scolopalia, distal to cytons.

(62) 5th tarsomere, extreme distal end. 2 scolopalia, distal to cytons.

Mesothoracic leg.

Femur—(63) Anterior, proximal surface. 330 scolopalia, distal to cytons. (Slifer, 1935.)

(64) Mesial and distal to scoloparium described above. 35 scolopalia, distal to cytons. (Slifer, 1935.)

Tibia—(65) Subgenual organ. Anterior proximal surface. 18 scolopalia, distal and mesial to cytons. (Friedrich, 1929.)

(66) Distal organ. Distal to scoloparium described above. 13 scolopalia, distal to cytons. (Friedrich, 1929.)

(67) Distal end of tibia. 8 scolopalia, distal to cytons.

Tarsus—(68) 5th tarsomere, distal. 2 scolopalia, distal to cytons.

(69) 5th tarsomere, extreme distal end. 2 scolopalia, distal to cytons.

Metathoracic leg.

Femur—(70) Anterior, distal surface. 55 scolopalia, distal to cytons. (Slifer, 1935.)

Tibia—(71) Subgenual organ. Anterior proximal surface. 10 scolopalia, distal and mesial to cytons. (Friedrich, 1929.)

(72) Distal organ. Distal to scoloparium described above. 6 scolopalia, distal to cytons. (Friedrich, 1929.)

(73) Distal end of tibia. 3 scolopalia, distal to cytons.

Tarsus—(74) 5th tarsomere, distal end. 3 scolopalia, distal to cytons.

(75) 5th tarsomere, extreme distal end. 2 scolopalia, distal to cytons.

Metathoracic wing.

(76) Base. 1 scolopale, distal to cyton.¹

SUMMARY.

(1) *Melanoplus differentialis*, besides the ten pairs of scoloparia found by earlier workers in other species of Acrididae and the five femoral pairs reported for this species by the present author, possesses sixty-one pairs of scoloparia which are described here for the first time.

(2) Scoloparia have been found in *Melanoplus differentialis* in every part of the body (with the exception of the tegmina) in which they have been found in other insects and, in addition, in some locations where none have previously been reported in any insect.

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¹ Erhardt (1916) searched the mesothoracic and metathoracic wing-bases of *Pachytylus nigrofasciatus* and *Psophus stridulus* for chordotonal organs but found none.

Some California Bees, *Townsendiella* and *Hesperapis* (Hymen.: Apoidea).

By CHARLES D. MICHENER, Pasadena, California.

Until now only one species of *Townsendiella* has been known. An additional species, therefore, is of unusual interest, especially when it is found to be perhaps generically distinct from the type *T. pulchra* Crawford, from New Mexico. The present species does not have flattened claws. The proportions of the joints of the palpi are different from those given by Crawford, the venation is somewhat different, and the general appearance is that of a black, finely punctured *Holcoposites*, rather than of a *Neolarra* as stated by Crawford for *T. pulchra*. The types of the new species are in the author's collection.

Townsendiella californica n. sp.

♀: Length $4\frac{1}{2}$ to a little over 5 mm.; black, the clypeus, labrum, mandibles except apices, and sides of first two tergites pale red; head about round viewed from in front; entire body covered with very short dense pubescence except a large triangular area on propodeum which is dull and very finely roughened; pubescence of sides of face, cheeks, longitudinal band through median ocellus, pleura, propodeum, most of scutellum, lateral edges and a pair of longitudinal discal lines on scutum, white; rest of pubescence on head and thorax pale brown; posterior outer edge of tegulae bare and shiny; femora and to a lesser extent the tibiae somewhat reddish; outer faces of hind and middle tibiae with a number of small spines; pubescence of abdomen nearly white, the following markings nearly black: transverse band with a median apical lobe on first tergite; similar but broader bands on second and third tergites, these extending to the anterior margins of the tergites, and the lobes extending to the posterior margins, the ends of the bands bent posteriorly; three spots on posterior half of fourth tergite, these faintly connected anteriorly. Posterior margin of fifth tergite bare, shiny, with a few small punctures; pygidial area parallel sided, broadly rounded posteriorly, bare, with abundant coarse punctures; wings short, the apical margin broadly dusky, the veins and stigma black, the first recurrent vein meeting or basad to first transverse cubital, the second recurrent vein half way from base to apex of second submarginal cell, the latter narrowed almost to a point above, the marginal cell rounded at apex, with a small appendage; maxillary palpi six jointed,

the second joint longest, the first, third, and fourth of about equal length and shortest, the fifth and sixth of about equal length; labial palpi four jointed, the second joint about two thirds as long as first, the third and fourth of about equal length, together a little less than two thirds as long as second; tongue a little shorter than labial palpi; under side of flagellum dull brownish, the scape about as long as next three joints together; mandibles simple; labrum broader than long.

One individual has the pubescence rather worn, so that the sculpturing of head and thorax can be seen. Wherever visible the surface is only faintly shining, with numerous close minute punctures (except as described above for propodeum).

♂. Similar to female but clypeus appearing blackish, its lateral margins reflexed; tegulae reddish; legs blacker; pubescence usually paler; pygidial area more slender, its sides converging posteriorly.

Holotype, a female, and paratypes, Altadena, CALIFORNIA, June 24 and 26, 1935, flying close over the ground in a colony of *Hesperapis rufipes* (Ashm.) where they were doubtless parasitic (Michener).

HESPERAPIS RUFIPES (Ashmead).

♂. Length 4 to 5½ mm.; form robust, the flagellum short as in a female; black, the anterior edge of clypeus broadly dull yellow, the labrum, mandibles except apices, and malar space also dull yellow; flagellum ferruginous, paler beneath; legs except for the coxae red, the anterior femora infuscated with black above; tegulae rather dark testaceous; eyes converging below; facial line longer than transfacial; head and thorax rather shiny, hardly sculptured, though the clypeus has a few punctures; enclosure of propodeum shining; anterior edge of clypeus depressed; head and thorax largely covered with short hair, that on top of head and thorax rather moss-like, dense, fulvous to pale ochraceous, that on cheeks and sides of thorax paler, sometimes white; abdomen only slightly shining, the tergites with apical bands of ochraceous to white pubescence, the apices of the tergites beneath the bands translucent whitish; pygidial area reddish; wings slightly dusky, the veins and stigma black.

♀. Length 6 to 7 mm.; black, the anterior margin of clypeus broadly dull red; mandibles except for the blackish apices, labrum, and malar space also dull red; legs black; venter of abdomen red; tergites one to three red, two and three black at extreme sides; tergite four black, faintly red at base; remaining

tergites black, the base of pygidial area red; flagellum red, paler beneath; sculpture and structure similar to that described for male; pygidial area with a longitudinal median groove in apical part; abdomen with bands of white pubescence similar to those of male; pubescence of head and thorax sparser than in the male, white except for dorsum of head and thorax where it is ochraceous and moss-like; vertex with some black hairs.

Many specimens from Altadena, CALIFORNIA, June 11, 1933, May 12, 1934, and June 26 and 28, 1935 (Michener). They were flying over the ground within two small areas about half a mile apart. Here they were very abundant, nesting in the hard flat ground and visiting flowers, chiefly those of *Hugelia virgata*. Outside of these areas none could be found, although the *Hugelia* and other vegetation appeared just the same and the ground looked the same.

The nearest relative is *H. elegantula*, (Ckll.), which has paler wings and stigma. Mr. P. H. Timberlake first identified my specimens as *H. rufipes*. In his very extensive collecting at Riverside, he has never taken it.

***Hesperapis arida* n. sp.**

♂. Length 6 to 7 mm.; form robust, the abdomen flattened, and the antennae short, much like the female; flagellum ferruginous beneath; eyes strongly converging below; mandibles red, the bases black, the apices blackish; clypeus somewhat shining with fine punctures; rest of head and thorax about the same, the enclosure of propodeum entirely dull; tegulae testaceous; wings clear, the veins nearly black, the stigma rather dark brown, shorter than in *H. wilmattae* Ckll.; abdomen absolutely dull, except for base of first tergite, which has a very faint shininess; tergites with broad white apical bands, the tegument beneath them testaceous; pygidial area red; legs black, the tibial spurs, hind knee plate, and extreme apices of tibiae reddish; pubescence mostly white, short, longest on lower part of cheeks, abundant on face, cheeks, pleura, sides of propodeum, and legs, that on under side of metatarsi ferruginous; sides of tergites with considerable hair between the bands; scutum with short, dull ochraceous, moss-like hair, and some longer white hairs.

♀. Length 8 mm.; similar to the male; anterior margin of clypeus dark red; moss-like hair of scutum more copious; pygidial area hardly red; entire first tergite with a very faint shininess; hind tibiae and tarsi with some rather long black hair.

Holotype, a male, and numerous paratypes from 20 miles south of Twenty Nine Palms, San Bernardino County, CALIFORNIA, April 14, 1935, on *Larrea tridentata* var. *glutinosa* (Michener, Coll.) The male is very distinct from *H. wilmattae* Ckll. by the short antennae, robust form, etc. The females, however, are not easily separated. The following characters are useful in their separation:

<i>wilmattae</i> .	<i>arida</i> .
Anterior margin of clypeus black.	Anterior margin of clypeus dark red.
Abdomen faintly shiny.	Abdomen beyond second tergite very dull.
Hind tibiae with few black hairs.	Hind tibiae with many black hairs.
Labrum black.	Labrum dark red.
Apices of mandibles red.	Apices of mandibles black.

Hesperapis leucura Ckll. is somewhat similar but smaller and more shiny.

HESPERAPIS WILMATTAE Cockerell.

♂. Similar to female, the antennae black; abdomen a little more shining; hind legs without black hairs; pubescence rather long, white, entirely covering face, and abundant on thorax, there being no moss-like hair on scutum.

Dry Lake (east of Borego Valley) (T. D. A. & W. P. Cockerell); Cottonwood Springs, Riverside County, April 14, 1935 (Michener), all in California.

The male is close to *H. nitidula* Ckll. but larger, eyes gray (green in *nitidula*); face narrower; posterior part of enclosure of propodeum duller (strongly shining, though not smooth in *nitidula*); genitalia nearly black in *wilmattae*, brown in *nitidula*.

Hesperapis may be divided into two subgenera, as follows:
 Male robust, with the form of a female, the flagellum short, its joints broader than long; moss-like pubescence present on dorsum *Hesperapis* s. str.
 Male slender, the flagellum long, most of the joints longer

than broad; moss-like pubescence absent except in female
H. wilmuttae *Panurgomia* Vier.
Zaccsta Ashm. is a synonym of *Hesperapis* s. str.

Hesperapis s. str. includes *elegantula* Ckll., *rufipes* (Ashm.),
 and *arida* Mich. Although male *elegantula* is unknown, I think
 that there is no doubt of its relation to *rufipes*.

Panurgomia includes all the American species which I have
 seen except those mentioned above.

Notes On Some American Colydiidae. (Coleoptera).

By HOWARD EVEREST HINTON, Zoological Laboratory,
 Cambridge, England.

This paper, one of the last of a series, is a result of the study
 of a few remaining species of neotropical Colydiidae repre-
 sented in the various collections before the writer from the
 United States National Museum and Mr. F. Nevermann. One
 genus is here relegated to synonymy, two new species are
 described, one species is removed from one genus and placed in
 another, and notes and additional locality records are given for
 five other species.

The writer takes this opportunity of expressing his thanks
 to Dr. K. G. Blair of the British Museum (Natural History)
 and Dr. A. D. Imms of Cambridge University for their gener-
 ous assistance in the preparation of this and other papers of
 the series.

LAPETHINI.

LAPETHUS Casey

1890. *Lapethus* Casey, Ann. N. York. Acad. V, p. 317, 321.

1895. *Lapethus* Sharp, Biol. Centr.-Amer. Col. II, 1, p. 494.

1895. *Lytopeplus* Sharp, Biol. Centr.-Amer. Col. II, 1, p. 494.

1898. *Brachylon* Gorh. Biol. Centr.-Amer. Col. VII, p. 256.

1913. *Lytopeplus* Champion, Trans. Ent. Soc. London, p. 79.

The only character separating *Lapethus* Casey from *Lytopeplus* Sharp is the greater separation of the front and middle coxae in the latter, but as this difference is only a matter of degree and is bridged by certain species (*Lapethus sharpi* Champ, etc.), it seems undesirable to retain the genus *Lytopeplus* Sharp.

LAPETHIUS BREVIS (Gorh.) (1898)

One, Guatemala: Alta V. Paz, Cacao, Trece Aguas, IV-19-1906 (*Barber, Schwarz*). This specimen is about one-third smaller than the smallest specimen in the series in the British Museum, but is otherwise similar.

LAPETHIUS SHARPI (Champ.) (1913)

Two, as follows: One, Guatemala: Alta V. Paz, Cacao, Trece Aguas, IV-24-1906 (*Barber, Schwarz*). One, Mexico: Estado de Morelos, Cuernavaca, VI-1934 (*H. E. Hinton*).

LAPETHIUS SULCIMARGO (Champ.) (1913)

One, Guatemala: Jacala, V-2-1906 (*Barber, Schwarz*). This specimen is slightly smaller and more evidently punctate than the unique type from Chontales, Nicaragua, but otherwise it seems to agree rather well. However, when a longer series is found, it may prove to be new.

LAPETHIUS ALLUAUDI (Grouv.) (1894)

1894. *Mychocerus alluaudi* Grouv. Ann. Soc. Ent. Fr. LXIII, p. 15.

1918. *Mychocerus alluandi* Grouv. Trans. Ent. Soc. London, p. 45, 47.

While studying the genus *Lapethus* and related genera, the writer had occasion to examine this non-American species. Typical examples collected in the Seychelle Islands agree in all important particulars with the genus *Lapethus* Casey, this genus differing from *Mychocerus* Er. in the position of the antennal cavities and in the absence of prosternal striae.

Lapethus cubanus sp. n.

Moderately narrowly obovate (length to breadth ratio about 115 : 68), moderately strongly convex. Cuticle shining, rufo-piceous; antennae, mouth-parts and legs rufo-testaceous.

Head finely punctate with punctures which are separated mostly by two to three times their diameters. Maxillary and labial palpi with the terminal segment in the form of a stout spine.

Prothorax at broadest point (base) one-third broader than long (60 : 42) and apical margin between apical angles much narrower than base (30 : 60). Apical margin extremely finely, scarcely noticeably margined; sides finely completely margined, when viewed from above converging moderately towards apex in basal one-half and more strongly so in apical one-half, when

viewed laterally the lateral margin is moderately strongly arcuate in apical one-half and straight but feebly oblique in basal one-half; base extremely finely but completely margined, moderately strongly sinuate on each side. Pronotum without an accessory lateral stria; surface with the punctures moderately fine, about twice as coarse as those of head and separated mostly by one to two times their diameters though often sparser.

Elytra nearly twice as long as prothorax (76 : 42) and broadest at about apical one-half. Surface apparently feebly striate (actually without stria lines), punctures corresponding to stria punctures coarse, subovate to nearly round and separated longitudinally on disk by one to two times their diameters; intervals flat, apparently impunctate.

Beneath with the surface of the prosternum microscopically alutaceous and obscurely punctate with punctures which are about as coarse or slightly coarser and as sparse as those of pronotum. Metasternum without a median impressed line on disk; surface of disk only extremely finely and sparsely punctate; lateral stria clearly marked. First ventral abdominal segment with the lateral stria extending near lateral margin of segment. Length, 1.4 mm.; breadth, .9 mm.

Type: In the collection of the United States National Museum. Greater Antilles: CUBA, Cayamas (*E. A. Schwarz*).

The new species differs from *L. substriatus* (Champ.) in its less depressed form and less strongly bisinuate prothoracic base. *L. cubanus* Hntn. is rather close to *L. ferrugineus* (Hntn. and Anc.) (1934) but is less ovate and more oblong and has the prothoracic base extremely finely margined near the middle, whereas in *ferrugineus* the base is not margined. Also, in the new species the lateral margin when viewed laterally is more strongly arcuate in apical one-half than it is in *ferrugineus*.

Lapethus lateralis sp. n.

Obovate, moderately convex; cuticle alutaceous for the most part, shining, rufo-piceous; antennae, mouth-parts and legs somewhat rufo-testaceous.

Head finely punctate with punctures which are separated mostly by one to two times their diameters. Maxillary and labial palpi with the terminal segment in the form of a stout spine.

Prothorax at broadest point (base) one-third broader than long (62 : 40) and apical margin between apical angles much narrower than base (29 : 62). Apical margin extremely finely,

scarcely noticeably margined; sides finely and completely margined, when viewed dorsally converging slightly towards apex in basal one-half and more strongly so in apical one-half, when viewed laterally the lateral margin is strongly arcuate in apical one-half and straight but feebly oblique in basal one-half; base extremely finely and completely margined, moderately sinuate on each side. Pronotum without an accessory lateral stria; surface with the punctures about or slightly coarser than those of head and separated mostly by one to two times their diameters.

Elytra nearly twice as long as prothorax (75 : 40) and broadest at about apical one-half. Surface apparently feebly striate (appearance due to arrangement of punctures), punctures corresponding to strial punctures rather coarse and irregularly separated on disk but usually separated by two or more times their diameters; intervals flat, finely and sparsely punctate, but apparently impunctate.

Beneath with the surface of the prosternum at middle only finely and sparsely punctate. Disk of metasternum without a median impressed line; surface of disk extremely finely punctate with punctures which are separated mostly by five or more times their diameters; lateral stria well defined. First ventral abdominal segment with the lateral stria becoming obsolete at posterior one seventh of segment and only slightly extended laterally near end, not clearly marked beyond basal two-thirds. Length, 1.4 mm.; breadth, .9 mm.

Type: In the collection of the United States National Museum. On log from BRAZIL, IV-24-1934 (*J. H. Morland*).

From *L. brazilianus* Champ. (1913), the new species differs in its smaller size and in not having the elytral intervals "rather convex and closely, minutely punctulate." From *L. substriatus* (Champ.) (1913), it differs in having the base of the prothorax feebly instead of strongly bisinuate, and from *L. ferrugineus* (Hntn. & Anc.), it may be separated by its less oval form and margined prothoracic base. It is, however, apparently most closely related to *L. cubanus* Hntn. and is separated from this West Indian species only with some difficulty, and, indeed, it is possible that a long series will show these two to be the same. The new species has the apical half of the lateral margin of the prothorax (when viewed laterally) distinctly more strongly arcuate than *cubanus*, and has the lateral stria on the first ventral abdominal segment much less clearly marked and not extending laterally for so great a distance.

CERYLONINI.

TYRTAEUS RUFUS Champ. (1913)

One, Panama: Paraiso, III-4-1911 (*E. A. Schwarz*). This specimen is distinctly smaller than any in the series in the British Museum, and in addition it has the elytra slightly more coarsely punctate.

PHILOTHERMUS PUBERULUS Schwarz (1878)

Five, as follows: Two, Mexico: Tampico, XII-27 (*E. A. Schwarz*). One, Guatemala: Jacala, V-2-1906 (*Barber, Schwarz*). One, Guatemala: Alta V. Paz, Cacao, Trece Aguas, IV-28-1906 (*Barber, Schwarz*). One, Panama: Paraiso, I-30-1911 (*E. A. Schwarz*).

Colorado Lepidoptera Records (Pieridae. Spingidae).

A badly rubbed specimen of *Gonepteryx clorinde* (Godart) (Rhopalocera: Pieridae) was collected in Denver, Colorado, on July 15, 1935, at flowers of *Delphinium* by Mrs. Minnie Gibbons. Holland (Moth Book, 1931) records it as—"Very abundant in Mexico, but only occurs as a straggler in the extreme southwestern part of Texas." The specimen has an expanse of $3\frac{3}{8}$ inches as compared with Holland's figure of 4 to 5 inches.

At Albion Lake in western Boulder County, Colorado, a specimen of *Clerio lineata* Fabricius (Heterocera: Spingidae) was collected at flowers of the Blue Columbine, *Aquilegia caerulea*, on July 25, 1935. This locality is at an altitude of 11,000 feet and is very close to the crest of the Continental Divide.—HUGO G. RODECK, University of Colorado Museum, Boulder, Colorado.

Mites Parasitic on Dragonflies Wanted.

Dr. Paul Münchberg, Bahnhofstr. 16, Schloppe, Kreis Dt. Krone, Grenzmark, Germany, whose work on mite larvae parasitic on Odonata is noticed on page 197 *postea*, asks for living American material, especially from *Lestes* and *Sympetrum*. Remove mites, not smaller than .6 mm., with a needle, place in loose damp cotton wool in a vial closed with plug of same, wrap with paraffin paper and mail in tube or box to him.

Entomological Literature

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

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

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.

New Titles of Periodicals and Serials Referred to

14. *Archivos do Instituto Biologico, Sao Paulo.*

GENERAL.—Anon.—Une invention remarquable due à l'entomologie "Le procédé Heliophore." [Lambillionea] 36: 90-93, ill. **Brossard, R.**—La photographie stereoscopique en couleurs des papillons et des chenilles. [L'Amat. Papillons] 8: 25-34. **Browne, C. A.**—Some relations of the New Harmony movement to the history of science in America. [Sc. Month.] 1936: 483-497, ill. **Carter, W.**—Insects and Plant Diseases. [37] 9: 159-170, ill. **Chagnon, G.**—Insectes nouveaux ou peu connus captures dans la tourbiere de Lanoraie, Quebec. [98] 63: 164-166. **Cockerell, T. D. A.**—The entomology of Prince Albert National Park, Saskatchewan. [4] 68: 85-88. **Curran, C. H.**—How insects protect their eggs. [Nat. Hist. N. Y.] 37: 441-456, ill. **Drake, C. J.**—Teaching and training in the field of entomology. [12] 29: 28-36. **Gibson, A.**—Recent advances in applied entomology in Canada. [V. Cong. Intern. Ent., Paris] 1932: 45-63. **Guignot, F.**—Sur les types en entomologie. [Misc. Ent.] 37: 28-30. **Hacker, H.**—An Introduction to Beekeeping. [Queensland (Austral.) Dept. Agr. & Stock, Div. Ent. & Pl. Path.] Bull. 11 (N. S.), 46 pp., ill. **Hardy, G. A.**—Notes on Vancouver Island Cerambycidae. [Rept. Prov. Mus. Nat. Hist. Brit. Col.] 1935: 34-35. **Hinds, W. E.**—Obituary. By F. L. Thomas. [12] 29: 225-226. **Linsley & Usinger.**—Insect collecting in California—II. Foothill region. [55] 12: 48-55, ill. **Maneval, H.**—Insectes fossiles des

calcaires Oligocenes de Ronzon. [Mem. Soc. Linn. Lyon] 79: 22-37, ill. (*). **Sanders, J. G.**—The commercial entomologist. [12] 29: 20-28. **Schmiedeknecht, O.**—Obituary by H. Hedicke. [Mit. Deutsch. Ent. Ges.] 7: 1-2, ill. **Sherman & Perry.**—Insect and plant associations in the Chilcotin. [Rept. Prov. Mus. Nat. Hist. Brit. Col.] 1935: 30-34, ill. **Strong, L. A.**—Stabilizing entomology. [12] 29: 1-6. **Swezey, O. H.**—The insect fauna of Ieie (*Freyinetia arborea*) in Hawaii. [37] 9: 191-202. **Vaz, Z.**—Ectoparasitas de animais domesticos observados no Estado de S. Paulo. [14] 6: 29-33. **Wardle, R. A.**—General Entomology. P. Blakiston's Son & Co., Philadelphia. 311 pp., ill. **Warnecke, G.**—Microclimat et distribution des Papillons. [L'Amat. Papillons] 8: 35-44, ill. **Weiss, H. B.**—The Pioneer Century of American Entomology. New Brunswick, N. J. 1936 320 pp. **Wilder, Gerrit Parmele.**—Obituary by Swezey & Ehrhorn. [37] 9: 189-190.

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SPECIAL NOTICES.—**Stiles, C. W.**—Notice of possible suspension of rules of nomenclature in certain cases. [68] 83: 552-553. (Orthop., Lepid., Hymen., etc.)

THE PIONEER CENTURY OF AMERICAN ENTOMOLOGY. By HARRY B. WEISS. Published by the Author, New Brunswick, New Jersey, 1936. 320 mimeographed pages 27.7 x 20.8 cm. \$4.25 postpaid.—The author, who is well known as the Chief of the Bureau of Plant Industry of the New Jersey State Department of Agriculture, and as the editor of the *Journal of the New York Entomological Society*, and who has contributed many readable historical and biographical articles on entomologists to the *Scientific Monthly* and other magazines, starts his book and his preface as follows: "At the outset I may as well confess that the title of this book is not strictly indicative of its contents. I have attempted to cover a longer period than a century, and to trace the record of entomology from its beginnings in this country to the year 1865."

Mr. Weiss's treatment of his material is chronological. He usually begins with the publication of some noteworthy article or book, but a biographical sketch of its author varies the catalogue. Such a sequence sometimes brings together two entomologists whose connection with each other is not obvious, as when Dr. Hans Herman Behr's exhibition, in 1855, at San Francisco, of insects of Honolulu, is followed by the account of the first paper, in 1856, in the *Proceedings* of the Philadelphia Academy, by the young entomologist of Baltimore, Philip Reese Uhler, or when the Honorable J., and the plain Thomas, Barlow, "disporting" themselves in the *American Quarterly Journal of Agriculture and Science* on the study of entomology and its novel productions, respectively, in 1845 and 1846, immediately precede the description of Dr. W. S. W. Ruschenberger's *Elements of Entomology* of 1845.

The grouping of data as evidenced by the titles of the chapters is: I. Entomology in the Accounts of Early Travelers (1588-1723), II. The Entomology of Early Books and Papers (1731-1800), III. The Early years of the Nineteenth Century (1800-1817), IV. Thomas Say and his Contemporaries (1817-1831), V. From Zimmermann to LeConte (1832-1845), VI.

Asa Fitch and Other Entomologists (1845-1854), VII. The Glover and Osten Sacken Period (1855-1860), VIII. From Walsh to Cowan (1860-1865), IX. The Entomology in Agricultural Periodicals before 1865, X. Scientific Societies, Scientific Journals, and Exploring Expeditions Contributing to the Progress of American Entomology, XI. Some Notes on Canada, XII. Entomology in Europe During the Pioneer Century in America.

The great names of American entomology previous to 1865 are commemorated, each in two or more pages. Of them Mr. Weiss justly remarks, p. 172, "One of the disadvantages of writing about outstanding entomologists in a work like this, is that such men having contributed so enormously to the science and having written so extensively—really, in order to have justice done them should be considered by themselves in separate volumes. It is easy to be specific and detailed about the work of an author of one or two short papers. It is difficult when the author has written a hundred lengthy articles, reports, etc., involving hundreds of species, observations, etc. And so it is necessary to be general about the work of Dr. Fitch and to refer those who want more information to the bibliography of Dr. Fitch's entomological writings which J. A. Lintner published in . . . 1882." Mr. Weiss has heeded his own prescription with his excellent biography of Thomas Say (1931), written in conjunction with Miss Grace Ziegler, reviewed in the NEWS for March, 1931, pp. 90-93. The passage quoted above recalls some expressions in the preface to Bodenheimer's two volumes on the history of entomology (1928) and, like him, Mr. Weiss would doubtless consider his own work as materials for a history, not a history itself.

That the lesser entomologists are not forgotten may be seen from an examination of the index, in which are entered the names of about 400 individuals of the period who have some claim to this title. Mr. Weiss has brought together a great mass of information concerning them and all their present confreres will do well to obtain this book at once, for only 150 copies have been published, owing to the author's inability to find a publisher willing to put the volume into print. Mr. Weiss can be reached at 19 North Seventh Avenue, Highland Park, New Jersey.—PHILIP P. CALVERT.

ZUR KENNTNISS DER ODONATENPARASITEN, mit ganz besonderer Rücksichtigung der Ökologie der in Europa an Libellen schmarotzenden Wassermilben. VON PAUL MÜNCHBERG. Archiv f. Hydrobiologie, Bd. XXIX S. 1-120. Published Nov. 1, 1935.—Although this work treats of European parasites of European Odonata, it contains much that is of interest to stu-

dents in other parts of the world. The first section reviews the literature on egg-parasitic Hymenoptera, from which it appears that the identifications of those species supposed to have issued from Odonate eggs are in great confusion. As the title states, the greatest part of this work deals with Hydrachnine larvae. They have been reported from 12 species of Zygoptera and 15 species of Anisoptera. The author has reared nymphs from larvae attached to 17 species of Zygoptera and 11 species of Anisoptera of Europe; they belong to the genera *Arrhenurus* Duges and *Georgella* Koenike. Twenty-four species of *Arrhenurus* and one of *Georgella* from Odonate hosts have been distinguished. Thrombidiid and Erythraeid larvae occur much less frequently on the Odonata and are considered as errant parasites. Odonata with rheophilous nymphs, especially Calopterygidae and Gomphidae, transform mite-free, as mites of the genera named are typical pond dwellers and avoid flowing water. The larvae of *Arrhenurus papillator* were found on 8 species of *Sympetrum* and 4 species of *Lestes*, *A. pustulator* larvae on one species each of seven genera of Anisoptera and one species of *Agrion*. The same species of larval mite attaches itself to different parts of different hosts. Thus *A. papillator* fastens itself to the lower surface of the basal wing-veins of *Sympetrum meridionale* and *fonscolombci*, but to the thorax or to the abdominal sternites of the other hosts. The parasitic phase lasts in general 3-4 weeks, but those which attach themselves to the wing-veins require a longer period, 6-8 weeks, perhaps due to the slighter amount of nourishment afforded by the veins. Details of the periods occupied by the nymphal stages, based on numerous rearings in laboratories are given. Two modes of infection of Odonate imagos by larvae of water mites are designated as prenatal and postnatal, *i. e.* before or after transformation. Swimming larvae, *i. e.* those of *Arrhenurus*, chiefly infect the Zygoptera prenatally, although postnatal infection may also occur when dragonflies of this sub-order descend below the water's surface for endophytic oviposition. Infection of Anisoptera in general and by *Arrhenurus papillator* or *Lestes* occurs prenatally ("nur bei der Geburt" *cf.* pp. 80-81 and 110). While the author had no opportunity to rear larvae of *Georgella*, he believes that they infect their Zygopterous hosts postnatally (pp. 77, 83). Dr. Münchberg is known as the author of excellent papers on the life histories of German Odonata and the morphology of their larvae (1930-1933). Those studies led him to the investigation of their Hydrachnine parasites and his numerous observations and experiments on their development and ecology furnish the present important contribution.—PHILIP P. CALVERT.

EXCHANGES

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

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

Wanted—Tabanidae (Horseflies and Deerflies). Exchange, purchase, or for determination. G. B. Fairchild, P. O. Box 272, Monticello, Fla.

Exchange.—Lepidoptera of the Western United States for rare American or tropical specimens. C. W. Herr, Woodburn, Ore. R-3.

Wanted—Insects in exchange for Japanese insects or to buy. Tell me your wishes. Hiromu Yamamoto, Matsuo-Kozan. Iwategun Iwateken, Japan.

Would like to exchange Southern California insects for any North American Mutillidae (wingless wasps or velvety ants). Curtis Brown, 2950 G St., San Diego, California.

Wanted.—To get in touch with Specialists who will make determinations for a share of our duplicates. We have many undetermined specimens from all parts of Iowa.—H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Wanted.—Communication with anyone who has or is collecting Lepidoptera in Burlington County, New Jersey. Also anyone having a microscope for sale.—E. P. Darlington, New Lisbon, N. J.

Wanted for Cash or Exchange.—North American Butterflies in series especially from type localities and remote places. C. F. dos Passos, Mendham, New Jersey.

Wanted—Specimens of North American **Cephidae**. Will make determinations and exchanges for purposes of revising the group. Donald T. Ries, Department of Entomology, Cornell University, Ithaca, N. Y.

Wanted—Collectors desiring living pupae with cocoon attached to natural food plant of Michigan, *Samia*, *Columbia* or hybrid with *S. Cecropia*, write W. S. McAlpine, 575 Townsend St., Birmingham, Mich.

Wanted—North American Chrysididae for exchange or determination, with privilege of retaining duplicates. W. G. Bodenstein, Department of Entomology, Cornell University, Ithaca, New York.

Wanted—Chloropidae (Oscinidae) of the world. Study, determination or exchange. C. W. Sabrosky, Entomology Dept., Michigan State College, East Lansing, Mich.

Wanted—Dr. Karl Eller of the Zoological Institute, of the University of Munich, who is at present engaged in a critical study of the races of *Papilio machaon* and related species, particularly desires to secure for study, as loans or otherwise, material of the American representative of this group. To be of service to him material must bear exact localities, altitudes when possible, and dates of capture. Dr. Eller has largely completed his work in the Old World forms and requests the cooperation of American students so that his investigations may be of broadly comprehensive character.

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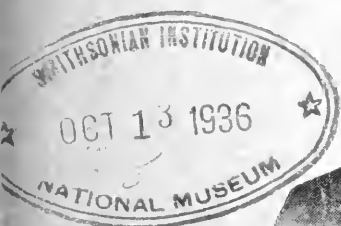
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OCTOBER, 1936

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No. 8



HENRY CHRISTOPHER MCCOOK,
1837-1911.

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Flight-Stridulation in American Acridians. (Orthop.: Acrididae).

By F. B. ISELY, Trinity University, Waxahachie, Texas.

In 1908 Karny¹ experimentally demonstrated the fact that in a number of European acridians, only the hind wings are used in making flight noises. In commenting on Karny's experiments, Uvarov² suggests "that the sound results from the fan-like opening and closing of the wing during flight; there is no need for the wing to close altogether (this does not happen), as the sound may be produced by the partial slackening of the membrane between the veins and the subsequent sudden expansion."

Current American authors, however, Blatchley,³ and Comstock and Herrick,⁴ Curtis and Guthrie,⁵ and many others still hold to the theory that during the flight certain species "rub together the upper surface of the front edge of the hind wings and the under surface of the wing-covers" and that this friction results in a crackling sound.

Morse,⁶ Allard,⁷ and Snodgrass⁸ on the other hand, express doubt as to just how the flight-noises are produced.

The literature on orthopteran musicianship is fairly volum-

¹ H. Karny, Ueber das Schnarren der Heuschrecken. *Stett. ent. Ztg.* 49: 112-119, 1908.

² B. P. Uvarov, Locusts and Grasshoppers. Imperial Bureau of Entomology, pp. 30-31, 1928.

³ W. S. Blatchley, Orthoptera of Northeastern America, pp. 188-89, 1920.

⁴ J. H. Comstock, A. B. Comstock, and G. W. Herrick, Manual for the Study of Insects, p. 56, 1931.

⁵ W. C. Curtis and Mary J. Guthrie, Textbook of General Zoology, p. 447, 1933.

⁶ A. P. Morse, Orthoptera of New England, pp. 239-40, 1920.

⁷ H. A. Allard, "Our Insect Instrumentalists and Their Musical Technique." *Ann. Rept. Smithsonian Inst.*, p. 568, 1928.

⁸ R. E. Snodgrass, "Insect Musicians, Their Music and Their Instruments." *Ann. Rept. Smithsonian Inst.*, pp. 411-12, 1923.

inous. Allard, Fulton, and Snodgrass, in a number of special papers, have given attention to the technique of these musical instrumentalists, especially the Tettigoniidae (katydids, cone-heads, meadow grasshoppers) and the Gryllidae (crickets).

The sawing, strumming, snapping notes of the acridians (short-horn grasshoppers) have received less attention than the "fiddle-bow" music of the tettigoniids and the gryllids. However, as far as the technique of flight-stridulation is concerned, the snapping, whirring, crepitating, crackling, clattering, rattling, clacking noises, when explained by American writers, are explained as cited above.

While an audible wing flutter is frequently made by many acridian species, flight-singing is perfected among a number of the "band-winged locusts," the Oedipodinae. Some of the Oedipodinae appear to crepitate only at the flight take off, others at the landing, some while hovering in mid air, and still others rattle during the entire period of their flight. Usually only the males are active in making stridulous calls, and these noise-making activities appear to be entirely voluntary and under the control of the individual while in flight.

The "Snapping Locust," *Circotettix verruculatus* (Kirby) is the premier stridulator of the Northeastern United States.⁹ It is, however, in the Rocky Mountain region that we have a number of our most conspicuous "Cracker Locusts." *Circotettix rabula rabula* Rehn and Hebard is the species found in the lower mountain altitudes up to timber line, but above timber line *Circotettix rabula altior* Rehn is the dominant flight stridulator.¹⁰ On a number of occasions in various parts of the Colorado Rockies, I have observed these rattlers holding their resounding canyon carnivals.

The musical performance of *Circotettix rabula rabula* is quite spectacular, and its "clatter" may be heard for over a quarter of a mile. On a warm sunshiny day a disturbed male may mount into the air to an elevation of thirty or forty feet.

⁹A. P. Morse, Orthoptera of New England, p. 479, 1920.

¹⁰Morgan Hebard, The Orthoptera of Colorado. *Proc. Acad. Nat. Sci.*, Philadelphia, lxxxii: 363, 1929.

Weaving up and down in zigzag flights, he gives forth a reverberating clicking and snapping which varies in volume with each repeated upward bound. This individual sing-song often serves as a signal for other male *C.r. rabula* rattlers to join in what soon may become a far reaching canyon chorus.

The fact that resting out-of-sight individuals of the same species take spontaneously to the air in response to the flight song or rattle of another individual of the same species, that has been put to flight by the movements of a field observer, clearly suggests that auditory stimulation and response actively functions among these grasshoppers. This auditory response behavior can be satisfactorily demonstrated by those who study these insects as they live under out-of-door conditions. It seems to me that this behavior satisfactorily answers affirmatively the query as to whether or not these acridians actually hear.

In Texas, as far as I have observed, the only really noisy flight stridulator is *Circotettix rabula nigrifasciatus* Beamer. This species I have found in the rugged, broken, cap-rock hills of the Texas Panhandle.¹¹ It is worthy of note that the loudest crepitators among the acridian flight stridulators are associated with rugged topography, i.e. bad lands, jagged ravines, boulder covered mountain sides, etc. Timber margin stridulators as a rule are more noisy than species out the open prairies or plains.

There are twenty-two species among the Oedipodinae within Northeastern Texas.¹² While many of these make flight noises, none of them take front rank as flight singers, and only a few of the genera *Arphia* and *Spharagemon* qualify as fair crepitators.

Recently while working with two of my students on the technique of Orthopteran musicians,¹³ it occurred to me that it would be worthwhile to test the Karny-Uvarov explanation of

¹¹ F. B. Isely, "Field Notes on Texas Orthoptera." ENTOMOLOGICAL NEWS, xlv: 6-7, 1934.

¹² F. B. Isely, "Acridian Researches Within Northeastern Texas" (Orthoptera). ENTOMOLOGICAL NEWS, xlvi: 69-71, 1935.

¹³ E. L. Dunaway and Jean Wilson, "Orthopteran Musicians, Their Sending and Receiving Instruments." 1935 Abstracts, North Texas Biological Society, p. 1, 1935.

flight sound production among the European acridians, against the current explanation of American authors, cited above, as to the technique of noise-making by our acridians during flight.

EXPERIMENTAL TESTS.

Accordingly, during the past summer, I have on several occasions undertaken to test experimentally the relation of the tegmina to flight and to flight-stridulation. The usual testing method is to visit favorable habitats of the desired species, capture a number of actively stridulating males, and carefully clip at their bases the tegmina or fore wings of a number of these specimens. Operated specimens and controls should not be crowded while they are being held for experimental testing. Also one can not expect to get the best results with specimens that are kept long in captivity or have been exhausted by experimentation. For that reason I have usually carried on observations with specimens very soon after they are captured and operated upon.

For testing, operated and control individuals of the same species may be liberated, preferably in an open area, where their flight and stridulating activities may be observed. In this way one may make comparisons both as to flight and as to flight-stridulation.

Seven species, *Arphia simplex* Scudder, *Spharagemon collaris cristatum* (Scudder), *Spharagemon equale* (Say), *Chortophaga viridifasciata* (DeGeer), *Encoptolophus sordidus costalis* (Scudder), *Hadrotettix trifasciatus* (Say), *Hippiscus rugosus* (Scudder), have been thoroughly checked and a number of other species more or less incidentally. In these species the hind wing expanse is comparatively large and the main veins of these wings are strongly thickened. All tests clearly show that the tegmina are unnecessary to flight noises.

As would be expected, the removal of the fore wings definitely impairs directed and controlled flight. However, operated specimens of all the seven species listed are capable of hop flights, and *S. equale* and *H. trifasciatus* fly with fair directness fifteen to twenty feet.

As far as flight-stridulation is concerned, in several cases noise-making is more apparent with operated specimens, that is to say, with the tegmina removed than with normal specimens. This is probably due to the fact that the hind wings are more vigorously used in operated specimens in trying to fly due to the absence of the fore wings. It is fair to say that in most instances the flight song of the operated specimens is characteristic of the species.

OTHER EXPERIMENTERS.

H. A. Allard of Washington D. C. and Gordon Alexander of the University of Colorado have recently experimented with acridian flight stridulators.

Mr. Allard writes: "I have kept your suggestion in mind and on a recent collecting trip in the Bull Run Mountains of Virginia I made some experiments along the lines you suggested. The grasshopper *Spharagemon bolli* was common and actively producing its crepitations along the wooded cart-roads. I captured a number of males of this species, carefully clipped off their fore wings, or tegmina, and allowed them to fly. As you have observed with other flight stridulators, these were able to fly fairly well with the tegmina removed and produced the characteristic snapping sound which they commonly make in flight. These crepitations, however, seemed to be somewhat less controlled than before. In addition to the males, I captured a female, clipped off her tegmina and gave her freedom to fly. She also produced an audible rustle without the upper wings.

There is not any doubt but that these flight "singers" can produce their characteristic sounds even when the tegmina are removed. I think it is plain enough that the wing covers need not be concerned with the flight crepitations that one hears."

Dr. Alexander reports under date of October 15, 1935: "I have carried out your experiments on four species of local Oedipodinae. These were: *Circotettix rabula rabula* R. & H., *Trimerotropis suffusus* Scudder, *Trimerotropis cincta* (Thomas), and *Arphia pseudonictana* (Thomas). These are among our noisiest and most persistent stridulators.

The experiments were carried out in the field,—all specimens

used having been collected after being heard "rattling" during flight. In each species, a specimen or more were prepared by having the tegmina cut off. When these were released they all made the rattling noise in flight. In every case the results were the same.

I also tried an additional experiment using a large pinning forceps of dental steel. I compressed the wings, a little bit at a time, from the base to the outer margin. This crushed the veins so that they lost their stiffness and the whole wing became flabby. When such specimens were released, they could fly about as well as before but did not make the rattling sound. Additional specimens were tried out with the tegmina intact but with the veins in the wings crushed. These fly quite well (one of them got clear away from me), but they did not make the rattling sound in any case which I tried. This additional experiment was tried with all four species named above, and in all cases the specimens flew fairly well—but without making the rattling noise. Incidentally, the crushing of the veins prevents the insect from folding the wings in pleats. At rest, the wings protrude from beneath the edge of the tegmina.

The first three species above were collected and studied in the upper end of Gregory Canyon, elevation 6,800 feet; the *Arphia* was caught in our yard at Boulder."

DISCUSSION.

Snodgrass¹⁴ has shown that the third axillary sclerite and its muscles constitute the motor elements in the flexor movements of the hind wings of acridians. He further points out that there are two independent wing movements—flight movements and flexion-extension movements. It is in this flexor-extensor mechanism, i.e. the rapid and independently executed fan-like opening and closing or even partial opening and closing of the hind wings, that we find an efficient stridulatory mechanism and the real source of flight noises. In fact this flexor-extensor apparatus seems to be specifically adapted for making controlled and directed flight music.

¹⁴ R. E. Snodgrass, "How Insects Fly." *Ann. Rept. Smithsonian Inst.*, pp. 397, 410, 1929.

In short, Karny's 1908 findings apply to American acridians as well as European acridians. The flexor-extensor mechanism of the hind wings with their rapid fan-like folding and closing produces the stridulous flight songs. Field behavior of a number of acridian species supports the conclusion that flight noises are heard and responded to by other individuals within the species concerned.

To summarize:

1. The tegmina are not concerned in flight-stridulation.
2. Acridian flight noises emanate from the hind wings, and require stiff veins for their production.
3. There is a definite correlation between the volume of flight songs and the topography of the habitat.
4. Grasshoppers hear and react to flight crepitations.

A New Bee of the Genus *Coelioxys* from Nebraska (Hymenopt.: Megachilidae).

By ROSCOE E. HILL, University of Nebraska, Lincoln.

Coelioxys bisoncornua new species.

♀. Length 12-14 mm. Black, with all of the legs except the coxae dark red, venter and extreme lateral edges of abdominal tergites more or less obscurely reddish.

Clypeus opaque, finely rugose, its apical margin bidentate, almost bare except for a thin ochreous apical fringe and a similar though less evident fringe of short hair about the epistomal suture. Supraclypeus and face similarly but more finely sculptured, with a faint carina between antennae which bifurcates to throw the anterior ocellus into a slight depression. Face thinly clothed with short appressed, yellowish white hair. Vertex comparatively bare, each of the strong dense punctures with an inconspicuous minute hair in its center, punctures fine back of ocelli but rather coarse and crowded laterally, a small opaque impunctate spot contiguous to superior orbital margin. Eyes green with very short hair. Antennae black, joint 3 longer than 4 and twice as long as 2. Mandibles dark reddish with black teeth. Cheeks coarsely punctured and moderately clothed with short white hair, anterior margin carinate.

Mesoscutum punctured like sides of vertex, a little less densely so on disk. Scutellum densely rugose, prominently angulated behind, the rugose lateral spines moderate in length

and broad, their points incurved so as to resemble a pair of bison horns. Propodeum opaque, finely rugose, enclosure satiny and minutely rugose, the sides of the propodeum angled and clothed with long, rather dense, shaggy, white hair. Mesopleura punctured like mesoscutum, their anterior margins carinate, all margins bounded by thin whitish hair lines which join under the tegulae to form a hair spot behind the dark testaceous and well-developed lateral pronotal carinae. Mesoscutum practically bare, without lines or spots of squamose hairs, except a short line behind tegulae, the anterior margin with a rather thin fringe of short, erect, pale ochreous hair. Mesoscutellar suture with two spots of white appressed hairs and a similar fringe along the posterior margin of the scutellum. Metanotum with a dense fringe of long, erect, whitish hair. Tegulae ferruginous.

Wings hyaline, brownish, becoming clouded apically, nervures and stigma dark brown, basal nervure meeting transversomedial, first recurrent nervure meeting second submarginal cell about same distance from base as second recurrent nervure from apex. Legs with short white pubescence, that on the tarsi within golden.

Abdomen slightly shiny, strongly punctured; the punctures on tergite 1 very close and rather fine; tergites 2 and 3 more coarsely punctured, those anterior of the entire and hairless sulci close, posterior of the sulci punctures are more remote and with very minute punctures interspersed among the larger ones, especially so on disk; tergite 3 with a shining, minutely punctured, otherwise impunctate, transverse band on disk posterior to sulci; tergites 4 and 5 shiny, without sulci and with coarse punctures uniformly separated for about the width of one; tergite 6 finely and densely punctured, broad at base and gradually narrowed to tip which is broadly rounded, a fine longitudinal carina running about two-thirds its length, on either side of which the tergite is deeply depressed at apex, a broadly rounded, though slight, lateral projection on each side near apex which is not reflexed. Tergites 1-5 with narrow, entire apical fasciae of squamose, white hairs, but without basal bands. Sternites 2-5 subapically with a more or less distinct transverse red line. Sternites 1-4 uniformly and coarsely punctured; sternite 5 with coarse punctures which are slightly more dense at apex; sternite 1 with a median white hair spot, but no apical margin, apices of 2-5 with thin entire hair bands. Apical sternite slightly longer than apical tergite, broad and gradually narrowed to near apex, where it is emarginated almost at a right

angle to form a narrow, more or less acute, apical projection, the punctures coarse and somewhat more close and elongate apically, a median carina running over half its length, the margins of the sternite finely pale ciliate.

♂. Length 11-13 mm. Like ♀ except that clypeus and face below antennal level is covered with a dense mat of appressed silvery hairs, the vertex subuniformly and somewhat more finely punctured, first recurrent nervure meeting second submarginal nearer base than second from apex, tergites 2 and 3 with entire sulci, those on 4 and 5 medially interrupted, tergite 4 less closely and tergite 5 more closely punctured, the sternum without the distinct red lines. Sulci on tergites 3-5 with medially interrupted hair fasciae, that on 2 without hair. Cheeks below broad and without a beveled or grooved area. Anterior coxae with short inconspicuous spines. Apical tergite closely punctured and with a basal hair band, its apical margin truncate, angularly slightly produced and feebly emarginate medially at the tip, below which is a short, broad, blunt terminal spine on each side, the extreme sides with longer, sharper, curved spines, segment 7 showing ventrally as a conspicuous hairy spine. Tergite 5 without lateral spines. Tergite 2 without foveae. Sternite 4 entire.

Holotype.: Halsey, Thomas County, NEBRASKA, August 9, 1912, on *Helianthus petiolaris* (J. T. Zimmer), ♀. *Allotype*: Gordon, Sheridan county, NEBRASKA, August 29, 1905, on *Helianthus petiolaris* (D. E. Winchester), ♂. *Paratypes*: Lincoln, NEBRASKA, August, 1 ♂; Neligh, Nebraska, August (M. Cary), 1 ♂; Blue Rapids, KANSAS, September 12, 1908, on *Helianthus grosscarratus* (O. A. Stevens, N. 1127), 1 ♀.

The male from Neligh differs from the other two males in the wing venation, agreeing with the females in this respect. The female from Blue Rapids, Kansas, does not have the distinct narrow transverse red lines on the sternum; otherwise it agrees with the holotype.

All the above specimens are in the permanent collection of the University of Nebraska at Lincoln.

The general aspect of this handsome species is much like that of *C. edita* Cresson (= *deplanata* Cresson), to which it is most closely related, but from which it may easily be separated by its prominently angulated scutellum (rounded behind in *edita*), the complete lack of the line of appressed squamose

hairs dilated into two spots on anterior border of the meso-scutum and the similar line on posterior margin of the scutellum which are so conspicuous in *cdita*, the darker red legs, the narrower fasciae, the presence of the minute punctures on tergites 2 and 3, the more poorly developed occipital fringe (well developed in *cdita*), the more deeply apically depressed sixth tergite, the more uniform puncturation of the penultimate sternite (punctures much finer and close on apical third than at base in *cdita*), and other differences. From *C. sculptifrons* Crawford in the generally closer abdominal puncturation, especially on tergites 2 and 3 apicad of the transverse sulci, the much closer puncturation of tergite 6 (in *sculptifrons* the punctures are over a puncture width apart basally), the subuniformly coarsely and rather closely punctured sternite 5 (in *sculptifrons* this is coarsely punctured basally but minutely and very closely punctured apically), the bidentate apical margin of the clypeus (clypeus with 5 short apical teeth in *sculptifrons*), and other differences. From *C. rudis* Cockerell it is known by the wholly red femora (basal half black in *rudis*), the lack of the sub-apical impunctate band on the first tergite, the dentate margin of the clypeus (straight and simple in *rudis*), and other characters. Aside from *cdita*, *sculptifrons*, and *rudis* the character of the apical segment and the red legs will distinguish it from our other species of the genus. The bispinose tip of tergite 6 in the male distinguishes it from *C. cdita* as well as all other allied species.

A New Robber Fly, with a Key to the Species of *Callinicus* and *Chrysoceria*. (Diptera: Asilidae).

By J. WILCOX, Bureau of Entomology and Plant Quarantine,
United States Department of Agriculture.

The genera *Callinicus* Loew and *Chrysoceria* Williston are separated from the remainder of the *Dasygogoninae* that lack a terminal claw-like spur on the fore tibiae by the presence of a pair of stout, inwardly directed spines at the apices of the middle tibiae. The species here described appears to link these two genera and unless some structural character can be found

to separate them, there seems to be no reason for retaining *Chrysoceria*.

KEY TO THE SPECIES.

1. Abdominal segments 2-5 largely bright yellow pollinose, the remainder of these segments shining black; wings hyaline, the anterior crossvein before the middle of the discal cell. (*Chrysoceria*) 2
- Abdominal segments 2-5 largely shining brownish or yellowish red, at most the posterior margins pollinose; wings yellowish or brownish, the anterior crossvein at or beyond the middle of the discal cell (*Callinicus*) 3
2. Femora black; central stripe of the mesonotum extending to the scutellum and confluent with the intermediate postsutural black spots, the presutural black spots extending to the lateral margins and to the humeri; only segments 1-5 of female abdomen pollinose; length 11-15 mm. (Oreg., Wash., Calif., Mont., Wyo.) *pollenia* Cole
- Femora yellow; central stripe of mesonotum not reaching the scutellum and not confluent with the postsutural spots, the presutural spots small and broadly separated from the lateral margins and humeri by golden pollen; segments 1-6 of female abdomen pollinose; length 10-14 mm. (Calif., Ariz., Utah) *pictitarsis* Bigot
3. The abdomen yellowish red, the first segment and male segments 2-6 and female segments 2-5 with posterior golden pollinose fasciae; wings yellowish; length 13-17 mm. (Calif.) *vittatus*, new species
- The abdomen reddish-brown, the sides of the first segment and the small posterior corners of male segments 2-5 and female segments 2-4 yellowish-gray pollinose; wings brownish; length 13-19 mm. (Calif.) *calcaneus* Loew

Callinicus vittatus n. sp.

♂. Length 16 mm. Head densely golden pollinose and pilose, the palpi and proboscis shining black. Antennae yellowish, the third joint apically and the style black; first two joints subequal in length and yellow haired; the third joint one and three-fourths times the length of the first two joints together; the style one-fifth the length of the third joint and with a minute apical bristle.

Mesonotum and scutellum yellowish in ground color, the central stripe and the intermediate spots black; densely yellowish pollinose, the central stripe and the transverse suture medially grayish pollinose, the intermediate spots dull black. Nimmerous hairs and bristles golden. Pleurae black in ground color,

the coxae yellowish, both densely yellowish pollinose and pilose, the hairs of the coxae yellowish white.

Abdomen and genitalia shining yellowish red, segments 1-6 with posterior golden pollinose fasciae, these fasciae entire on segments 1-5 but somewhat narrowed at the middle, the rather numerous hairs yellowish.

Legs light yellowish red, the hairs and bristles golden; claws black, the bases reddish; pulvilli light brown; empodium reddish; middle tibiae with a pair of stout, apical, inwardly directed spines.

Halteres yellowish. Wings yellowish, the costal cell quite densely so, veins golden, brownish apically and posteriorly.

♀. Length 17 mm. Very similar. The third antennal joint missing. The thorax greased, in this condition the median and intermediate spots of the mesonotum plainly black. Segments 1-5 of abdomen with entire posterior pollinose fasciae, segments 6-8 bare of pollen.

Holotype: ♂, Sequoia National Park, CALIFORNIA, Potwisha, elevation 2,000-5,000 feet, VI-20 '29 (E. C. Van Dyke); in the California Academy of Sciences. *Allotype*: ♀, same data, V-28 '29; in the California Academy of Sciences. *Paratype*: ♂ (length 13 mm.), same data, VI-13 '29; in the writer's collection.

Notes on Intermountain Aphids¹

By G. F. KNOWLTON and C. F. SMITH.

The following report deals largely with aphids infesting range and forest plants in Utah and Idaho. Unless otherwise indicated, collections are in Utah and by the writers.

CINARA LASIOCARPAE (G. and P.). On *Abies lasiocarpa*, summit of Logan Canyon, June 10, 1934 (T. O. Thatcher).

C. FORNACULA Hottes. A male, Navajo Lake, Utah, June 16, 1935, appears to be of this species (Det. M. A. Palmer).

C. FERRISI (Swain). A slide, received through the courtesy of Professor M. A. Palmer, was collected by Paul Rice at Moscow, Idaho, July 21, 1931.

¹Contribution from the Entomology Department, Utah Agricultural Experiment Station. Authorized for publication.

C. GLEHNA (Essig). On *Picea pungens*, River Heights, June 15, 1935 (Thatcher).

PERIPHYLLUS UTAHENSIS (Kult.). On *Salix* at Rexburg, Idaho, June 23, 1935; *Alate vivipara*.—Antennal III, 0.47 to 0.51 mm., with 6 to 11 sensoria; IV, 0.235 to 0.28, with 1 to 4 sensoria; V, 0.17 to 0.22; VI, 0.09 + 0.14 to 0.11 + 0.18 mm. *Apterous vivipara*.—Antennal III, 0.34 to 0.47 mm.; IV, 0.14 to 0.22; V, 0.11 to 0.12; VI, 0.078 + 0.125 to 0.11 + 0.14 mm. Because of the greater relative length of the unguis as compared with the base of antennal VI, the greater development of antennal segments III and IV, and the conspicuous difference in relative lengths of antennals IV and V of alates, the writers consider this material to be *P. utahensis* rather than *P. macrostachyae* (Essig). Also Riverdale and Cleveland, Idaho, September 1, 1935. On *Salix*, Harrisville, June 24, 1935; Hooper, June 3, 1935, in Utah.

P. MACROSTACHYAE (Essig). On *Salix*, Currant Creek, August 16, 1935; Harrisville, June 3, 1935.

PTEROCOMA POPULEA Kalt. On *Populus*, Cowley Canyon, May 16, 1934; Evans, May 13, 1930; Hyde Park; Lark, October 3, 1935; Logan Canyon; Paradise; Salt Lake City, in Utah. Also Rexburg, Idaho, June 23, 1935.

CLAVIGERUS SMITHIAE (Monell). On *Populus*, Grouse Creek, September 28, 1935; Lark, October 3, 1935, in Utah. Also on *Populus* and *Salix* at Rexburg, Idaho, June 23, 1935.

Bipersona hottesi n. sp. *Apterous vivipara*.—Size 2 to 2.5 mm. long; ocular tubercles well developed; antennae pale to dusky; antennal III, 0.82 mm. long, without sensoria; IV, 0.59 to 0.62; V, 0.45 to 0.5; VI, 0.14 + 0.73 to 0.78 mm. long; rostrum exceeding second coxae; rostral IV + V, 0.16 to 0.19 mm. long; hind tibiae 2.25; hind tarsi 0.14; cornicles dark, 0.67 to 0.84; cauda pale to dusky, having a much twisted appearance, hard median portion 0.27 and total length 0.41 mm.

Habitat: Upon wild rose, *Rosa* sp., Big Cottonwood Canyon, Utah, June 29, 1925 (Knowlton). *Type* slide in collection of senior author.

Taxonomy. *Bipersona hottesi* differs from *B. torticauda* (Gill.) in lacking secondary sensoria on antennals III and IV,

in having a shorter rostral IV + V, in possessing blunt to apically enlarged hairs on head and antennae, and in only apical end of hind tibiae being dark.

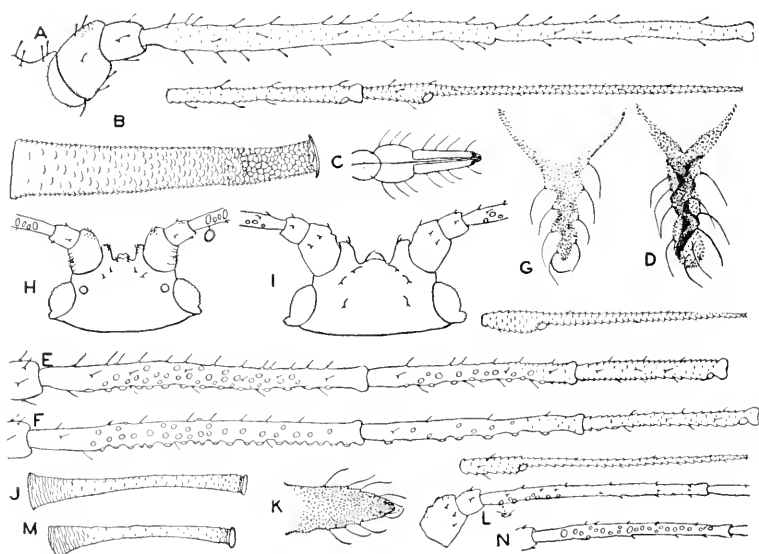


Fig. 1. *Bipersona hottesi* n. sp. Apterous, A to D. *Bipersona torticauda*. Apterous, E, G; alate F. *Macrosiphum zerosalphum*. Apterous, I, J, L; alate II, K, M, N.

B. TORTICAUDA (Gillette). On thistle, Tooele, Utah, June 15, 1915 (C. P. Gillette). The identified slide was secured through the courtesy of Professor M. A. Palmer.

MACROSIPHUM AMEROSIAE (Thos.). On marsh elder, Bozeman and Manhattan, Montana, August 14, 1926 (C. B. Philip). Rexburg, Idaho, June 23, 1935.

M. COWENI (Hunter). In stomach of a lizard, *Sceloporus g. graciosus* at Josepa, Skull Valley, October 2, 1932; on *Artemisia tridentata*, Ash Creek Canyon, April 25, 1935; Hurricane; Mueller Park; Parley's Canyon, in Utah. Also Winder, June 9, 1935; and Stone, Idaho, May 19, 1930.

M. DIRRHODUM (Walk.). On *Rosa*, Blacksmith Fork Canyon, July 18, 1925; Hooper, June 3, 1935; Logan, October 12, 1929; Lake City, July 28, 1926. Also Bozeman, Montana, August 15, 1926 (Philip).

M. ERIGERONENSIS (Thos.). On *Grindelia squarrosa*, Bozeman, Montana, August 17, 1926 (Philip).

M. PACKI Kult. On *Chrysothamnus*, usually *nauscosus*, Beaver, May 3, 1934; Cedar; Cedar City; Clover, October 2, 1932; Glendale, June 27, 1933; Indian Canyon, June 12, 1933; Pintura, May 1, 1934; Riverdale. Also Elk Springs, Colorado, August 18, 1935 (Knowlton).

M. PISI (Kalt.). On alfalfa, Green River, Utah, March 5, 1935. Logandale and Overton, Nevada, April 26, 1935.

M. PSEUDOROSAE Patch. On wild rose, Amalga; City Creek and Emigration Canyons, June 21, 1925; Big Cottonwood Canyon, June 29, 1925; Granite, June 6, 1935; Utah. Also Emigration Canyon, Idaho, June, 1925.

M. ROSAE (L.). On *Rosa*, Mapleton and Provo, Utah, June 7, 1935. Overton, Nevada, April 25, 1935. Puyallup, Washington, August 27, 1932 (A. J. Hanson).

M. SPORADICUM Kult. Cedar Valley, on *Chrysothamnus*, June 13, 1935; Dunbar, September 12, 1935.

M. TARAXACI (Kalt.). Mink Creek, Idaho, July 7, 1935, on dandelion. Puyallup, Washington, July 16, 1933 (A. J. Hanson).

M. ZEROZALPHUM Kult. This yellowish green aphid occurs upon filaree, *Erodium cicutarium*. Winged and wingless females were collected in Utah at Bountiful, Salt Lake City, and Murray, on May 2, 1927, and at Leeds on April 25, 1935. Wingless viviparae were collected at Brigham and Deweyville, April 28, 1927; at Penrose, June 3, 1930; and at Santa Clara, June 25, 1935.

Neotropical Aeshnas Wanted (Odonata).

The undersigned has well on the way a Synopsis of the Neotropical species of the genera *Aeshna*, *Coryphaeschna* and perhaps some allies, to be illustrated by figures of the genitalia, terminal abdominal structures, patterns of the top of the frons

and of the thorax. He will be glad to have the privilege of examining material of the groups indicated (to be returned to their owners), especially of such species as *brevifrons*, *castor*, *colorata*, *coronata*, *dugesii*, *haarupi*, *intricata*, *joannisi*, *litigatrix*, *peralta*, *rufipes*, *unicolor*, *variegata* and *williamsoniana*, and of *Subac Schna* and *Limnetron*; or to identify material of these four genera for a moderate return in duplicates, or to purchase desirable material thereof. Fullest data on localities and dates of capture are especially desired. Each sender of such specimens will receive a copy of the published Synopsis. PHILIP P. CALVERT, Zoological Laboratory, University of Pennsylvania, Philadelphia, Pennsylvania, U. S. America.

Notice of Possible Suspension of Rules of Nomenclature in Certain Cases.

Attention of the zoological profession is invited to the fact that request for the "Suspension of the Rules" has been made in the following cases, on the ground that "the strict application of the Règles will clearly result in greater confusion than uniformity." According to procedure one year's notice is hereby published, "making it possible for zoologists, particularly specialists in the group in question, to present arguments for or against the suspension under consideration."

Note A.—Suspend rules.

Note B.—Insert in Official List with the type as given in parentheses.

INSECTA.—The so-called "Erlangen List" of 1801 to be suppressed.

ORTHOPTERA.—*Locusta* Linn., 1758 (*Gryllus Locusta migratorius* Linn., 1758); *Phaneroptera* Serville, 1831 (*Gryllus falcatus* Poda, 1761); A, B.

HYMENOPTERA.—*Cimex* Olivier, 1790 (*Tenthredo lutea* Linn., 1758); A, B. *Crabro* Fabricius, 1775 (*Sphex cribraria* Linn., 1767); A, B. *Lasius* Fabricius, 1805 (*Formica nigra* Linn., 1758); A, B. *Anthophora* Latreille, 1803 (*Apis pilipes* Fabr., 1775); A, B. *Ichneumon* Linn., 1758 (*Ichneumon catensorius* Linn., 1758); A, B. *Pimpla* Fabr., 1804 (*Ichneumon instigator* Fabr., 1793); A, B. *Ephialtes* Gravenhorst, 1829 (*Ichneumon manifestator* Linn., 1758); A, B. *Bracon* Fabr., 1805 (*Bracon minutator* Fabr., 1798); A, B. *Pompilus* Fabr., 1798 (*Pompilus pulcher* Fabr., 1798); A, B. *Bethylus* Latreille, 1802 (*Omalus fuscicornis* Jurine, 1807); A, B.

Prosopis Jurine, 1807 (*Sphinx signator* Panzer, [1798]); A. B. *Ceraphron* Jurine, 1807 (*Ceraphron sulcatus* Jurine, 1807); A. B. *Torymus* Dalman, 1820 (*Ichneumon bedeguaris* Linn., 1758); A. B. *Proctotrupes* Latreille, 1796 (*Proctotrupes brevipennis* Latreille, 1802); A. B. *Sphinx* Linn., 1758 (*Sphinx flavipennis* Fabr., 1793); A. B. *Ammophila* Kirby, 1798 (*Sphinx sabulosa* Linn., 1758); A. B.

LEPIDOPTERA. — In interpreting the generic names assigned by Freyer in his *Neuere Beiträge zur Schmetterlingskunde* to the species there described, each species is to be regarded as having been described by Freyer as belonging to the genus cited by him at the head of each description and not to the genus with which he actually associated the specific name. For example, Freyer described, under the genus *Hipparchia* Fabricius, a species to which he gave the specific name *criphyle*, and which he proceeded to name *Papilio criphyle* Freyer. Freyer is to be deemed to have described this species under the name *Hipparchia criphyle* and not under the name *Papilio criphyle*. A.

Potamis Hübner, *Rusticus* Hübner, and *Mancipium* Hübner to be suppressed in favor of *Morpho* Fabr., *Helicopsis* Fabr., and *Pontia* Fabr.; A.

LEPIDOPTERA (RHOPALOCERA). — *Euploca* Fabr., 1807 (*Papilio corus* Fabr., 1793); A. B. *Satyrus* Latreille, 1810 (*Papilio actaca* Esper, [1780]); A. B. *Argynnis* Fabr., 1807 (*Papilio paphia* Linn., 1758); A. B. *Vanessa* Fabr., 1807 (*Papilio atalanta* Linn., 1758); A. B. *Euthalia* Hübner, [1823] (*Papilio lubentina* Cramer, 1777); A. B. *Nymphidium* Fabr., 1807 (*Papilio caricae* Linn., 1758); A. B. *Colias* Fabr., 1807 (*Papilio hyale* Linn., 1758); A. B.

Species in parentheses are to be declared the types: *Lycoides* Hübner, [1823] (*Papilio argyrognomon* Bergstrasser, 1779); A. *Agriades* Hübner, [1823] (*Papilio glandon* Prunner, 1798); A. *Polyommatus* Latreille, 1804 (*Papilio icarus* Rottenburg, 1775); A. *Euchloë* Hübner, [1823] (*Euchloë ausonia* Hübner var. *esperii* Kirby, 1871), *Princeps* Hübner, [1807] and *Orphicides* Hübner, [1823] (*Papilio demodocus* Esper, 1798), *Carcharodus* Hübner, [1823] and *Spilothyrus* Duponchel, 1835 (*Papilio fritillarius* Poda, 1761); A.

C. W. STILES,

Acting Secretary, International
Commission on Zoological
Nomenclature.

May 1, 1936
U. S. National Museum
Washington, D. C.

Entomological Literature

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

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

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

New Titles of Periodicals and Serials Referred to

14. *Archivos do Instituto Biologico, Sao Paulo.*

GENERAL.—Armstrong & Carpenter.—Insect coloration. [31] 138: 242-243. **Berger, L.**—Nomenclature, simplifications or complications? [Lambillionea] 1936: 123-126. **Bryson, H. B.**—Technique for rearing subterranean insects. [103] 9: 73-84, ill. **Carrick, R.**—Experiments to test the efficiency of protective adaptations in insects. [36] 85: 131-140, ill. **Clausen, C. P.**—Insect parasitism and biological control. [7] 29: 201-223, ill. **da Costa Lima, A. M.**—Terceiro catalogo dos insectos que vivem nas plantas do Brasil. Rio de Janeiro, Brazil. 460 pp. *Insectos do Brasil.* [O Campo R. d. Janciro] 1935: Aug. p. 20-24, Sept. p. 26-27, Oct. p. 11-15, Nov. p. 31-35, Dec. p. 11-19, 1936: Jan. 14-18, Mar. p. 17-23, Apr. p. 12-16, cont. **Crabb, E. D.**—Faulty titles of zoological papers. [Univ. Colo. Studies] 23: 293-304. **Creighton, J. T.**—Newell Entomological Society. [12] 29: 634. **Felt & Rankin.**—Insects and diseases of ornamental trees and shrubs. Macmillan Co., New York, 1936. xix + 507 pp., ill. **Flanders, S. E.**—A biological phenomenon affecting the establishment of Aphelinidae as parasites. [7] 29: 251-255. **Fletcher, T. B.**—Stridulation in insects. [107] A, 11: 68. **Geiser, S. W.**—A century of scientific explora-

tion in Texas. Part 1. 1820-80. [Field & Laboratory] 4: 41-55. **Hayward, K. J.**—Six months Collecting along the Alto Parana, Argentina. [Proc. & Trans. S. London Ent. & N. H. Soc.] 1935-36: 55-83, ill. **Holik, O.**—A propos de l'emploi des designations "minor," "nana," "minuscule. [Lambillionca] 1936: 148-149. **Jaeger, E. C.**—The California deserts. A visitor's handbook. Chapter 5. Insects and their near relatives. [Stanford Univ. Press] 207 pp., ill. **Jeannel, R.**—Ancienete des insectes. [Rev. Franc. Ent.] 3: 101-106. **McLaine, L. S.**—A new phase of insect distribution by means of flood waters. [4] 68: 141. **Mellanby, K.**—Humidity and insect metabolism. [31] 138: 124-125. **Pearse, A. S.**—The migrations of animals from sea to land. [Duke Univ. Press.] 176 pp. **Pratt, J. G.**—Photomicrography of opaque objects. Overcoming the big obstacle-lack of depth of focus. [Amer. Photography] 1936: 348-354, ill. **Tietz, H. M.**—A novel light trap. [12] 29: 462, ill. **Weiss, H. B.**—Entomologists and entomological publications. [12] 29: 635-636. **Wolcott, G. N.**—"Insectae Borinquenses." A revised annotated check-list of the insects of Puerto Rico. With a host-plant index by J. I. Otero. [Journ. Agr. Univ. Puerto Rico] 20: 1-627, ill. **Wormser & Hayes.**—The permanent preservation of insects. [19] 31: 111-128, ill.

ANATOMY, PHYSIOLOGY, ETC.—**Alexandrov, W. J.**—Permeability of chitin of some dipterous larvae and the method of its study. [Acta Zool.] 16: 1-19. **Anderson, W. H.**—A comparative study of the labium of coleopterous larvae. [Smithson. Misc. Coll.] 95, no. 13, 38 pp., ill. **Andre & Pratt.**—The toxicity of certain stomach poisons to the June beetle, *Phyllophaga implicita*. [Iowa St. Coll. Journ. Sci.] 10: 243-248. **Berge, S.**—A new hereditary deformation of thorax of *Drosophila melanogaster*. [Meldinger Norges Landbrukshiskole] 16: 470-486, ill. **Dreher, K.**—Bau und Entwicklung des Atmungssystems der Honigbiene (*Apis mellifica*). [46] 31: 608-672, ill. **Eggers, F.**—Kritische Bemerkungen zur Halterenfrage. [34] 115: 186-190. Das Frommelfeltschutzgitter bei *Calocampa*. [34] 115: 212-217, ill. **Evans, A. C.**—Histolysis of muscle in the pupa of the blow-fly *Lucilia sericata*. [107] A, 11: 52-54, ill. **Glover & Richardson.**—The penetration of gaseous pyridine, piperidine and nicotine into the body of the American cockroach, *Periplaneta americana*. [Iowa St. Coll. Journ. Sci.] 10: 249-260. **Gontarskai, H.**—Die Wachserzeugung der Ar-

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A, 11: 35-44, ill. **Zavrel, J.**—Endokrine Hautdrüsen von *Syndiamesa branicki* (Dipt.) [Publ. Fac. Sci. Univ. Masaryk, Brno] No. 213, 18 pp., ill. **Zeuner, F. E.**—The prothoracic tracheal apparatus of Saltatoria. [107] A, 11: 11-21, ill.

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SPECIAL NOTICES.—**A Monograph** of the British Neuroptera. By F. J. Kellington. Vol. 1. 269 pp., ill. [Ray Soc., London]. **Plant Protection** Lenin Academy of Agricultural Sciences in USSR, Institute of Plant Protection. Fasc. 1-, 1935. Each fasc. is separately paged all in Russian, but contents also given in English. Mostly papers on pests and their control. Not otherwise cited in this list.

THE GENITALIA OF THE TINEINA. By F. N. PIERCE and Rev. J. W. METCALFE, 1936, pp. 116, 68 plates. (Published by F. N. Pierce at Oundle, Hampshire, England.) There is probably an increasing number of people who are interested in scientific pursuits as a hobby, but are not satisfied with merely making collections of specimens. They have more ambitious aims, they would like to make positive contributions to scientific knowledge. What can they do? There is urgent need for more workers in taxonomy, but the revision of groups of insects is no easy matter. Such work, or even the description of new species, requires time and experience, and large resources in the way of collections and literature. It may often be a good plan for a young worker to concentrate on some relatively small group, and one could cite many cases in which this has been done with good results. But there are two types of work which are in themselves fruitful, and at the same time do not require large libraries or other facilities. One is the observation of habits and life histories, a practically inexhaustible field, too little cultivated in this country. Fabre, who made no pretence of being an expert taxonomist, wrote fascinating books on the behaviour of insects. Peckham, no specialist on Hymenoptera, described the nesting of wasps in what we now regard as a sort of classic. For such workers, dealing necessarily with relatively few species, it is usually possible to find experts who will determine the species. The other type may be described as comparative morphology, leading to the discovery of structures which shed new light on evolution and classification, and often on general biological problems. For this work it is necessary to have series of accurately identified specimens; but if

this was formerly an obstacle, it is less so today, since the various museums and private collections have accumulated vast numbers of duplicates which can readily be spared for anatomical studies. The work is laborious, but very interesting, and any one who has tried it will be surprised to find how many structures there are in an insect, which the ordinary taxonomist has never observed. Perhaps the greatest difficulty concerns the illustrations, which require skill in drawing, and are expensive to publish. There is a new process, however, which cuts down the cost of publishing figures very considerably.

A leading worker in this morphological field is Mr. F. N. Pierce, whose studies of the genitalia of European Lepidoptera have done much to clarify the conception of genera and species, and have been a standing challenge to those old-fashioned lepidopterists who recognized only the obvious external characters. He has now extended these studies to the "micros," where they are most needed, and after publishing an account of the Tortricidae (1921), has had the courage to attack that vast complex the Tineina or Tineoidea. So far as possible, all the British species are dealt with, with a figure of the genitalia of each, and a short description (abbreviated as much as possible on account of the cost of printing). In the course of the work, no less than seven species (four new) have been added to the British lists. Some generic revisions are suggested, but the authors have felt that some specialist who knew the genera of the world should follow up their suggestions, and make the revisions which appeared desirable. In a few cases, pairs of supposed species have proved identical, but when the genitalic characters were found to be recognizable though slight, the species were accepted as valid. There are a few cases in which the genitalia show no differences, yet other characters (notably those derived from the life history) indicate that the species concerned are really different. A noteworthy example of this sort is afforded by *Yponomeuta padellus* and *Y. malinellus*. The writer of this review is, of course, wholly incompetent to discuss the details, but he is greatly impressed by the magnitude of the work, the care with which it has been done, and its obvious great importance to lepidopterists all over the world. It is also evident that similar studies on other faunae will be most fruitful of interesting results.—T. D. A. COCKERELL.

Prof. W. M. Wheeler, emeritus professor of entomology at Harvard University, has been elected an honorary fellow of the Royal Society of Edinburgh, according to *Science* for July 31, 1936.

A MONOGRAPH OF THE BRITISH NEUROPTERA by FREDERICK JAMES KILLINGTON, Editor of the Transactions and Journal of the Society for British Entomology. Vol. I, pp. xix, 269, 68 text figures, 15 plates. London Printed for the Ray Society. Sold by Bernard Quaritch, Ltd., 11 Grafton St., New Bond St., London, W. I. 1936. This volume (No. 122 of the Series) is issued to the subscribers to the Ray Society for the year 1935. Price 25 shillings.—This book is of importance to students of Neuroptera in all parts of the world by reason of its detailed account of the morphology of adult and immature stages of these insects. Chapter I, The Imago, consists of 67 pages, of which 59 (or more than one-fifth of the whole text) deal with the external morphology, the remaining 8 with the internal morphology. In treating of the exterior of the body, the Hemerobiidae have been selected for a more detailed account, "mainly for two reasons: firstly, because it includes approximately half of the British genera and species of Neuroptera; secondly, because the sclerites are for the most part well chitinized and pigmented and consequently, except in one or two regions, well defined." Following the morphology of the Hemerobiidae, that of the Coniopterygidae, Osmylidae, Sisyridae and Chrysopidae is more briefly considered. Chapter 2 is on the egg (12 pages), Chap. 3 on the larva (35 pages), Chap. 4 on the pupa (13 pages), Chap. 5 on bionomics (43 pages). Adding to these the Introduction (12 pages), we have a total of 182 pages and 54 text figures constituting the general part of this book. "In all British Neuroptera there are constantly three [larval] instars, and, in fact, this is true of all Neuroptera with the exception of the Australian Ithonidae, in which family Tillyard (1922*b*) states there are five." One of the best known and interesting features of the larva is the suctorial mandibles and maxillae. After reviewing the opinions of authors on the morphology of the terminal blade of the maxillary, Killington inclines to that of Withycombe, that it corresponds to the lacinia (p. 104). Special features of the chapter on bionomics are the tables showing the habitats, the monthly distribution throughout the year, the prey and the Hymenopterous parasites of each species. The longest known life-cycle of any of the British species "does not exceed twelve months, and in the majority of species is considerably less than this. . . . The number of broods varies, with the species, from one to several in a year or there may be a succession of broods throughout the entire year (*Hemerobius stigma*)" (pp. 147, 146). The list of British Neuroptera, pages 10-12, embraces 18 genera and 53 species

(Coniopterygidae 5, 7; Osmylidae 1, 1; Sisyridae 1, 3; Hemerobiidae 9, 28; Chrysopidae 2, 14. The American student will note that there are no Myrmeleonidae). Chap. 6, 87 pages, describes the first 10 genera and 15 species, leaving the remainder for Volume 11. The beautifully clear text figures and five of the plates are line engravings, the remaining plates half-tones, four of them showing the wings of Hemerobiids in colors from the author's drawings.—P. P. CALVERT.

ANCIENT ARTIZANS. The Wonders of the Insect World. STUART WARD FROST. Boston, The Van Press, 1936. 295 pp., 152 figures. \$3.50. Here we find a work concerned with interesting habits of some insects, bringing together under one cover much that is scattered and almost lost in scientific volumes and beyond reach of the ordinary reader. These accounts are told in a readable fashion with illustrations of a few of the outstanding insects. Scientific names are referred to in footnotes. The studies have been taken largely from common species that can be seen by anyone who will take the time to pause and observe. The author, acting on a suggestion of a well known student of entomology that insects passed through development stages similar to that of man, has divided the work into chapters treating of the insects, illustrating such stages. Of these he recognizes foragers, nomads, hunters, agriculturists, masons, carpenters, spinners, weavers, miners, aviators, divers, musicians, assassins and fishermen. The examples as a rule are well taken and each chapter gives ample references for further study. The work should appeal to all interested in the rôle of insects in nature.—E. T. C.

Change of Name (Diptera: Syrphidae).

In the Transactions of the American Entomological Society, volume LVI, page 146 (1930) I described a new genus of Syrphid fly which I called *Cacomyia*, overlooking the fact that a genus had been already erected in Diptera bearing this name. Therefore, I propose the name *Cacoceria* for the species of fly I describe as *Cacomyia*, with, for the genotype of *Cacoceria*, the original species *ressoni* n. sp.—FRANK M. HULL.

The International Health Division of The Rockefeller Foundation in 1935 operated on a budget of \$2,200,000. Grants were made for yellow fever studies in Brazil; for research on yellow fever, malaria, and other diseases at the laboratories of

the International Health Division at the Rockefeller Institute; for field research on malaria in Cuba, Puerto Rico, Albania, Bulgaria, Greece, Italy, Portugal, Spain, and India, and for laboratory studies of this disease at the University of Chicago; for demonstrations in the control of malaria in Colombia, Nicaragua, Salvador, and Albania.

OBITUARY

ALBERT PITTS MORSE, of Wellesley, Massachusetts, a student of the Orthoptera and the Odonata, died April 29, 1936, at the age of seventy-three. For many years a member of the faculty of the Wellesley College, and later Curator of Natural History at the Peabody Museum at Salem, Massachusetts, he left an enduring monument in his "Manual of the Orthoptera of New England," probably as fine a regional entomological study as has been produced in America. A summary of Mr. Morse's many activities, accompanied by an excellent portrait, has been presented by Dr. Richard Dow in the July issue of the "Bulletin of the New England Museum of Natural History," published by the Boston Society of Natural History.

A biographical notice of CHARLES ROBERTSON, who died at Carlinville, Illinois, June 17, 1935, by H. B. Parks, appeared in *Bios* (the quarterly of the Beta Beta Beta Biological Fraternity, Oklahoma City), Vol. 7, no. 2, pages 85-96, May, 1936. Robertson was born June 12, 1858, studied at Blackburn University (now College) and at Harvard. He taught biology at Blackburn, 1880-1886 and 1898-1910. Impressed by Herman Müller's *Die Befruchtung der Blumen durch Insekten*, he planned an investigation of this subject for the Carlinville area; his papers on this topic began in 1886 and continued to 1931. The nature of his studies compelled him to devote much attention to the taxonomy of the Hymenoptera and to describe many new species of bees. A bibliography of his writings, of 148 titles, accompanies Dr. Park's biography; twenty of these appeared in the *NEWS*.

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—Collectors desiring living pupae with cocoon attached to natural food plant of Michigan, *Samia*, *Columbia* or hybrid with *S. Cecropia*, write W. S. McAlpine, 575 Townsend St., Birmingham, Mich.

Wanted—North American Chrysididae for exchange or determination, with privilege of retaining duplicates. W. G. Bodenhein, Department of Entomology, Cornell University, Ithaca, New York.

Wanted—Chloropidae (Oscinidae) of the world. Study, determination or exchange. C. W. Sabrosky, Entomology Dept., Michigan State College, East Lansing, Mich.

Wanted—Dr. Karl Eller of the Zoological Institute, of the University of Munich, who is at present engaged in a critical study of the races of *Papilio machaon* and related species, particularly desires to secure for study, as loans or otherwise, material of the American representative of this group. To be of service to him material must bear exact localities, altitudes when possible, and dates of capture. Dr. Eller has largely completed his work in the Old World forms and requests the cooperation of American students so that his investigations may be of broadly comprehensive character.

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SAY. American Entomology.
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SNODGRASS. Insect Head, 1928.
WEISS. Pioneer Century of American Entomology.
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ENTOMOLOGICAL NEWS

NOVEMBER, 1936

Vol. XLVII

No. 9



HENRY CHRISTOPHER MCCOOK,
 1837-1911.



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TO CONTRIBUTORS. All contributions will be considered and passed upon at our earliest convenience and, as far as may be, will be published according to date of reception. The receipt of all papers will be acknowledged. Owing to the limited size of each number of the NEWS, articles longer than six printed pages will be published in two or more installments, unless the author be willing to pay for the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division. Proof will be sent to authors. Twenty-five "extras" of an author's contribution, without change in form and without covers, will be given free when they are wanted; if more than twenty-five copies are desired *this should be stated on the MS.*

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Stated Meetings of The American Entomological Society will be held at 8.00 P. M., in 1936, on the fourth Thursday of each month excepting June, July, August, November and December, and on the third Thursday of November and December.

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

The printer of the "News" will furnish reprints of articles, without covers, over and above the twenty-five given free at the following rates: One or two pages, twenty-five copies, 35 cents; three or four pages, twenty-five copies, 70 cents; five to eight pages, twenty-five copies, \$1.40; nine to twelve pages, twenty-five copies, \$2.00; each half-tone plate, twenty-five copies, 30 cents; each plate of line cuts, twenty-five copies, 25 cents; greater numbers of copies will be at the corresponding multiples of these rates. Printed covers for 50 copies, \$4.00 or more, according to number of pages bound.

ENTOMOLOGICAL NEWS

VOL. XLVII.

NOVEMBER, 1936

No. 9

An Interesting New Horsefly from North Carolina (Diptera : Tabanidae).¹

By CORNELIUS B. PHILIP, Entomologist, U. S. Public Health Service.

Among specimens received from Mr. J. S. Brimley, of Raleigh, North Carolina, an apparently undescribed fly of unusual appearance was found. Three males were also found in the Hine collection by Dr. Alan Stone of the U. S. National Museum and are here included.

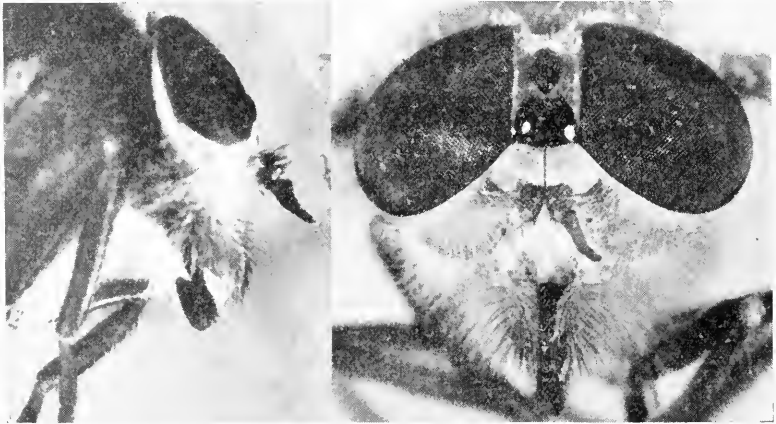
Anacimas geropogon n. sp. (Gr., old man + whiskers).

Of the appearance of "*T.*" *dodgei* Whit., but the body, margins of veins and costal cells of wings with a brownish cast, and it lacks the pronounced thoracic lines; face and cheeks, sternum and pleurae, coxae, and basal palpal joint covered with unusually long, white hairs; second palpal joints with long, coarse, porrect hairs, white and black intermixed; antennae rather slender, red, the first two joints with sparse, long black hairs, third almost bare except for a few long upstanding hairs on the dorsal prominence and a very few shorter erect hairs on the annuli; tongue, particularly the labellae, remarkably small; abdomen of female flattened, with a dark brown, mid-dorsal stripe its full length, on either side a pale buff stripe, and a brownish stripe along each edge. The male is readily associated on antennal and other head characters, although the bright orange-brown abdomen shows practically none of the pattern of the female, except sometimes a reduced, elongate, dark spot middorsally on the second segment.

♀. 15 mm. Eyes with very sparse, scarcely discernible short hairs; relaxed, 3 very narrow closely situated purple stripes on a green ground. Front broad, at least one-third its height, sides parallel, light brownish, darker on the vertex; no ocelligerous tubercle; frontal and median callosities piceus, convex, separated narrowly, the former wider than high and narrowed above, the latter bluntly ellipsoid, a little taller than the former and

¹Contribution from the Rocky Mountain Laboratory, U. S. Public Health Service, Hamilton, Montana.

half as wide as high. Subcallus contrasting pale yellowish pollinose. Antennae rather slender, the third joint a little longer than the annuli and the prominence rather rounded, excision shallow; terminal annulus hardly as long as the preceding one. *Thorax* with indications of 2 pale lines, otherwise dark testace-



Head of *Tabanus geropogon* n. sp., female.

Showing tomentose appearance with porrect hairs on tumescent palpi and on antennae basally; also the slender proboscis and unusually small labellae (profile in partial silhouette under blue filter; face under yellow filter; Leica enlargement, "super-pan" film).

ous, covered with rather short brownish hairs, a tuft of white hairs above the base of each wing. Wings dilute brownish, darker on the vein margins and costal border; cell R_5 broadly open, and no stump-vein above. Legs pale reddish, a little darker on the tarsi; femora clothed chiefly with white hairs, a few black ones interspersed. Venter of abdomen pale reddish, heavily pale pilose, a few black hairs on the sixth and seventh sternites.

♂. 14.5 mm. Eyes with imperceptible, sparse pubescence, the contrasting, pale area of distinctly enlarged facets occupying $2/3$ the total area. Vertical triangle buff, pollinose, slightly raised above upper eye level. Terminal palpal joints swollen, hardly twice as long as thick. Outer front tarsal claws a little longer than the inner. Wing veins not so plainly margined; otherwise this sex resembles the female except for the more orange abdomen above and below, which is almost without pattern.

Holotype, ♀. California Beach, NORTH CAROLINA, April 20, 1930, through the kindness of Mr. J. S. Brimley, in excellent state of preservation. In the collection of the author. *Allotype*, ♂. Southern Pines, N. Car., Apr. 19, 1917. In the collection of Ohio State University Museum, Columbus. *Paratypes*. Two males, one with same data as allotype, the other from the same locality, April 7, 1908, A. H. Mance, are like the allotype, except the latter is only 12.5 mm. and there is a more definite dark middorsal spot on the second abdominal tergite. In the collections of the Ohio State and U. S. National Museums.

The female bears a striking superficial resemblance to *Merycomyia mixta* Hine and the rather remarkable head characters show close relationship to *Anacimus dodgei* (Whit). I am indebted to Dr. Stone, who also studied the type of *A. limbellatus* End., for pointing out its generic affinities, as well as for the opportunity of establishment of the allo- and paratypes. The females of all three species of *Anacimus* have a rather broad, middorsal, brownish stripe on the abdomen in addition to small tongues and distinctive vestiture, especially about the head.

Two New Cockle Burr Midges (Diptera: Cecidomyiidae).

By E. P. FELT, Bartlett Tree Research Laboratories, Stamford,
Connecticut.

The two species described below were reared by Mr. Leith F. Hitchcock, of the Australian Commonwealth Prickly Pear Board Xanthium Investigations.

Asphondylia xanthii n. sp.

♂. Length 3.5 mm., antennae nearly as long as the body, sparsely haired, dark brown, the third with a length four times its diameter; palpi triarticulate; mesonotum dark brown, the submedian lines thickly haired; scutellum and postscutellum fuscous yellowish; abdomen light brown; halteres fuscous, yellowish basally; legs a somewhat variable yellowish-straw color.

♀. Length 4 mm., antennae about three-fourths the length of the body, the third segment with a length five times its diameter; ovipositor about three-fourths the length of the body.

the basal lobes, so conspicuous in many species, relatively small.

This species runs in our key to *A. autumnalis* Beutm., from which it is distinguished by the nearly uniform color of the legs.

The insects were reared June 4, 1935, from galls on the growing tips of the branches of cockle burr, *Xanthium speciosum*, collected at Navasota, TEXAS. *Holotype* a male.

***Mycodiplosis radices* n. sp.**

♂. Length 1.25 mm. Antennae one-half longer than the body, thickly haired, the basal enlargements of the flagellate segments dark brown, the distal enlargements yellowish, the fifth segment with the stems three and two and one-half times their diameter respectively; the enlargements, their setae and circumfila normal for the genus, the terminal segment having the basal portion of the stem with a length four times its diameter, the distal enlargement cylindrical, with a length three times its diameter and bearing a stout appendage, swollen near the middle, approximately four times as long as its major diameter.

Mesonotum reddish-brown, the submedian lines yellowish; scutellum pale, yellowish; postscutellum reddish-brown; abdomen dark brown, sparsely haired. Wings fuscous with irregular yellowish areas as in a strongly marked *Lcstodiplosis*; halteres and coxae pale yellowish; femora mostly dark brown; tibiae dark brown, with a broad yellowish band basally and near the middle; tarsi dark brown, except that the basal two-thirds of the second, the basal half of the third and fourth and all of the fifth segments are yellowish; claws slender, strongly curved, the anterior unidentate; pulvilli short.

Genitalia: basal clasp segment stout, terminal clasp segment short and stout; dorsal plate short, broad, broadly and triangularly emarginate, the lobes acute; ventral plate short, broad, narrowly emarginate, lobes rounded.

♀. Length 2 mm. Antennae extending to the base of the abdomen, thickly haired, apparently dark brown, though when magnified the basal fourth of the flagellate antennal segments is seen to be fuscous, the distal part yellowish; the fifth segment with a stem one-fourth the length of the cylindrical basal enlargement, the latter with a length three times its diameter; the terminal segment slender, tapering and with a length four times its major diameter. Palpi quadriarticulate, the first segment quadrate, the second rather broad with a length three times its width, the third a little longer and more slender and the fourth one-fourth longer than the third. Mesonotum dark

brown, the submedian lines, scutellum and postscutellum mostly yellowish. Abdomen light brown. Ovipositor half the length of the body, mostly yellowish, the lobes with a length three times the width, somewhat expanded distally. Other characters as in the male.

This species approaches closely *M. alternata* Felt, from which it may be separated by the distinctly longer basal stem of the fifth antennal segment, the darker color of the mesonotum and the uniform coloration of the abdomen.

Reared in August, 1935, from the roots of cockle burr, *Xanthium* sp. collected at Mobile, ALABAMA. *Holotype* a male.

Types deposited in the United States National Museum.

The Coleoptera or Beetles of Georgia. III.

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

HISTERIDAE.

(See page 20, this volume)

6565—*HISTER LAEVIPIES* Germ. Albany VII, 30, 31; Atlanta VIII, 15, 29.

6571—*H. INTERRUPTUS* Beauv. Stone Mt. IV, 28, 27.

6591—*H. MARGINICOLLIS* Lec. Atlanta VI, 30, 27.

6597—*H. CIVILIS* Lec. Calhoun V, 23, 31.

6599—*H. DISPAR* Lec. Jasper, VII, 17, 31.

6613—*H. DEFECTUS* Lec. Hiawasse VI, 15, 29.

H. sp. Stone Mt. IV, 28, 27.

6651—*PLATYSOMA CAROLINUM* Payk. Jonesboro V, 12, 30.

6692—*EPIERUS REGULARIS* Beauv. Waycross V, 15, 32.

6696—*E. PULICARIUS* Er. Savannah IV, 11, 31; Jesup V, 29, 31.

6790—*ACRITUS EXIGUUS* Er. Tallapoosa V, 6, 28.

LYCIDAE.

6926—*CALOPTERON RETICULATUM* Fab. Cleveland VIII, 10, 31; Canton VIII, 17, 31; Atlanta VIII, 5, 32 (2); Kennesaw Mt. VIII, 11, 28; Neel Gap IX, 1, 29.

6931—*CELETES BASALIS* Lec. Blairsville VI, 15, 29.

6939—*EROS AURORA* Hbst. Atlanta II, 24, 30 (2); III, 8, 30 (2); III, 15, 29; III, 28, 31.

6940—*E. SCULPTILIS* Say. Blue Ridge VI, 14, 29.

6941—*E. HUMERALIS* Fab. Macon IV, 29, 31; Atlanta V, 10, 34 (2).

6942—*E. TRILINEATUS* *Melsh.* Stone Mt. VI, 18, 30; VII, 25, 29; Yonah Mt. VIII, 5, 34.

6943—*E. CRENATUS* Germ. Cedartown VI, 25, 32.

6945—*PLATEROS MODESTUS* Say. Athens VI, 13, 32.

6946—*P. CANALICULATUS* Say. Brunswick VI, 5, 29.

6950—*P. FLORALIS* Melsh. Jefferson VI, 13, 32.

P. sp. Stone Mt. VI, 18, 30.

6958—*CALOCHROMUS PERFACETUS* Say. Jesup VI, 5, 29.

LAMPYRIDAE.

6967—*CALYPTOCEPHALUS BIFARIA* Say. Stone Mt. V, 24, 27.

6971—*LUCIDOTA ATRA* Fab. Bremen V, 6, 28; Tallulah Falls V, 13, 31; Neel Gap V, 28, 34; Atlanta V, 30, 29.

6975—*L. CORRUSCA* Linn. Jefferson VI, 13, 32; Toccoa VII, 3, 31.

6978—*L. NIGRICANS* Say. Stone Mt. V, 26, 27 (2); Gainesville VI, 3, 27; Kennesaw Mt. VI, 8, 28.

6980—*L. MINUTA* Lec. Macon IV, 3, 31.

6987—*PYRACTOMENA LUCIFERA* Melsh. West Point VI, 10, 32.

6988—*PHOTINUS CONSANGUINEUS* Lec. LaGrange VI, 4, 32.

6994—*P. COLLUSTRANS* Lec. Folkston V, 8, 32.

6996—*P. PYRALIS* Linn. Jesup IV, 12, 31; Atlanta V, 10, 34; VI, 19, 30; Perry VI, 21, 28; Helen VII, 11, 34.

6998—*P. CASTUS* Lec. Rome VI, 20, 32.

7013—*PHOTURIS PENNSYLVANICA* DeG. Savannah IV, 11, 31; Cornelia V, 16, 28.

PHENGODIDAE.

7023—*PHENGODES PLUMOSA* Oliv. Neel Gap V, 28, 34; VI, 14, 31.

CANTHARIDAE.

7051—*CHAULIOGNATHUS PENNSYLVANICUS* DeG. Douglasville V, 6, 28; Blue Ridge VI, 14, 29; Clarkesville VII, 25, 31.

7052—*C. MARGINATUS* Fab. Atlanta VI, 8, 32; VI, 13, 27; Ringgold VI, 14, 30 (6); Stone Mt. VI, 26, 27; Blairsville VIII, 31, 29 (7); Stone Mt. IX, 5, 32 (4); Atlanta IX, 9, 32 (5).

7055—*PODABRUS TRICOSTATUS* Say. Hiawassee V, 28, 34.

7056—*P. REGULOSUS* Lec. Griffin VI, 12, 27.

7057—*P. FRATER* Lec. Blue Ridge VI, 26, 31.

7058—*P. BASILARIS* Say. Toccoa VI, 16, 29.

7067—*P. PROTENSUS* Lec. Blairsville V, 14, 31.

7091—*CANTHARIS DENTIGER* Lec. Macon IV, 29, 31.

7097—*C. CAROLINUS* Fab. Cleveland VI, 24, 31.

- 7098—*C. LINEOLA* Fab. Toccoa V, 14, 30; Swainsboro V, 31, 31.
 7110—*C. LONGULUS* Lec. Blairsville VI, 15, 29.
 7121—*C. BILINEATUS* Say. Griffin IV, 4, 31.
 7137—*POLEMUS LATICORNIS* Say. Stone Mt. V, 26, 27 (2).
 7147—*SILIS DIFFICILIS* Lec. Dawsonville V, 15, 31.
 7161—*S. BIDENTATUS* Say. Hawkinsville IV, 3, 31; Toccoa VI, 16, 29.
 7169—*TRYPHERUS LATIPENNIS* Germ. Cornelia VI, 16, 29.
 7170—*BELOTUS ABDOMINALIS* Lec. Folkston V, 8, 32.

MELYRIDAE.

- 7196—*COLLOPS TRICOLOR* Say. Stone Mt. IV, 28, 27 (41); Macon IV, 29, 31; Calhoun V, 23, 31.
 7207—*C. NIGRICEPS* Say. Jesup V, 5, 30; Athens VI, 13, 32.
 7207a—*C. NIGRICEPS FLORIDANUS* Schffr. Cairo VI, 18, 31.
 7210—*C. GEORGIANUS* Fall. Rockmart VI, 25, 32.
 7227—*C. QUADRIMACULATUS* Fab. Milledgeville V, 28, 31; Douglasville VII, 15, 27; Atlanta VIII, 9, 31 (2).
 7231—*TEMNOPSOPHUS BIMACULATUS* Horn. Bainbridge VI, 19, 31.
 7279—*PSEUDEBAEUS APICALIS* Say. Hartwell VI, 16, 29.
 7300—*ATTALUS GRANULARIS* Er. Cornelia VI, 16, 29.
 7303—*A. MORULUS* Lec. Jonesboro VI, 12, 27.
 7322—*A. SCINCETUS* Say. Savannah IV, 11, 31; Blue Ridge VI, 26, 31.
 7506—*MELYRODES CRIBRATA* Lec. Hiawassee V, 28, 34.

CLERIDAE.

- 7516—*MONOPHYLLA TERMINATA* Say. West Point VI, 10, 32.
 7544—*CYMATODERA BICOLOR* Say. Dahlonega VII, 9, 31.
 7545—*C. INORNATA* Say. Tate VI, 27, 32.
 7566—*C. UNDULATA* Say. Newnan V, 18, 31.
 7577—*PRIOCERA CASTANEA* Newm. Quitman VI, 17, 31.
 7585—*THANASIMUS DUBIUS* Fab. Albany VI, 1, 32.
 7596—*ENOCLERUS NIGRIPES* Say. Neel Gap VI, 14, 31.
 7597—*E. ROSMAREUS* Say. Blue Ridge VI, 26, 31.
 7605—*E. ICINEUMONEUS* Fab. Atlanta VII, 20, 30.
 7612—*E. LUNATUS* Klug. McRae IV, 14, 31; Stone Mt. VI, 21, 27 (2); VI, 26, 27.
 7630—*TRICHODES APIVORUS* Germ. Columbus V, 19, 31; Stone Mt. VI, 5, 32; VI, 22, 27 (3); VI, 25, 30; VII, 1, 30; Americus VI, 20, 31; Dalton VII, 24, 31.
 7637—*HYDROCERA UNIFASCIATA* Say. Stone Mt. V, 25, 28 (2).

7675—*H. VERTICALIS* Say. Atlanta V, 19, 27.

7694—*ZENODOSUS SANGUINEUS* Say. Tate VI, 27, 32.

CORYNETIDAE.

7696—*PHYLLOBAENUS DISLOCATUS* Say. Augusta VI, 9, 32.

7708—*CHARIESSA PILOSA* Forst. Macon VI, 21, 29.

7716—*CREGYA OCLATUS* Say. Gainesville VI, 24, 31.

CUPESIDAE.

7744—*CUPES CONCOLOR* Westw. Sandersville V, 31, 31; Blairsville VII, 10, 31; Atlanta VII, 25, 29.

OEDEMERIDAE.

7758—*XANTHOCHROA LATERALIS* Melsh. Jasper VII, 17, 31.

7763—*NACERDA MELANURA* Linn. Jesup V, 5, 30.

7768—*COPIDITA NOTOXOIDES* Fab. Gray VI, 21, 29.

7769—*C. THORACICA* Fab. Valdosta IV, 14, 31.

7776—*ALLOXACIS DORSALIS* Melsh. Savannah IV, 11, 31.

7799—*ASCLERA PUNCTICOLLIS* Say. Tallapoosa V, 6, 28.

7800—*A. RUFICOLLIS* Say. Stone Mt. VI, 26, 27.

MORDELLIDAE.

7810—*MORDELLA MELAENA* Germ. Atlanta VI, 12, 27; Cartersville VII, 4, 34; Stone Mt. VII, 12, 29 (3); VII, 17, 29 (4); Americus VII, 30, 31.

7811—*M. SCUTELLARIS* Fab. Ellijay VI, 27, 31.

7814—*M. OCTOPUNCTATA* Fab. Fort Valley VI, 1, 31; Dalton VI, 7, 31; Atlanta VI, 7, 28; VI, 12, 27; Stone Mt. VI, 13, 34; Americus VI, 20, 31; Kennesaw Mt. VI, 24, 34.

7817—*M. MARGINATA* Melsh. Talking Rock VI, 27, 32.

7830—*GLIPODES HELVA* Lec. Gainesville VIII, 16, 29.

7833—*MORDELLISTENA BICINCTELLA* Lec. Fort Valley VI, 1, 31.

7838—*M. TRIFASCIATA* Say. Cornelia VI, 16, 29; West Point VI, 19, 32.

7859—*M. COMATA* Lec. Swainsboro V, 31, 31.

7875—*M. SEMIUSTA* Lec. Tate VI, 27, 32.

7894—*M. AMBUSTA* Lec. Thomasville VI, 19, 31.

7910—*M. PUBESCENS* Fab. Perry VI, 21, 29; Ellijay VI, 27, 31.

7911—*M. BIHAMATA* Melsh. Covington VI, 16, 27.

7912—*M. LITURATA* Melsh. Blairsville VI, 15, 29.

7913—*M. FUSCATA* Melsh. Yonah Mt. VII, 12, 34.

7926—*M. DISCOLOR* Melsh. Calhoun VI, 28, 32.

7942—*ANASPIS FLAVIPENNIS* Hald. Blairsville VI, 15, 29.

7943—*A. RUFA* Say. Savannah IV, 11, 31; Hartwell VI, 13, 32.

RHIPIPHORIDAE.

7950—*MACROSIAGON DIMIDIATUM* Fab. Hawkinsville VI, 21, 29; Dalton VII, 24, 31.

7953—*M. PECTINATUM* Fab. Augusta VI, 9, 32.

7954—*M. CRUENTUM* Germ. Stone Mt. VII, 14, 29; VIII, 10, 32; Ringgold VIII, 5, 31.

7956—*M. LIMBATUM* Fab. Americus VII, 30, 31.

M. sp. Atlanta VIII, 14, 29.

MELOIDAE.

7973—*PYROTA ENGELMANNI* Lec. Ringgold VIII, 5, 31; Atlanta IX, 5, 30; IX, 17, 27.

7981—*P. GERMARI* Hald. Hartwell VI, 14, 32.

7986—*P. LINEATA* Oliv. Clarkesville VII, 25, 31.

7989—*POMPHOPOEA POLITA* Say. Baxley VII, 22, 29.

7990—*P. AENEAE* Say. Atlanta IV, 7, 33; IV, 8, 31; IV, 29, 31; Macon IV, 29, 31.

7998—*EPICAUTA TRICHRUS* Pallas. Stone Mt. VI, 22, 27; VI, 26, 27; Cartersville VII, 24, 31; Clayton VIII, 17, 29; Atlanta IX, 4, 32 (2).

8000—*E. STRIGOSA* Gyll. Augusta VIII, 29, 30.

8003—*E. HETERODERA* Horn. Americus VI, 20, 31.

8018—*E. VITTATA* Fab. Atlanta VII, 7, 31 (3); Dalton VII, 24, 31.

8019—*E. LEMNISCATA* Fab. Folkston V, 8, 32.

8024a—*E. CINEREA MARGINATA* Fab. Macon VI, 21, 29; LaFayette VII, 17, 31; Stone Mt. VII, 30, 29 (17); VIII, 7, 32 (12); VIII, 9, 28 (28); Waleska VIII, 28, 28 (2); Atlanta VIII, 28, 32 (2).

8033—*E. PENNSYLVANICA* DeG. Cornelia VI, 28, 31; Rome VIII, 3, 31; Neel Gap IX, 1, 29; Atlanta IX, 4, 32.

8042—*MACROBASIS UNICOLOR* Kby. Griffin V, 12, 30; Dalton V, 23, 31; Hiawassee V, 28, 34; Stone Mt. VI, 2, 28 (48).

8112—*TETRAONYX QUADRIMACULATA* Fab. Stone Mt. VII, 10, 29 to VIII, 10, 29 (125); Americus VII, 30, 31; Helen VIII, 5, 34; Kennesaw Mt. VIII, 11, 28; LaFayette VIII, 16, 31.

8167—*GNATHIUM FRANCILLONI* Kirby. Atlanta VIII, 23, 32.

8179—*NEMOGNATHA PIEZATA* Fab. Fort Valley VI, 1, 31; Snellville VI, 12, 31; Gainesville VI, 24, 31; St. Simons Island VII, 22, 29; Albany VII, 30, 31; Yonah Mt. VIII, 5, 34 (2); Atlanta VIII, 5, 32 (9); VIII, 19, 29 (3); VIII, 21, 32 (8).

8180—*N. PUNCTULATA* Lec. Cleveland VII, 10, 31.

N. sp. Yonah Mt. VIII, 5, 34 (2).

PYROCHROIDAE.

8220—*NEOPYROCHROA FLABELLATA* Fab. Toccoa VI, 16, 29.8225—*DENDROIDES BICOLOR* Newm. Stone Mt. IV, 28, 27.

PEDILIDAE.

8278—*MACRATRIA CONFUSA* Lec. Cornelia VI, 16, 29.8279—*M. MURINA* Fab. Dahlonga VII, 9, 31.

ANTHICIDAE.

8283—*NOTOXUS BICOLOR* Say. Clarkesville V, 28, 34.8304—*N. MONODON* Fab. Gainesville VI, 24, 31.8359—*ANTHICUS STURMI* Laf. Toccoa VI, 16, 29.

EUGLENIDAE.

8475—*ELONUS BASALIS* Lec. Savannah IV, 11, 31.8477—*EMELINUS MELSHEIMERI* Lec. Rockmart VIII, 17, 28.

CEBRIONIDAE.

8516—*CEBRIO BICOLOR* Fab. Atlanta VII, 29, 27; VIII, 9, 29 (2).

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Notes on Some Spiders of the Family Pisauridae (Araneae).

By S. C. BISHOP, University of Rochester, and
C. R. CROSBY, Cornell University.

Since the publication by one of us (Bishop, 1924), of the Revision of the Pisauridae of the United States, a number of specimens have come to hand which provide material for the description of four males not previously known.

Several specimens of *Dolomedes pinicola* Hentz were received from Mr. Stanley Mulaik of Edinburg, Texas, and Dr. W. J. Gertsch of the American Museum has sent us specimens of *Thanatidius dubius* Hentz, *Dolomedes striatus* Giebel and *Thaumasia peregrina* Bishop. The records of a few additional species are added.

Key to the Males of Dolomedes.

- | | |
|---|----------------------------|
| 1. A spinose hump on the femur of the fourth leg beneath | 2 |
| No spinose hump on the femur of the fourth leg beneath | 3 |
| 2. Tibial apophysis very long, extending almost one-half the length of the bulb | <i>triton</i> Walckenaer |
| Tibial apophysis short, extending only to the base of the bulb | <i>vittatus</i> Walckenaer |
| 3. Median apophysis of bulb broad, produced to a point near | |

- the tip on the side toward the embolus 4
 Median apophysis of bulb slender, distal half narrow,
 ribbon-like, almost transparent 7
4. Median apophysis of bulb constricted at base 5
 Median apophysis of bulb broad throughout; tibial
 apophysis wide and ear-like *striatus* Giebel
5. Apophysis of tibia broadly dilated and deeply notched
 distally 6
 Apophysis of tibia short, concave internally, broadly
 notched at tip; venter of abdomen with a definite median,
 light stripe from the genital furrow to the spinnerets; ab-
 domen above white or grayish white marked with light
 brown *albivens* Hentz
6. A tooth at the base of tibial apophysis on the ventral side;
 abdomen above dull yellow without definite dark mark-
 ings *pinicola* Hentz
 No tooth at the base of tibial apophysis on the ventral
 side; abdomen above crossed by several transverse, W-
 shaped white lines *scriptus* Hentz
7. Median apophysis acutely angled at middle of its length;
 basal half abruptly swollen in the middle *tenebrosus* Hentz
 Median apophysis nearly right-angled at middle of its
 length; basal half not conspicuously swollen
okefinokensis Bishop

DOLOMEDES PINICOLA Hentz (Figure 1).

Micrommata pinicola Hentz, Jour. Bost. Soc. Nat. Hist. 6:287,
 pl. 10, fig. 14. 1850.

Dolomedes pinicola Bishop, N. Y. State Mus. Bul. No. 252,
 pp. 60-61, pl. 35. 1924.

Tcippus lamprus Chamberlin, Proc. U. S. Nat. Mus. 63:28,
 1924.

The male has not been described. Hentz had only the female,
 as indicated in his figure, and Bank's specimen was an immature
 female. The specimen described by Chamberlin as *Tcippus*
lamprus is a young individual less than half grown.

♂. Length, 10 mm. Cephalothorax, length, 5 mm., width,
 4.5 mm. Cephalothorax with the ground color orange yellow,
 on either side of the mid-dorsal line a broad dusky band with
 a narrow anterior extension enclosing a light oval area back
 of the eyes, extreme margins slightly dusky; the light areas of
 the sides of the thorax clothed with soft white hairs, the light
 area back of the eyes and the dusky bands clothed with brown

hairs; extreme margin of the cephalothorax and median ocular area clothed with long white hairs directed forward. Viewed from above, the cephalothorax is broad, evenly rounded on the sides to the posterior eyes then sharply converging to the rather truncated front; viewed from the side, the posterior declivity short and steep, then gently rounded over to the cervical groove, top of head flat and nearly level.

Posterior eyes in a strongly recurved line, equal, the median separated by three-fourths the diameter and from the lateral by the diameter. Anterior eyes in a very slightly recurved line, the median larger than the lateral, separated by two-thirds the diameter and from the lateral by one-third the diameter. Median ocular area broader than long, height of clypeus two and one-half times the diameter of an anterior median eye. Chelicera orange yellow, lower margin of the furrows with three teeth on one and four on the other.

Abdomen above yellowish white, finely reticulated and with a median, basal, lanceolate area smooth, followed by two rows of small brown spots slightly converging and decreasing in size posteriorly. Sides of abdomen dull yellowish, clothed with short white hairs; venter yellowish and clothed as on the sides; back of the epigastric furrow a broad white area, widest in front, converging posteriorly and marked with two indistinct lines of brown dots extending to the spinnerets.

Legs and palpi dusky orange yellow, the legs in order of length 1-4-2-3; 29-27-25-21 mm. respectively; tibiae of first and second legs beneath with 4-4 spines, the apical short, others long but not overlapping. Sternum orange-yellow with a broad submarginal dusky band. Labium and endites orange yellow.

Tibia of palpus moderately long and stout, the distal mesoventral angle produced into a broad lobe; the apophysis broadly attached at base, deeply excavated distally and armed at base on the ventral side with a short, curved black tooth. The tegulum is roughly horseshoe-shaped, the distal arm longer and broader than the ventral; the median apophysis narrow at base, widened distally and expanded into a thin transparent flange which is drawn out to a beak-like point on the lateral side; the long, slender, whip-like embolus arises at the back of the bull and curves forward and ventrally, its tip resting in the groove of the fulcrum and covered by the membranous conductor.

By the form of the tibial apophysis and the structure of the bull, this species is evidently related to *Doloumces albineus* and *D. scriptus*.

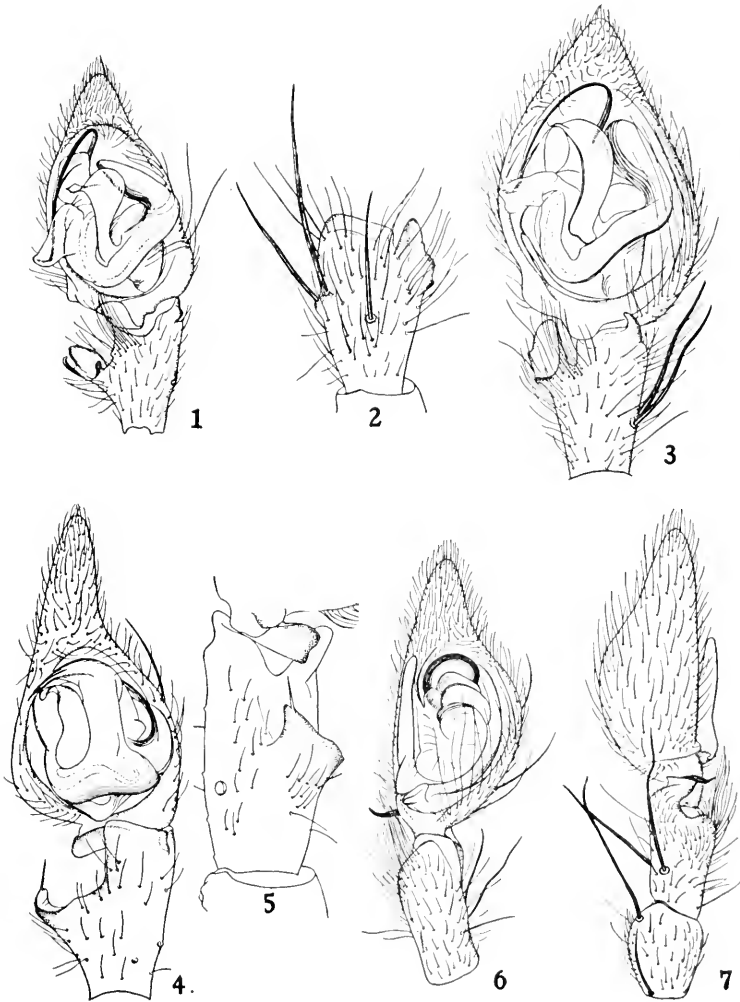


Fig. 1. *Dolomedes pinicola*, ♂, right palpus, ventral view. 2. *Dolomedes striatus*, ♂, tibia of right palpus, dorsal view. 3. Same, right palpus, ventral view.

Fig. 4. *Thanatidius dubius*, ♂ right palpus, ventral view.

5. Same, ♂, tibia of right palpus, dorsolateral view. 6. *Thaumasia peregrina*, ♂, right palpus, ventral view. 7. Same, dorsolateral view.

TEXAS: Edinburg, Sept.-Oct., 1933, 1 ♂ (Mulaik) (*Allotype*). FLORIDA: Wewahitchka, Dead Lake, April 6, 1927, 1 ♀ (Crosby).

Dolomedes striatus Giebel (Figures 2-3).

Dolomedes striatus Giebel, Zeit. Ges. Natur. 33:252. 1869.

Dolomedes striatus Bishop, N. Y. State Mus. Bul. No. 252, pp. 57-59, pl. 33, fig. 1, pl. 34, fig. 2. 1924.

The male resembles the female closely in color and pattern but is a little smaller.

♂. Length, 11 mm. Cephalothorax, length 5.5 mm., width, 4.5. Legs 4-1-2-3; 24-22-21-19, long respectively; tibiae of first and second legs beneath with 4-4 spines, the apical short, the others long and overlapping.

Femur of the palpus long and slender, somewhat compressed at base and slightly widened distally; armed above with a transverse, curved row of four dark spines just back of the tip, followed by a row of three spines along the mid line; patella short and with the sides nearly straight, slightly convex above and armed above at base with a long slender black spine; tibia slender at base, evenly widened distally, produced at the tip ventromesally into a distinct tooth-like projection and dorso-laterally into a broad ear-shaped apophysis diagonally truncate at tip; tibia armed above at the middle of its length with a single long black spine and mesally by a pair of black spines.

In the form and position of the tegulum and embolus, this species closely resembles *D. pinicola*; the median apophysis, however, is of nearly uniform width throughout and the tip on the lateral side is a much sharper point.

Since this species was reinstated in 1924, a number of additional specimens have been found. NEW YORK: Mendon Ponds, Monroe Co., Sept. 28, 1928, 1 juv. ♂ (Bishop). CONNECTICUT: Norwalk, June 4, 1933, 1 ♂ (*Allotype*); July 10-11, 1933, 1 ♂ (Gertsch). NEW JERSEY: Ramsey, July 9, 1934, 1 ♀; Sept. 24, 1934, 1 ♀ (Gertsch).

THANATIDIUS DUBIUS Hentz (Figures 4-5).

Thomisus ? dubius Hentz, Bost. Soc. Nat. Hist. Jour. 5:448, pl. 23, fig. 11. 1847.

Thanatidius dubius Simon, Hist. Nat. Araignées 2:288, 293. 1898.

Thanatidius dubius Bishop, N. Y. State Mus. Bul. No. 252, pp. 17-18, pl. 1, pl. 33, fig. 2. 1924.

We have seen only one male of this species, a specimen in which the abdomen is lacking. Dr. W. J. Gertsch has compared this specimen with one from Southern Pines, North Carolina, and found them to be identical and there are several males in the collection of the Museum of Comparative Zoology at Cambridge from the same locality.

♂. Cephalothorax, length, 4.5 mm.; width, 3 mm. The cephalothorax has the characteristic markings of the female. They consist essentially of a broad, median, brown band in which there is a light line through the dorsal groove; the light line widens anteriorly to the width of the ocular area then narrows and passes between the posterior median eyes; sides of the cephalothorax dull yellowish. The eyes are in four rows as in the female but the posterior lateral and median eyes are slightly larger than the anterior. The legs are too much broken to determine the relative lengths.

Femur of palpus rather long and slender, somewhat widened distally; patella short, convex above; tibia viewed from above, narrow at base and with the mesal side nearly straight, strongly protuberant on the lateral side, at the middle of the length, where the apophysis is borne; apophysis a broad, black, shovel-shaped process bearing on its dorsomesal angle a long sharp spine. Base of cymbium, on the lateral side with a low rounded protuberance ventrad of which there is a longer, heavier process. The bulb of the palpus is comparatively simple; the embolus arises on the mesal side, makes a half-turn around the bulb next to the cymbium and emerges near the tip on the lateral side.

TEXAS: Edinburg, 1 ♂ (Mulaik) (*Allotype*). NORTH CAROLINA: Southern Pines, June 1920, 1 ♂ (W. T. Davis). MISSISSIPPI: Ocean Springs, Jan. 1905, 1 ♀ (Comstock). THAUMASIA PEREGRINA Bishop (Figures 6-7).

Thaumasia peregrinus Bishop, N. Y. State Mus. Bul. No. 252, pp. 62-63, pl. 36, pl. 37, fig. 1-4. 1924.

The male of this species closely resembles the female in form, color and pattern. The size, and the proportions of the body and legs are somewhat different as indicated below.

♂. Length, 10 mm. Cephalothorax, length, 5 mm., width, 4 mm. Legs in order of length, 4-(1-2)-3, 37-34-34-29 mm. long respectively; tibiae of first and second legs beneath with

4-4 spines, the distal pair short, the others long but not overlapping.

Femur of palpus narrow at base, concave on the mesal side and widened distally, marked above near the middle of its length by an indistinct grayish patch and armed above with six long, stout, black spines, four forming a transverse curved line near the tip of the segment, the other two in the mid-line near the middle of the length; patella short, stout, strongly convex above and armed above near base with a slender black spine and distally by a very long, stout, sinuous, black spine; tibia narrower than patella and with the sides nearly straight, armed above at base with a pair of long black spines and on the mesal side at base by a basally stout, apically slender black spine set at right angle to the segment; the tip of the tibia above strongly compressed and produced into a long point from the lateral side of which the tibial apophysis extends laterally at nearly a right angle; the tip of the apophysis is slender, flattened and curved forward.

The bulb of the palpus differs markedly from that of other genera of Pisauridae and in the absence of sufficient material to permit the expansion of a palpus for detailed study, the parts are difficult to homologize. The tegulum is narrow and is exposed only at the base of the bulb; the embolus is a stout, black, sharply curved rod which arises at the back of the bulb, makes one complete turn around the end, the tip emerging on the lateral side above a long stout process which extends the entire length of the bulb on the lateral side.

The *type* of the species, a female, was taken at Hot Springs, ARKANSAS. TEXAS: Rio Grande City, Starr Co., July, 1934, 1 ad. ♂, (Allotype) 1 juv. ♂, 1 juv. ♀ (Mulaik).

The following new records are of interest:

PELOPATIS UNULATA Keyserling. MISSISSIPPI: Ocean Springs, July 13, 1930, 1 ♀ (Dietrich). FLORIDA: Gainesville, Mar. 4, 1933 (Wallace).

PISAURINA BREVIPES Emerton. NEW YORK: Lake Sebago, Interstate Park, July 23, 1934, ♀ ♀ (Gertsch). NEW JERSEY: Ramsey, Aug. 26, 1934, ♀ ♀ (Gertsch).

DOLOMEDES OKEFINOKENSIS Bishop. FLORIDA: Gainesville, Jan. 24, 1933, 1 ♀ (Wallace); Mar. 4, 1933, 1 ♀ (Wallace).

DOLOMEDES ALBINEUS Hentz. FLORIDA: Gainesville, Jan. 29, 1932, 1 ♂; Jan. 11, 1933, 1 ♀; Nov. 23, 1933, 1 ♀ (all Wallace).

Some Synonymy in the Chloropid Genera *Hippelates* and *Diplotoxa* (Diptera).*

By CURTIS W. SABROSKY, Michigan State College, East
Lansing, Michigan.

In view of the increasing medical importance of *Hippelates*, special attention has been directed to the changes in nomenclature in this genus. The author is now working on a monographic revision of the genus and its relatives, and detailed notes and redescriptions will be reserved for that more extensive treatment.

HIPPELATES CIRCUMDATA (Becker). New combination.

1912. *Siphonella circumdata* Becker, Ann. Mus. Nat. Hung., X, p. 185. (Chloropidae, V). [Haiti.]

The species is really a *Hippelates*, as I found upon examination of the female holotype [Colln. Melander]. It is very close to *Hippelates peruanus* Becker. It has just come to my attention that Dr. H. W. Kumm recently (Bul. Ent. Research, XXVII, p. 318) referred *circumdata* to synonymy under *Hippelates peruanus* Becker, apparently upon the advice of Dr. Curran, to whom I mentioned the real status of *circumdata* following my study of the type in June, 1935.

HIPPELATES DISSIDENS (Tucker). New combination.

1908. *Oscinis dissidens* Tucker, Ent. News, XIX, p. 274.

1912. *Oscinella particeps* Becker, Ann. Mus. Nat. Hung., X, p. 115, in part. New synonym.

1913. *Hippelates texana* Malloch, U. S. Natl. Mus. Proc., XLVI, p. 251. New synonym.

The holotype male of *Oscinis dissidens* Tucker was found to be a *Hippelates*, and comparison with the type series of *Hippelates texana* Malloch showed that the latter is an absolute synonym. Types of both species are in the U. S. National Museum. A portion of the type series of *Oscinella particeps* was

* The author has studied the types of all species herein mentioned, and he is pleased to acknowledge the aid of Grant No. 352 of the Bache Fund of the National Academy of Science for making this possible.

also found to belong to *dissidens*, as discussed under the next heading.

HIPPELATES PARTICEPS (Becker). New combination.

1912. *Oscinella particeps* Becker, Ann. Mus. Nat. Hung., X, p. 115.

1913. *Hippelates subvittata* Malloch, U. S. Natl. Mus. Proc., XLVI, p. 251. New synonym.

Becker described *particeps* from a series of four specimens in Melander's collection, including one male from Pennsylvania (labeled "type" in the collection), and females from Galveston and Austin, Texas, and Alabama.

The male, [Penn.], which agrees with the original description and is therefore designated here as the type of *particeps*, is unmistakably the same species which Malloch described the following year as *subvittata*. The latter therefore becomes an absolute synonym. The three females are also *Hippelates*, but belong to the species described as *Oscinis dissidens* by Tucker and as *Hippelates texana* by Malloch (see under *dissidens*). From the description, it is evident that Becker regarded the specimen agreeing with *subvittata* as typical of his species, a conclusion which is borne out by two specimens from Haiti in Melander's collection, labeled "det. Becker" (metatypes).

OPETIOPHORA STRAMINEA Loew. Coquillett (1898, Jour. N. Y. Ent. Soc., VI, p. 44) placed this species in the genus *Hippelates*, to which it has since been referred. The genus *Opetiophora* was raised to full generic rank by Sabrosky (1935, Trans. Amer. Ent. Soc., LXI, p. 239).

LASIOPLEURA LONGULUS (Becker). New combination.

1912. *Hippelates longulus* Becker, Ann. Mus. Nat. Hung., X, p. 89.

1913. *Hippelates longulus*; Malloch, U. S. Natl. Mus. Proc., XLVI, p. 264. (Species not identified; description repeated.)

1931. *Hippelates longulus*; Aldrich, Ent. Soc. Wash. Proc., XXXIII, p. 71. (Locality Grenada, not Canada, Becker in error.)

Aldrich (*loc. cit.*) believed that the species, which was described from a lone female in his collection, was merely *Pseudohippeclates capax* (Coq.). The type is undoubtedly congeneric with *capax*, recently placed by Malloch (1934, *Dipt. Patagonia & S. Chile*, VI, p. 417) in *Lasiopleura* Becker, but the author believes that it represents a distinct species. *Capax* is somewhat larger, and the basal halves of all femora are yellowish, whereas in *longulus* the legs are entirely black.

DIPLOTOXA MESSORIA (Fall.)

1820. *Oscinis messoria* Fallén, *Dipt. Suec., Oscinides*, p. 5.

1866. *Diplotoxa messoria*; Loew, *Zschr. Ent. Breslau*, XX, p. 66.

1903. *Chlorops bilineata* Adams, *Kans. Univ. Sci. Bul.*, II, p. 40. New synonym.

The holotype male of Adams' species has been studied by the writer at the University of Kansas, and it is unquestionably the same species which occurs widely throughout northern United States, Canada and Europe. A considerable series of North American specimens and some European ones have been examined, and no difference could be noted.

DIPLOTOXA CONFLUENS Loew.

1872. *Chlorops (Diplotoxa) confluens* Loew, *Berl. Ent. Ztschr.*, XVI, p. 107. (Cent. X, no. 94.) [Texas.]

1912. *Diplotoxa glabricollis* Becker *nec* Thomson, *Ann. Mus. Nat. Hung.*, X, p. 40. (*Chloropidae* IV.) [Texas, Illinois.] New synonym.

1912. *Diplotoxa inclinata* Becker, *Ann. Mus. Nat. Hung.*, X, p. 43. [Texas.] New synonym.

Meigen (1820, *Syst. Besch.*, VI, p. 141) described a *Chlorops confluens*, but inasmuch as Loew's species was definitely placed in his subgenus *Diplotoxa*, later raised to generic rank, I do not regard it as a homonym which requires changing. Becker (1910) believed that *confluens* Meigen was really a synonym of *Chloropisca trifasciata* Zett.

The holotype female of *inclinata*, from Austin, Texas (Colln. Melander) is an absolute synonym of *confluens*. Becker described the third antennal segment as being entirely black, but

on the type only the distal half is black. It has been the author's observation that this character is quite variable in many species of Chloropidae. In spite of this fact, the character is often used as a primary basis for separating species in this family. In the series of eight cotypes of *confluens* in the Museum of Comparative Zoology at Harvard University, the color of the third antennal segment ranges from almost entirely black to only the distal half blackened.

The specimens from Austin, Texas, and Chicago, Illinois, recorded by Becker (1912, p. 40) as *glabricollis* Thomson, were examined and found to be typical *confluens*. It seems extremely improbable that *glabricollis* (type locality, Buenos Aires) occurs in North America. The author has examined a long series of specimens from several localities in Chile, [U. S. Natl. Mus. Colln.], and he agrees with Malloch (1934, Dipt. Patagonia & S. Chile, VI, p. 397) that these probably belong to the species which Thomson described (1868, Eugenes Resa, p. 604). Becker's South American records (Chloropidae V, p. 137) of *glabricollis* are more probably correct, although from Duda's brief notes it is possible that *Diplotoxa rufomarginata* Duda 1930 (= *D. glabricollis* Becker, in part) may be a distinct form.

Biography of Benjamin Dann Walsh.

Volume XIX (Troye-Wentworth) of the Dictionary of American Biography, published under the auspices of the American Council of Learned Societies by Charles Scribner's Sons, September 11, 1936, contains a biography of the eminent Anglo-American entomologist, B. D. Walsh, by Dr. L. O. Howard, pp. 388-389.

Change of Address.

R. C. Shannon is now at Caixa Postal 49, Rio de Janeiro, Brazil.

Head of Department of Entomology at Cornell.

Dr. O. A. Johannsen has become head of the department of entomology at Cornell University, taking the place of Dr. J. G. Needham, retired.—*Science*, July 24, 1936.

Entomological Literature

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

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

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, part, &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, (*).

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GENERAL CATALOGUE OF THE HEMIPTERA. G. Horváth, General Editor, H. M. Parshley, Managing Editor. Fascicle IV Fulgoroidea, Part 2 Cixiidae by Z. P. METCALF, D. Sc., College of Agriculture and Engineering of the University of North Carolina. Published by Smith College, Northampton, Mass., U.S.A. 1936. 269 pages. Price \$2.00.—Earlier numbers of this catalogue, beginning with Fasc. I, 1927, have been noticed in previous issues of ENTOMOLOGICAL NEWS. This part "follows the general form of the present series. The family is divided into tribes, and the genera are arranged under the tribes in as near a phylogenetic order as our present knowledge will permit. The species are arranged under the genera in an alphabetic sequence. . . . The species have also been listed under every known combination so that it is possible to find any species without recourse to the index which will be published at the completion of the fascicle, together with the full bibliography." Thus, the species *apicalis* Uhler, in bold face type, appears on page 51 under the genus *Oliarus* and again on page 137, in smaller italics, under the genus *Myndus*. "The classification adopted in this catalogue is the one proposed by Muir in 1925. Muir recognized 90 genera distributed into two tribes. . . . The 786 species of this family are widely distributed in all regions of the world save the extreme Arctic and Antarctic regions. The faunas of Europe, North America, Central America, Hawaiian Islands, Japan, India and New Zealand are fairly well known, but vast regions of the world have hardly been explored." The bibliography of the family as a whole occupies pp. 7-14. The catalogue of genera and species extends from page 14 to page 255. Then follows the generic and specific synonymy, pp. 256-267, an index of names proposed, p. 268, and an index of genera and higher groups, pp. 268-9. The type is clear, the paper heavy, but not glazed. Dr. Metcalf's catalogue must surely prove to be most helpful to all investigating this group of insects. P. P. CALVERT.

Special ceremonies in honor of Prof. T. H. Morgan, whose work in genetics has been so largely based on *Drosophila*, were planned by the University of Kentucky for his seventieth birthday on Sept. 25, 1936. The University gave him his B.S. in 1886 and will present a bronze plaque, to be attached to his birthplace at Lexington, Kentucky, according to *Science* for Aug. 14, 1936.

A Change of Name in Staphylinidae (Coleoptera).

Prof. Ralph Voris, of the State Teachers College, Springfield, Missouri, who has been making a special study of the literature pertaining to the family Staphylinidae, informs me that

the specific name *multipunctatus* of my *Philonthus multipunctatus* (Coleoptera of Indiana, 1910, p. 389; Leng Catalogue, number 4472; Blatchleyana, 1930, no. 25), is a homonym of *Philonthus multipunctatus* Nordman, Symbolae ad. Mon. Staph. 1837, p. 106, 95, which in turn is a synonym of *Staphylinus multipunctatus* Mannerheim, Brachelytra, 1830, 31, 79.

I therefore herewith change the name of my species to *Philonthus kessleri* Blatch. This nome is a tribute to Miss Isadora Kessler, who for thirty-nine years has been my secretary and stenographer, who has typed from my long-hand hieroglyphics (which when cold she can read much better than I), the greater part of 14 of my 16 Indiana State Geological Reports (300 to 1700 pages each); my four manuals on insects, my seven Nature books and all my miscellaneous publications (Nos. 79 to 197 of my Bibliography in "Blatchleyana"). She also wrote most of the labels for my insects and to her I have dictated the thousands of letters I have necessarily written from 1897 to 1936. But for her sympathetic, conscientious and efficient aid my work would have fallen far short of what I have accomplished.

W. S. BLATCHLEY.

OBITUARY

DR. JUSTUS WATSON FOLSOM, well known for his papers on the development and taxonomy of the Collembola, died at the infirmary at Vicksburg, Mississippi, on September 24, 1936, after an illness of several weeks following heart attacks, according to an obituary notice in *Science* for October 16, 1936. The same source adds that he was born at Cambridge, Massachusetts, September 2, 1871, received the B. S. in 1895, and D. Sc. in 1899 from Harvard, was professor of natural science at Antioch College, Yellow Springs, Ohio, 1899-1900, instructor and assistant professor of entomology at the University of Illinois, 1900-1923, and entomologist in the Division of Cotton Insect Investigations, Bureau of Entomology and Plant Quarantine, United States Department of Agriculture, at Tallulah, Louisiana, 1925 to the time of his death. One of his best known papers was *The Development of the Mouth-parts of Anurida maritima* of 1900, in which he advocated the necessity of recognizing "the superlingual segment as equivalent in morphological value to the other primary [head] somites." His excellent text book *Entomology with reference to its ecological aspects*, in four editions, (1906, 1913, 1923, 1934) has been successively reviewed in the NEWS.

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—Dr. Karl Eller of the Zoological Institute, of the University of Munich, who is at present engaged in a critical study of the races of *Papilio machaon* and related species, particularly desires to secure for study, as loans or otherwise, material of the American representatives of this group. To be of service to him material must bear exact localities, altitudes when possible, and dates of capture. Dr. Eller has largely completed his work in the Old World forms and requests the cooperation of American students so that his investigations may be of broadly comprehensive character.

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The Position of the Strepsiptera in the Classification of Insects.

By W. DWIGHT PIERCE, Ph.D., Philadelphia, Pennsylvania.

The systematic position of the Strepsiptera has been much debated, but it has been the most common practise to either include the group in the Coleoptera, or align it with the Coleoptera. I have maintained since 1909 that the Strepsiptera are not related to the Coleoptera and belong far from them in the classification. I wish at this time to reargue the question, adding new arguments to support my contentions, and this time suggesting rather definite affinities.

So far as I can find, the only reasons for placing them next to the Coleoptera are:

1. The Strepsiptera have only functional metathoracic wings, with mesothoracic balancers, which are supposed to be equivalent to Coleopterous elytra.
2. The Strepsiptera undergo a hypermetamorphic development analogous to that in the Rhipiphoridae.
3. The Strepsiptera and Rhipiphoridae have flabellate antennae.

These arguments are very superficial and not of very much value when judged from phylogenetic standpoints, because:

1. Balancers are possessed by the Diptera and Coccoptera, which are much more like those of the Strepsiptera, than are the elytra of Coleoptera and Dermaptera; with the difference however that the last three have these organs on the mesothorax, the first two on the metathorax. Tokunaga (1935. Phil. J. Sci. 56 (2): 127-214) in his description of the morphology of the Nymphomyiid fly, *Nymphomyia alba* Tokunaga, has figured a balancer, which more closely resembles the typical Strepsipterous balancer than anything else I have seen.

2. Hypermetamorphic development occurs in various families of Coleoptera (Micromalthidae, Rhipiphoridae, Meloidae); in some of the parasitic Hymenoptera; in the Neuroptera (Mantispidae); in the Aphidoptera; and the Strepsiptera.

3. Flabellate antennae occur in various families of Coleoptera, Hymenoptera, and Lepidoptera, and throughout the Strepsiptera. In fact nearly every Strepsipterous type occurs in the Hymenopterous Encyrtidae, and there is much greater resemblance here than between Rhipiphorid and Strepsipteran antennae.

Thus it can be seen that the usual arguments for placing with or near the Coleoptera are not arguments at all.

To place the Strepsiptera we must look at more fundamental questions.

In ordinal classification of insects the dominant characters used are metamorphosis, wings, mouthparts, thoracic structure, leg segmentation, and nervous system, and probably, other internal structures should be given more attention. The Strepsipterous insects have a hypermetamorphic development, metathoracic wings, mesothoracic balancers, nonagglutinate thorax, with the metathorax preponderant, legs with from six to nine segments due to reduction of the tarsus, and a three ganglion nervous system. We will look into some of these points.

1. Wings are possessed more or less by all orders, except the primitive Archaeognatha, Zygentoma, Protura, Collembola, Dicellura and Rhabdura, and the parasitic degenerated orders Mallophaga, Anoplura and Siphonaptera. Winglessness occurs however in Blattida, Mantida, Corrodentia, Isoptera, Coleoptera, Hymenoptera, Panorpatae, Diptera, Hemiptera, Homoptera, Aphidoptera, and always in female Coccoptera and Strepsiptera. In most of these winged orders, winglessness is a sporadic occurrence, usually due to parasitism, or to underground life.

2. Wings with simple veins and no cells are characteristic only of Aleurooptera, Coccoptera, and Strepsiptera. In all other orders there is multiplicity of veins, with branches and cells, with the simplest veining in the Psylloptera. Those en-

tomologists who have given most attention to the study of fossil insects and to insect phylogeny place a great deal of stress on the phylogenetic importance of wing venation. Certainly, the venation in these three orders is of a type by itself.

3. Only two functional metathoracic wings and mesothoracic elytra characterize Orthoptera, Dermaptera, and Coleoptera; only two functional metathoracic wings and mesothoracic balancers characterize Strepsiptera; only two mesothoracic wings and metathoracic balancers characterize Coccoptera and Diptera.

II. The mouthparts of insects may be aligned into two categories with various subdivisions.

1. There are those with sucking mouthparts in all stages: Protura, Hemiptera, Homoptera, Thysanoptera, Anoplura, Psylloptera, Aleuroptera, Aphidoptera and Coccoptera.

2. There are those with retracted mouthparts, but with distinct mandibles, such as Collembola, larval Diptera, and larval Strepsiptera. In the Diptera, the adult mouthparts are sucking, in the Strepsiptera non-functional, but mandibulate.

3. The other orders are characterized at least in the larval stage by external mandibles, and in the majority the adults also have functional mandibles; but in the Trichoptera and Lepidoptera the mandibles become non-functional, and the mouthparts are developed for sucking.

III. 1. In thoracic structure, the insect orders begin with those having non-agglutinate subequal thoracic segments; and here we may place the wingless Archaeognatha, Zygentoma, Protura, Collembola, Dicellura and Rhabdura.

2. The development of wings brought about thoracic modifications to strengthen the wing mechanism. These modifications are in two directions: agglutination of thoracic sclerites, and enlargement of one or more thoracic segments.

3. Agglutination of pro-, meso-, and meta-thorax, or of two of the three, occurs in all of the orders but two, the Aleuroptera and Strepsiptera. In the former the mesothorax and the metathorax are both greatly enlarged, and each bears a pair of wings, and the notum of each clearly differentiates praescutum, scutum, scutellum, postlumbium and postscutellum. In

the Strepsiptera only the metathorax is greatly enlarged, as it alone bears wings, and its notum is characterized by clear differentiation of the same sclerites as in Aleurodoptera. It is interesting to note that the mesothorax in Coccoptera and at least in the Dipterous Nymphomyiidae is strictly homologous with the Aleurodopterous mesothorax and the Strepsipterous and Aleurodopterous metathorax, although in these two orders the metathorax is so reduced as to be only a leg-bearing segment, with balancers. In the Aleurodoptera and Strepsiptera the prothorax is small and much as in the primitive orders.

4. The agglutination of the entire thorax into a strong wing-bearing mass occurs in a number of orders, in all of which the prothorax is very small, and the other two parts are enlarged. This agglutination is simplest in Anoplura. In Coccoptera and Diptera, the mesothorax is dominant, and is the only wing bearing segment. In Odonata, Plecoptera, Neuroptera, Megaloptera, Raphidioptera, Mecaptera, Trichoptera and Lepidoptera, the mesothorax and metathorax are subequal, or the metathorax is in the ascendancy; these are all four-winged. The Hymenoptera have gone still farther and the first abdominal segment is agglutinate to the thorax, otherwise the order belongs with the Neuroptera group just mentioned.

5. In the remaining orders the prothorax is emphasized and free, and the mesothorax and metathorax are agglutinate: Mantodea, Blattaria, Ephemera, Phasmida, Orthoptera, Thysanoptera, Hemiptera, Homoptera, Isoptera, Embiida, Corrodentia, Mallophaga, Dermaptera and Coleoptera.

IV. The Strepsiptera are characterized by pupation within the last larval skin, or puparium; this is also characteristic of Aleurodoptera and appears in some Coccoptera, and in all Diptera Brachycera. In Aleurodoptera, Brachycera and Strepsiptera there is a detachable cephalotheca permitting emergence.

V. The Strepsiptera give birth to living young. This also occurs in Aphidoptera, Coccoptera, some Diptera Brachycera, and perhaps in other orders. These young strepsipterons are of campodeoid form, greatly resembling the larvae of Coccoptera and Aleurodoptera, and are possibly homologous to the first larvae of Rhipiphoridae and Meloidae in Coleoptera.

VI. With the exception of the most primitive Strepsiptera, *Eoarcnos*, in which the female is legged and resembles a female coccid, the females are legless and permanently parasitic; they are wingless, as are all female Coccoptera, and many female Aphidoptera. The male Strepsiptera and Coccoptera (usually) are winged and legged, and alone of importance phylogenetically in placing their orders in the system. It is really sad that students of the coccids have devoted practically all of their time to the females.

VII. In the male Strepsiptera the anus is on the tenth segment which appears as a dorsal flap overhanging the projecting ninth with its aedeagus appendage. A very similar and strictly homologous genital apparatus appears in the Psylloptera and in the Nymphomyiidae of Diptera Nematocera.

VIII. The interesting raspberry eyes, with separate ommatidia, so characteristic of Strepsiptera, are found also in the Diptera, Nymphomyiidae, and Cecidomyiidae; in Aphidoptera, Chermesidae; in Coccoptera, *Drosichoïdes haematoptera*; in Thysanoptera, *Acolothrips*; and in Trilobita, Phacopidae; in some Chilopoda and Isopoda. Incidentally let us note at this point the great resemblance between the mesothoracic wing of Nymphomyia and a Thysanopteran wing.

IX. There is a greater significance to ordinal classification in the nervous system than has been commonly brought out, and may we not hope that some student will take up the phylogeny of the insect nerve cord. The primitive nervous system consists of a brain with protero-, deutero-, and triterocerebrum, suboesophageal ganglion, and a double ventral nerve cord with segmental ganglia in each segment of thorax and abdomen. The trend is toward union of ganglia. In Machilis and Isoptera, and other insects, the last abdominal ganglia are united. There may be considerable range of different degrees of union of ganglia in an order, and yet I believe there are definite ordinal trends. The only nervous system of Plecoptera, which I have seen figured is of the primitive type. In many insects there is a strong thoracic ganglion. In the Coleoptera, in which the prothorax is not agglutinate to the meso-metathorax, we find

(*Melolontha vulgaris*, *Acilius sulcatus*, *Lucanus dama*) that the prothoracic ganglion is separate from the meso-metathoracic ganglion. In Orthoptera (*Melanoplus spretus*) which is more primitive than the Coleoptera but of the same type of thoracic agglutination, the prothoracic ganglion is distinctly separate, and the mesothoracic and metathoracic are approximate, yet distinct. Now when we come to the Hymenoptera, with agglutinate thorax and first abdominal, we find a similar agglutination of the four ganglia in *Formica rufa*. The Strepsiptera have definitely the suboesophageal, thoracic and first abdominal ganglia united into a thoracic mass, and the remainder of the abdominal ganglia united into one mass. In Coccoptera (*Aonidiella citrina*) and in Diptera (*Sarcophaga carnaria*) we find the extreme condensation with only a brain and a thoracic ganglion into which are fused the suboesophageal, thoracic and abdominal ganglia.

X. The female Strepsiptera have median unpaired tubes leading into a duct between the adult body and the uncast larval skin, with exit in the cephalothorax, for emergence of young. There is no known homologue of this structure.

XI. The Strepsipterous tarsi are always provided with the same number of joints on each pair of legs; although there are those with five joints and claws (primitive type), four joints, three joints, and two joints without claws. Thus the Strepsiptera parallel the tarsal arrangements of the Coleoptera, except that there are no heteromerous Strepsiptera. The common practise of aligning Strepsiptera with heteromerous Coleoptera is entirely without good phylogenetic foundation.

XII. The first larval form of the Strepsiptera is homologous to that of the worms Echiurida, many Isoptera, Symphyla, Thysanura, Rhabdura, Aleuroptera and Coccoptera.

XIII. In the crustacean Entoniscidae with homologous larvae we find parasitic sac-like females, and so do we in Coccoptera.

The arguments given above show that the Strepsiptera possess distinct ordinal characteristics, but also show definite homologies to other orders, and mostly to Psylloptera, Aleu-

odoptera, Coccoptera, and Diptera, and furthermore that they cannot be considered as belonging to the same phylogenetic line as the elytriphorous Coleoptera.

We find that the Coccoptera, Diptera and Strepsiptera form a group of orders with two wings and two balancers; that they more or less transform within a puparium; that larvigensis is a phenomenon found in all three; that wingless females are found in all three. They might therefore be classed as dipteroid, pupariate.

The distinct resemblances of Coccoptera and Diptera cause us to wonder whether the so-called relations of Diptera and Mecaptera are correct.

On the Olfactory Powers of *Megarhyssa lunator* (Hymenoptera: Ichneumonidae).

By C. E. ABBOTT, Chicago, Illinois.

When a female specimen of *Megarhyssa lunator* is about to emerge from pupation, the males, which have previously emerged, gather on the trunk of the tree in numbers and await her coming. If, as often occurs, several females appear on successive days, the male insects may hover about for as much as two weeks. It was this behavior that made possible the following series of tests.

I wanted to determine whether or not the antennae of the male insects function in bringing the sexes together. Since it is not certainly known what senses aid the suitors, it may be assuming too much to say that the sense is olfactory, yet because, in the case of many insects, it has been so considered, and since, further, this sense has been relegated to the antennae, it seemed well to ascertain what effect upon mating the elimination of the antennae might have.

The insect about to be treated was placed in a test tube with the protruding antennae held in place by a paraffined cork stopper. The protruding organs were then sprayed with ethyl chloride until their stiffness indicated that they were frozen. A little of the chemical usually got into the test tube, partially

anaesthetizing the insect, which, however, soon recovered sufficiently to fly away. If the specimen did not fly away it was deposited about half a block from the "home tree." In order to certainly identify them, the treated specimens all had the tips clipped from the first pair of wings. This did not interfere with flight, nor in any other way effect the behavior of the insects.

Experiments were conducted over a period of about two weeks, and sixteen specimens were treated. Nearly an equal number were left untreated for comparison. Every day following treatment, the number of treated specimens returning was noted.

Eleven returns were recorded for treated specimens. There was no way of accurately determining whether these were actually separate insects or a smaller number "repeating." But at least four treated specimens returned at one time. The fact that a treated specimen returned several times would, in itself, be of significance, since it would tend to indicate that such returns were not a matter of accident.

Although the results given are meager, they do seem to indicate that the antennae of *Megarhyssa* are of doubtful value in bringing about mating. The function of these antennae as olfactory organs is also doubtful. This is significant when we consider that the Hymenoptera are usually exploited as the best examples of insects exhibiting an antennal olfactory sense.

These results do not invalidate the conclusions drawn from tests made on ants and bees, which, after all, may differ considerably from *Megarhyssa* in the disposition and use of olfactory organs.

**Notes on the Oviposition and Life-history of the
Leafhopper *Oncometopia undata* Fabr.
(Homoptera : Cicadellidae).**

By RALPH B. SWAIN, Department of Entomology and
Zoology, Colorado State College, Ft. Collins, Colo.

Several times in the literature on Cicadellidae mention has

been made of the peculiar white deposits taking the form of raised spots or blotches frequently found one on each elytron, at or near the centre of the anterior margin. I believe that no explanation for the occurrence of these structures has ever been offered. Riley and Howard (*Insect Life* V, pp. 150-154, 1892-93) writing of *Homolodisca coagulata* Say, state regarding the elytron that: "There is a large reddish blotch just beyond the middle and near the anterior border. Fresh females often have a white powdery spot superimposed upon this reddish spot. This white spot is easily rubbed off, and is not apparent after the insect is a few days old. It is probably waxy in its nature." I have frequently observed the chalky spots on the elytra of members of the genera *Scaphoides* and *Platymetopius*. The following resumé of some life-history studies, carried on at the Bureau of Entomology field laboratory, Webster Groves, Mo., in 1933, explain, I believe, the use, if not the origin of the structure in *Oncometopia undata* Fabr., and may indicate its use wherever it appears.

In the case of *O. undata*, at any rate, the white deposits are shown not to be mere ornaments. One female, caged in a celluloid cylinder on a sunflower plant and observed at two different times in the act of oviposition, accomplished the task in the following manner. Resting head downward on the stem of the plant, she punctured the epidermis with her ovipositor and thrust it in and under to the right. On withdrawal of the ovipositor, a long cylindrical egg, about two millimeters in length could be seen under the thin plant skin, the whole appearing as a whitish blister. Then the metathoracic legs were brought up and together over the elytra. On the down stroke the distal ends of the tibia with their spurs and spines were scraped against the chalky deposits, some of the material being removed and applied to the plant skin over the egg. Here the fine particles were held by the rather sticky epidermal hairs. This performance was repeated until there resulted a patch of six to perhaps twenty eggs, all laid closely side by side, and all neatly powdered. A new incision was made for the admittance of each egg. On the following day, fresh deposits might be

on the elytra, and within a day or two a new egg scar would be found on stem or leaf petiole of the enclosed food plant.

A female, seen at one instant to be unspotted, five minutes later had light grey opaque liquid drops in place on the elytra. These hardened and became the familiar white deposits within another five minutes. I believe that the liquid must be transferred to the elytra by the hind tibia, and that it must come from the anus. But it is not the ordinary honey dew. The droplets of honey dew, ejected in quick succession from the anus while the insect is feeding, will not on evaporation, produce nearly so much residue per volume. The liquid must be a honey dew concentrate or come from another source. The purpose of the powder coating over the egg scar would seem to be camouflage, to hide the eggs from parasites or predators.

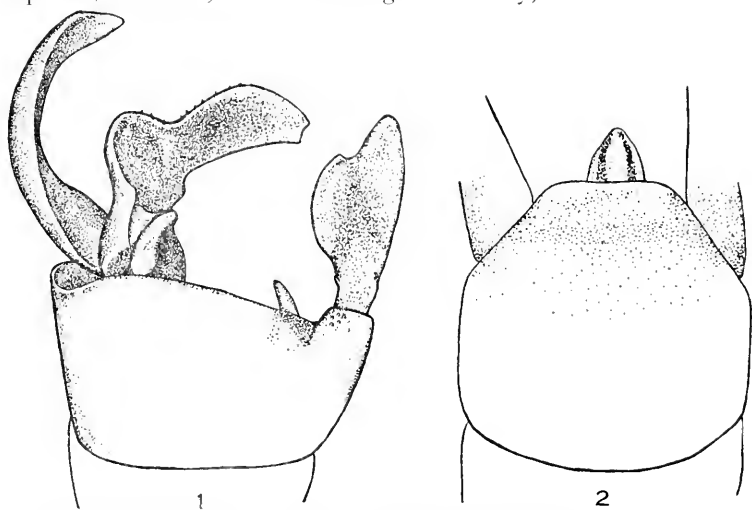
Some observations of the life-history are prompted by field and cage records. In about four days after being laid, the eggs show yellow spots at the ends nearest the laying-punctures, due to the development of the embryonic eyes. The colour darkens through orange to light reddish brown. In seven to ten days after oviposition a long-legged, big-headed nymph squirms out through the puncture and begins to feed. There are five nymphal stadia at the latitude of St. Louis. The time required for growth from egg to adult under out-door cage conditions was approximately seventy-five days. If, as I believe, the species hibernates in the adult stage, and oviposition in the spring begins before the middle of April, then there is probably time for only two full generations. Females were captured which at once laid fertile eggs, copulated at least once with caged males, and continued ovipositing over the space of a month. This can account for the fact that the broods are rather poorly defined.

The writer is greatly obliged to Mr. A. F. Satterthwait of the field laboratory of the Bureau of Entomology at Webster Groves, Mo., for the use of laboratory space and equipment and much kind advice.

A New *Timema* From California (Orthoptera : Phasmidae).

By H. F. STROHECKER, Department of Zoology, University of Chicago.

This aberrant genus, erected by Scudder in 1895¹ for the single species *californica*, has been sufficiently characterized by Candell in 1903² and by Hebard, who in 1920³ added a second species, *chumash*, from Los Angeles County, California.



Timema podura sp. n. Fig. 1. Apex of abdomen of ♂ x 30. Fig. 2. Penultimate abdominal segment of ♀, Dorsal view x 30.

Among a small lot of Orthoptera recently received from Mr. A. T. McClay of Hollywood were sixteen specimens of *Timema*, two males and two females of which are *californica*. The remaining twelve specimens are of a species evidently undescribed as yet. Of these four males and six females bear the label "Sequoia National Park, California, May 24, 1929," and one male and one female are labeled "Greenhorn Mt., California, May 17, 1930."

The asymmetrical abdominal appendages of the males, the

¹ Can. Ent., XXVII, p. 30.

² Proc. U. S. Nat'l. Mus. XXVI, p. 883.

³ Ent. News, XXXI, p. 126.

three-jointed tarsi, ventrally attached legs and general habitus refer this species without question to the genus *Timema* of Scudder.

***Timema podura* sp. n.**

Male (*Type*: Sequoia National Park, CALIFORNIA).

More robust than *californica*, antennae and legs stouter than in that species. Vertex and pronotum smooth, without the low tubercles present in *californica*. Sinistral cercus broad, weakly bifid, somewhat concave above, evenly convex below, with a small basal tooth. Dextral cercus not bifid as in *californica* and *chumash*. Intercercal plate exceptionally large, foot-shaped, concave above. Color tawny with parallel rows of fuscous spots, the general pattern recalling that of *Anisomorpha*.

Female (*Allotype*: Sequoia National Park, California).

Differing from *californica* in coloration, which is similar to that described for the male. Penultimate tergite posteriorly truncate, the angles rounded. Posterior margin not at all emarginate.

Measurements in Millimeters.

Males		Length of	Length of	Width of	Length of
		Body	Pronotum	Pronotum	caudal tibia
Sequoia Nat'l Park		13.7	2.1	2.9	3.2
"	"	13.5	2.1	2.9	3.1
"	"	13.7	2.0	2.9	3.1
"	"	14.0	2.1	2.9	3.2
Greenhorn Mt.		13.0	2.1	2.7	3.0
Sequoia Nat'l Park		18.4	2.7	3.2	3.4
"	"	18.9	2.5	3.2	3.7
"	"	22.0	2.9	3.9	4.2
"	"	19.4	2.7	3.8	4.0
"	"	18.5	2.6	3.5	3.8
"	"	19.0	2.7	3.6	3.5
Greenhorn Mt.		18.4	2.7	broken	3.8

One male and one female labelled "type" and "allotype" respectively will be deposited in the U. S. National Museum. A pair of paratypes has been placed in the Hebard collection in Philadelphia.

***Thysania zenobia* in Maine (Lepid.: Noctuidae).**

The Noctuid moth *Thysania zenobia* Cramer was taken in Augusta, Maine, October 14, 1936. The moth was found on the ground in a lively condition.—ROBLEY W. NASH, State of Maine Forest Service, Augusta.

Notes on *Papilio asterius* Cram. and a Record of var. *americus* Kollar. (Lepidoptera: Papilionidae).

By EDWIN P. MEINERS, M. D., St. Louis, Missouri.

Papilio asterius Cram. is triple-brooded in the vicinity of St. Louis, Missouri, but at no time is it a common butterfly on the wing. The caterpillars are at times found in numbers feeding on carrots and parsley and the rearing of these offers the best opportunity of obtaining specimens. The species overwinters in the chrysalis stage, emerging in April and early May. Such specimens from overwintering chrysalids are somewhat smaller than those of the summer broods, though not as markedly so as in some of our other *Papilios*. The spots of the yellow bands are somewhat restricted in size and there is usually an absence of the discal spot in the bands of the secondaries, as in variety *curvifascia* Skinner. I have never seen any specimens of this variety in the summer broods taken here.

There is one specimen in my collection in which the yellow bands of the secondaries cover the entire discal area. Except that the ground color is a deep black and the yellow markings are of the usual normal shade, it pretty well matches the figure of *P. americus* Kollar in the revised edition of Holland's Butterfly Book. This specimen emerged April 9, 1910, along with normal specimens reared from larvae taken on parsley at Troy, Illinois. According to Holland there are apparently only two records of *P. americus* having been taken in North America, both of these being from Arizona. The one figured by Holland was taken by the Wheeler Expedition, the other is recorded by Barnes and McDunnough in *Cont. N. H. Lep. N. A.*, III, 1916. I had long considered the specimen in my collection as an unnamed aberration, until it was recently examined by Dr Austin H. Clark, who considered it the same as *P. americus*. It is interesting to note that this form emerged from the spring brood which normally produces forms having the yellow bands more restricted than in the normal forms.

The Cicindelidae of Nebraska (Coleoptera).

By F. G. MESERVE,

Sioux Falls College, Sioux Falls, South Dakota

This paper is a list of the tiger beetles that occur in Nebraska. Data concerning geographic and seasonal distribution are given. The material, unless otherwise indicated, is in the permanent collection of the Department of Entomology of the University of Nebraska. This collection contains 4,031 specimens from North America, which belong in four genera and 128 species and varieties. It has recently been greatly augmented by the addition of several thousand specimens from the collection of the late Professor Robert H. Wolcott, of the University of Nebraska. There are 2,706 specimens from Nebraska, belonging in three genera and including fifty-nine species and varieties. The nomenclature used is that of Leng's "Catalogue of the Coleoptera of North America, North of Mexico."

The writer wishes to acknowledge valuable assistance and suggestions given by Professors M. H. Swenk, D. B. Whelan and Raymond Roberts and Mr. O. S. Bare, extension entomologist, all of the Department of Entomology of the University of Nebraska, and Messrs. Warren Knaus, of McPherson, Kansas, and C. H. Bratt, of Bennet, Nebraska.

1. *AMBLYCHEILA CYLINDRIFORMIS* (Say). Scarce. Extreme western part of state. Scotts Bluff County, July 19, one female, taken by L. M. Gates.

2. *TETRACHA VIRGINICA* (Linn.). Scarce. Extreme southeastern and southwestern portions of state. Gage, Lancaster and Dundy counties. July 24 to October 4, 37 specimens.

3. *CICINDELA FORMOSA* Say. Common. Generally distributed throughout the state. April 19 to September 20, 274 specimens.

4. *C. FORMOSA GENEROSA* Dej. Scarce. Extreme northwestern part of state. One specimen taken in Sioux County. May.

5. *C. FORMOSA LATECINCTA* Lec. (*vide* Leng). Scarce. None in Nebraska collection.

6. *C. LENGI* W. H. Not widely distributed. Central and western portions of state. April 16 to September 4, 42 specimens.

7. *C. LIMBATA* Say. Not widely distributed. Rather common in the north-central portion of state. Cherry, Holt and Thomas counties. May 24 to August 25, 123 specimens.

8. *C. PURPUREA* Oliv. Scarce. Extreme eastern portion of state. Lancaster and Cass counties. February 24 (collected in clay pit) to September 19, 16 specimens.

9. *C. PURPUREA AUDUBONI* Lec. Scarce. Lancaster, Holt and Sioux Counties. February 24 (collected in clay pit) to June 18, 10 specimens.

10. *C. PURPUREA GRAMINEA* Schp. Scarce. Cass, Saunders, Custer, Lancaster, Dawes and Sioux counties, March 17 to September 27, 33 specimens.

11. *C. SPLENDIDA* Hentz. Not widely distributed. Recorded from Douglas, Cass, Saunders, Lancaster and Antelope counties. February 15 (collected in clay pit) to October 13, 137 specimens.

12. *C. SPLENDIDA DISCUS* Klug. (*vide* Leng). Scarce. None in Nebraska collection.

13. *C. SPLENDIDA TRANSVERSA* Leng. Scarce. Extreme eastern part of state. Lancaster, Douglas and Cass counties. February 24 (collected in clay pit) to September 22, 31 specimens.

14. *C. SPLENDIDA DENVERENSIS* Csy. Not very common. Recorded from Douglas, Custer, Thomas, Cherry, Dawes and Sioux counties, April 16 to September 3, 32 specimens.

15. *C. SPLENDIDA CONQUISITA* Csy. (*vide* Leng). Scarce. None in Nebraska collection.

16. *C. SPLENDIDA OREADA* Csy. (*vide* Leng). Scarce. None in Nebraska collection.

17. *C. LIMBALIS* Klug. Relatively common. Eastern portion of state. Douglas, Cass, Nemaha, Lancaster, Cuming and Hamilton counties, March 1 to October 21, 72 specimens.

18. *C. LIMBALIS AMOENA* Lec. (*vide* Leng). Scarce. None in Nebraska collection.

19. *C. DECEMNOTATA* Say. (*vide* Schaupp*). Scarce. None in Nebraska collection.

20. *C. DUODECIMGUTTATA* Dej. Scarce. Lancaster County, March 29 to October 8, 32 specimens.

21. *C. REPANDA* Dej. Common throughout the state. April 11 to October 30, 206 specimens.

22. *C. HIRTICOLLIS* Say. Scarce. Scattered portions of state. Lancaster Knox, Dundy and Cherry counties, May 14 to September 11, 14 specimens.

* Schaupp, F. G. 1883. Synoptic tables of Coleoptera. Cicindelidae. Bull. Br. Ent. Soc., 6:73-124.

23. *C. HIRTICOLLIS PONDEROSA* Thoms. Rather common throughout central and eastern portions of state. April 22 to August 10, 69 specimens.

24. *C. TRANQUEBARICA* Hbst. Common in eastern part of state. Scarce in central and western portions. Douglas, Lancaster, Custer, Cuming and Cherry counties, March 17 to September 22, 70 specimens.

25. *C. TRANQUEBARICA VULGARIS* Say. Scarce. Lancaster County, May 7, one specimen.

26. *C. TRANQUEBARICA OBLIQUATA* Dej. Not very common. Scattered points in western half of state. Scarce in eastern half. Lancaster, Holt, Thomas, Hitchcock, Dundy, Scotts Bluff, Dawes, Franklin and Sioux counties. February 24 to September 15, 15 specimens.

27. *C. TRANQUEBARICA HORICONENSIS* Leng. Scarce. Lancaster County, April 29 to September , 3 specimens.

28. *C. LONGILABRIS* Say. Scarce. Lancaster County, July 28, one specimen.

29. *C. LONGILABRIS MONTANA* Lec. Scarce. Sioux County, June, one specimen.

30. *C. LONGILABRIS NEBRASKANA* Csy. Scarce. Sioux County, June 28 to August 20, 3 specimens.

31. *C. FULGIDA* Say. Common in eastern portion of state. Scarce in western portion. Lancaster, Saunders, Dundy and Morrill counties, April 14 to October 15, 163 specimens.

32. *C. PULCHRA* Say. Scarce. Lancaster and Dundy counties, May 24 to August 11, 10 specimens.

33. *C. SCUTELLARIS* Say. Not very common. Taken at scattered points in eastern, central and southern parts of state, April 9 to September 20, 36 specimens.

34. *C. SCUTELLARIS LECOITEI* Hald. Douglas, Cass, Lancaster, Saunders, Cuming, Thomas and Cherry counties, April 2 to November 3, 123 specimens.

35. *C. SCUTELLARIS NIGRIOR* Schp. Scarce. Sioux County, August 19 to August 26, 2 specimens.

36. *C. SCUTELLARIS MODESTA* Dej. (*fidc.* Horn*). Scarce, none in Nebraska collection.

37. *C. SEXGUTTATA* Fab. Not very common. Douglas and Lancaster counties, May 28 to September 23, 27 specimens.

38. *C. SEXGUTTATA TRIDENS* Csy. (*fidc.* Horn). Scarce, none in Nebraska collection.

* Horn, W. 1908. "Genera Insectorum" of P. Wytzman., 82:379, 394, 396.

39. *C. SENGUTTATA VIOLACEA* Fab. Scarce. Eastern part of state, June 14 to August 11, 20 specimens.

40. *C. PATRUELLA* Dej. Scarce. Sioux County, July 18 to August 13, 4 specimens.

41. *C. PATRUELLA CONSENTANEA* Dej. (*vide* Schaupp). Scarce, none in Nebraska collection.

42. *C. PUNCTULATA* Oliv. One of the most common and widely distributed species in the state. Taken mostly in July and August, June 2 to October 30, 306 specimens.

43. *C. PUNCTULATA MICANS* Oliv. Not very common. Western part of state. Hitchcock, Dundy, Scotts Bluff, Thomas and Sioux counties. June 23 to August 15, 21 specimens.

44. *C. CELERIPES* Lec. Common in eastern part of state, May 20 to August 19, 280 specimens.

45. *C. CURSITANS* Lec. Scarce. Douglas, Cuming, Hitchcock and Dakota counties, June to August, 21 specimens.

46. *C. PUSILLA* Say. Taken only in extreme northwestern portion of state. Sioux County, June 20 to August 16, 56 specimens.

47. *C. PUSILLA TERRICOLA* Say. Scarce. Sioux County, July, one specimen.

48. *C. PUSILLA SAYANELLA* Csy. (*vide* Leng). Scarce. None in Nebraska collection.

49. *C. PUSILLA CINCTIPENNIS* Lec. Scotts Bluff, Dawes and Sioux counties, June 20 to August 16, 46 specimens.

50. *C. PUSILLA CYANELLA* Lec. Scarce. Dundy and Sioux counties, June to August 16, 2 specimens.

51. *C. CIRCUMPICTA* Laf. Lancaster County, June 18 to October, 89 specimens.

52. *C. NEVADICA* Lec. (*vide* Horn). Scarce. None in Nebraska collection.

53. *C. NEVADICA KNAUSI* Leng. Found only in extreme eastern and southwestern portions of state. Lancaster, Dundy and Hitchcock counties, June 11 to July 24, 166 specimens.

54. *C. CUPRASCENS* Lec. Eastern and southwestern portions of state. Dakota, Saunders, Knox and Dundy counties, July 12 to September, 26 specimens.

55. *C. CUPRASCENS MACRA* Lec. Generally distributed except in extreme northwestern part of state. June 26 to August 21, 49 specimens.

56. *C. LEPIDA* Dej. Rather scarce. Eastern half of state. April to July 25, 10 specimens.

57. *C. TOGATA* Laf. Lancaster County, June 21 to October 31, 84 specimens.

58. *C. TOGATA APICALIS* W. Horn. Lancaster County, April 27 to September 24, 29 specimens.

59. *C. TOGATA GLOBICOLLIS* Csy. (*fide* Horn). Scarce. None in Nebraska collection.

*Species	FEB	MCH	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
<i>Amblychella cylindriciformis</i> (1)					-					
<i>Tetracha virginica</i> (37)										
<i>Cicindela formosa</i> (274)										
<i>formosa generosa</i> (1)				-						
<i>longi</i> (42)										
<i>limbata</i> (123)										
<i>purpurea</i> (16)										
<i>purpurea aridaboni</i> (10)										
<i>purpurea graminea</i> (33)										
<i>splendida</i> (137)										
<i>splendida transversa</i> (31)										
<i>splendida denverensis</i> (32)										
<i>limbalis</i> (72)										
<i>duodecimguttata</i> (32)										
<i>repanda</i> (206)										
<i>hirticollis</i> (14)										
<i>hirticollis ponderosa</i> (69)										
<i>tranquebarica</i> (70)										
<i>tranquebarica vulgaris</i> (1)										
<i>tranquebarica obliquata</i> (15)										
<i>tranquebarica horiconensis</i> (3)										
<i>longilabris</i> (1)										
<i>longilabris montana</i> (1)										
<i>longilabris nebrascana</i> (3)										
<i>fulgida</i> (153)										
<i>pulchra</i> (10)										
<i>scutellaris</i> (36)										
<i>scutellaris lecontei</i> (123)										
<i>scutellaris nigrior</i> (2)										
<i>sexguttata</i> (27)										
<i>sexguttata violacea</i> (20)										
<i>patruella</i> (4)										
<i>punctulata</i> (306)										
<i>punctulata micans</i> (21)										
<i>celeripes</i> (280)										
<i>cursorians</i> (21)										
<i>pusilla</i> (56)										
<i>pusilla terricola</i> (1)										
<i>pusilla cinotipennis</i> (46)										
<i>pusilla cyanella</i> (2)										
<i>circumpicta</i> (89)										
<i>navadica knausi</i> (166)										
<i>cuprascens</i> (26)										
<i>cuprascens macra</i> (49)										
<i>lepada</i> (10)										
<i>togata</i> (84)										
<i>togata apicalis</i> (29)										

*Only those in permanent collection listed.

Numbers in parentheses following names indicate number of specimens of each species.

Discussion.

Cartwright* (1935) has shown the seasonal distribution of the South Carolina tiger beetles. It is obvious from his data that certain species range continuously through the middle of the summer. Certain others appear earlier in the year, are not

* Cartwright, O. L. 1935. The tiger beetles of South Carolina with the description of a new variety of *Tetracha virginica* (L.) (Coleoptera: Cicindelidae). Bull. Brooklyn Ent. Soc., 30:69-77.

abundant or are absent in the middle of the summer and then appear again in the fall. This is also true with the Nebraska species.

There seems to be two possible explanations of the fact that some species appear early in the spring, are absent during the hottest months of the summer and are again present in the fall. The animals, as adults, may go into aestivation during the middle of the summer or, what seems more logical, the adults winter over and appear early in the spring. The late summer and fall animals may represent a second brood. It is possible that those which range throughout the summer and appear later in the spring represent the generation which overwintered as pupae rather than adults.

Further data from other localities should shed more light on this interesting phase of seasonal distribution.

A New Generic Name (Lepidoptera, Euchromiidae).

Ciseps is here proposed for *Scepsis* Wlk., 1854, Cat. Brit. Mus., II, 285, preoccupied by *Scepsis* Wlk., 1850, Insecta Saundersiana, I, pt. 1, 71 (Diptera, Tabanidae). The type of the genus *Ciseps* is *fulvicollis* Hbn., which is the type of *Scepsis* Wlk., 1854, nec 1850.

Scepsis was first proposed by Walker in 1850 for a genus of Tabanid flies and was four years later again used by the same author when he erected a new genus for *Ctenucha fulvicollis*. Systematists working in the Lepidoptera have always considered the Tabanid genus as being preoccupied because the title page of the completed work, Insecta Saundersiana, bears the date 1856, but the work was issued in four parts, the first appearing in 1850, and it was in this part that *Scepsis* was first proposed. As far as I am able to determine, *Ciseps fulvicollis*, *C. packardii* and *C. twilightii* can neither be returned to *Ctenucha* nor placed in any of the related South American genera.

This was brought to my attention by Mr. L. L. Pechuman who is working in the Tabanidae.

J. G. FRANCLEMONT, Ithaca, New York.

Corrections for November, 1936, News.

Pages 229, 231, for Mr. J. S. Brimley, read Mr. C. S. Brimley. Page 231, first line, for California Beach read Carolina Beach.

Entomological Literature

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

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

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 insertments.

(*) 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.

New Titles of Periodicals and Serials Referred to

14. Archivos do Instituto Biologico, Sao Paulo.

GENERAL.—Cockerell, T. D. A.—The fauna of the Sunchal (or Margas Verdes) formation, northern Argentina. [40] No. 886, 9 pp., ill. (S*). **Comstock, J. H.**—An introduction to entomology. 8th ed., revised. Ithaca, Comstock Publ. Co., 1936. xix + 1044 pp., ill. **Folsom, J. W.**—Obituary by A. S. H. [68] 84: 343-344. **Graham, A. B.**—Some thoughts on teaching entomology to adults. [12] 29: 911-913. **Hayward, K. J.**—Random notes on Argentine collecting. 2.—An unproductive winter expedition. [21] 48: 111-118. **Horn, W.**—Ueber "vergessenes," biologisches wissen. [110] 3: 238-243. **Knowlton, G. F.**—The insect fauna of Utah. [Pro. Utah Acad. Sci., Arts & Letters] 13: 249-262. **Knowlton & Smith.**—Rose insects. [Pro. Utah Acad. Sci., Arts & Letters] 13: 263-267, ill. **Kühn, A.**—Genetik und entomologie. [110] 3: 234-238. **Morofsky, W. F.**—Survey of insect fauna of some Michigan trout streams. [12] 29: 749-754. **Musser, D. R.**—Observations on the effectiveness of some moth-proofing chemical compounds. [103] 9: 116-125. **Navas, R. P. L.**—Insectos del Brasil. [Rev. Mus. Paulista] 20: 721-734, ill. (*). **Robertson, C.**—Obituary by H. B. Parks. [BIOS. Okla. City Univ.] 7:

85-96. **Semenov-Tian-Shansky, A. P.**—Notice by M. Burr. [21] 48: 107-109, ill. **Sorenson, C. J.**—Contribution to a symposium on the biology of Utah. [Pro. Utah Acad. Sci. Arts & Letters] 13: 219-223. **Swan, D. C.**—Berlese's Fluid: remarks on its preparation and use as a mounting medium. [22] 27: 389-391. **Tanner, V. M.**—List of the insect types in the entomological collections of the Brigham Young University, Provo, Utah. [Pro. Utah Acad. Sci. Arts & Letters] 13: 147-152.

ANATOMY, PHYSIOLOGY, ETC.—**de Beaumont, J.**—Hymenopteres gynandromorphes. [Bull. Soc. Vandoise Sci. Nat., Lausanne] 59: 85-90, ill. **Brandt, H.**—Ueber die aenderung des geschlechtsverhältnisses bei insekten und ihre ursachen. [110] 3: 218-221. **Crampton, G. C.**—Suggestions for a new interpretation of the postabdomen in male Cyclorhaphous Diptera. [19] 31: 141-149, ill. **Davis & Harris.**—The biology of *Pseudosinella violenta*, with some effects of temperature and humidity on its life stages. [Iowa St. Coll. J. Sci.] 10: 421-428, ill. **Deckers & Andre.**—Studies on temperature and moisture as factors influencing winter mortality in adult chinch bugs. [Iowa St. Coll. J. Sci.] 10: 403-420. **Fidler, J. H.**—On the first instar larvae of some species of *Otiorrhynchus* found on strawberries, with notes on their biology. [22] 27: 369-376, ill. **Flemion & Hartzell.**—Effect of low temperature in shortening hibernation period of insects in the egg stage. [12] 29: 806. **Foxon, G. E. H.**—Observations on the locomotion of some Arthropods and Annelids. [75] 18: 403-419, ill. **Frey, W.**—Untersuchungen über die Entstehung der Strukturfarben der Chrysididen nebst Beiträgen zur Kenntnis der Hymenopterencuticula. [46] 31: 442-489, ill. **Galliard, H.**—Recherches sur les Reduvides nematophages *Rhodnius* et *Triatoma*. [54] 14: 1-34. **Harland, S. C.**—Genetic behaviour of a mutant in a Trinidad cotton stainer (*Dysdercus urichi*). [Tropical Agriculture] 13: 256. **Hilton, W. A.**—Nervous system and sense organs. LVII. Protura. Nervous system and sense organs. LVIII. Insects, General. Nervous system and sense organs. LIX. Insecta Thysanura. [13] 28: 11-12; 29-38; 47-53, ill. **Hodge, C.**—The anatomy and histology of the alimentary tract of the grasshopper, *Melanoplus differentialis*. [J. Morph.] 59:423-440, ill. **Janes & Hager.**—Studies on the incubation of chinch bug eggs. [Iowa St. Coll. J. Sci.] 10: 395-402. **Key, K. H.**

L.—Experimental studies on locomotor activity in *Locusta migratoria migratorioides*. [22] 27: 399-422, ill. **Knipling, E. F.**—A comparative study of the first-instar larvae of the genus *Sarcophaga* (Calliphor.), with notes on the biology. [J. Parasitol.] 22: 417-454, ill. **Koneff, A. A.**—An iron-hematoxylin-anilin-blue staining method for routine laboratory use. [Anat. Rec.] 66: 173-176, ill. **Koonz, C. H.**—Some unusual cytological phenomena in the spermatogenesis of a haploid parthenogenetic Hymenopteran, *Aenoplax smithii*. [92] 71: 375-385, ill. **Lameere, A.**—*Precis de zoologie. IV. Myriapodes, caracteres fondamentaux des insectes, les insectes inferieurs, chap. XV, XVI. Les paurometaboloques*, pp. 263-468. *Les holometaboliques*, pp. 1-160, ill. [Recueil. Inst. Zool. Torley-Rousseau Univ. Brus.] VI. fas. 1. **Lassmann, G. W. P.**—The early embryological development of *Melophagus ovinus* with special reference to the development of the germ cells. [7] 29: 397-413, ill. **Maurice, A.**—*La Lucilia sericata en therapeutique*. [54] 14: 35-47, ill. **Mer, G. G.**—Experimental study on the development of the ovary in *Anopheles elutus* (Dipt. Culicidae). [22] 27: 351-359. **Nieschultz, O.**—*Die Entwicklungstadien von Tabanus rubidus und T. striatus* (Dipt.). [52] 5: 230-255, ill. **Querci, O.**—Effects of alimentation on the development of some Pierinae (Lepid.). [21] 48: 110-111. **Roy, D. N.**—On the role of ovulation in *Aedes aegypti*. (Dipt. Culicid.). [22] 27: 423-429. **Scott, A. C.**—Haploidy and aberrant spermatogenesis in a Coleopteran, *Micromalthus debilis*. [J. Morph.] 59: 485-516, ill. **Snodgrass, R. E.**—Morphology of the insect abdomen. Part 111. The male genitalia. [Smiths. Misc. Coll.] 95: 96 pp., ill. **Squire, F. A.**—Observations on the pupal respiration of some insects of economic importance. [22] 27: 381-384, ill. **Tauber, O. E.**—Mitosis of circulating cells in the hemolymph of the roach, *Blatta orientalis*. [Iowa St. Coll. J. Sci.] 10: 431-439, ill. **Thorpe, W. H.**—On a new type of respiratory interrelation between an insect (Chalcid) parasite and its host (Coccidae). [116] 28: 517-540, ill. **de la Torre-Bueno, (R. T.) & Ambrose.**—Effects of the protective vapors of the Coreid bug *Thasus gigas* on a tarantula (*Eurypelma* sp.). [19] 31: 184. **Trager, W.**—The utilization of solutes by mosquito larvae. [92] 71: 343-352, ill. **Wagner, J.**—*Ueber den Bau des Hinterdarms bei Flohlarven und seine Veränderungen während der Metamorphose beim Menschenfloh (Pulex irritans)*. [89] Abt. Anat., 61: 343-390, ill.

West, A. S.—Winter mortality of larvae of the European pine shoot moth, *Rhyacionia buoliana* in Connecticut. [7] 29: 438-448.

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from California. [55] 12: 120-122, ill. **Werneck, F. L.**—Contribuicao ao conhecimento dos Mallophagos encontrados nos mamíferos sul-americanos. [111] 31: 391-590, ill. (*).

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Special Notice. Entomologists do not usually look in the Bulletin of the New York Public Library for articles in their field. We therefore call attention to the issues of the Bulletin for September and October, 1936, Nos. 9 and 10 respectively, of Vol. 40. They contain two installments, pages 739-752, 827-828, of "The more important insect enemies of books," by Harry B. Weiss and Ralph H. Carruthers. After a brief historical introduction, the enemies are briefly described under the headings *Troctes divinatoria et al.*, *Lepisma saccharina et al.*, Cockroaches, *Sitodrepa panicea*, *Ptinus fur*, *Dermestes lardarius et al.*, *Catorama mexicana*, Other beetles, Brown House-moth (*Borkhausenia pseudospretella*) Termites, Other miscellaneous insects and Control of book insects in the tropics. There are two half-tone plates of 5 species of Dermestidae and 9 species of other insects. The October number also contains "Insect pests of books. An annotated bibliography up to 1935. Part I," by Ralph H. Carruthers and Harry B. Weiss, pp. 829-841. One hundred and five titles are entered under the headings Bibliography, Ancient and Classical periods, To the end of the 17th century and 18th century. Under each heading the entries stand under their authors' names, arranged alphabetically. The annotations are often extensive. We are informed that this will be completed in the December number, after which the library will print separates at a slight cost.

P. P. CALVERT.

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EXCHANGES

(Continued)

Wanted—Tabanidae (Horseflies and Deerflies). Exchange, purchase, or for determination. G. B. Fairchild, P. O. Box 272, Monticello, Fla.

Exchange.—Lepidoptera of the Western United States for rare American or tropical specimens. C. W. Herr, Woodburn, Ore. R-3.

Wanted—Insects in exchange for Japanese insects or to buy. Tell me your wishes. Hiromu Yamamoto, Matsuo-Kozan. Iwategun Iwateken, Japan.

Would like to exchange Southern California insects for any North American Mutillidae (wingless wasps or velvety ants). Curtis Brown, 2950 G St., San Diego, California.

Wanted.—To get in touch with Specialists who will make determinations for a share of our duplicates. We have many undetermined specimens from all parts of Iowa.—H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Wanted.—Communication with anyone who has or is collecting Lepidoptera in Burlington County, New Jersey Also anyone having a microscope for sale.—E. P. Darlington, New Lisbon, N. J.

Wanted for Cash or Exchange.—North American Butterflies in series especially from type localities and remote places. C. F. dos Passos, Mendham, New Jersey.

Wanted—Specimens of North American Cephidae. Will make determinations and exchanges for purposes of revising the group. Donald T. Ries, Department of Entomology, Cornell University, Ithaca, N. Y.

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