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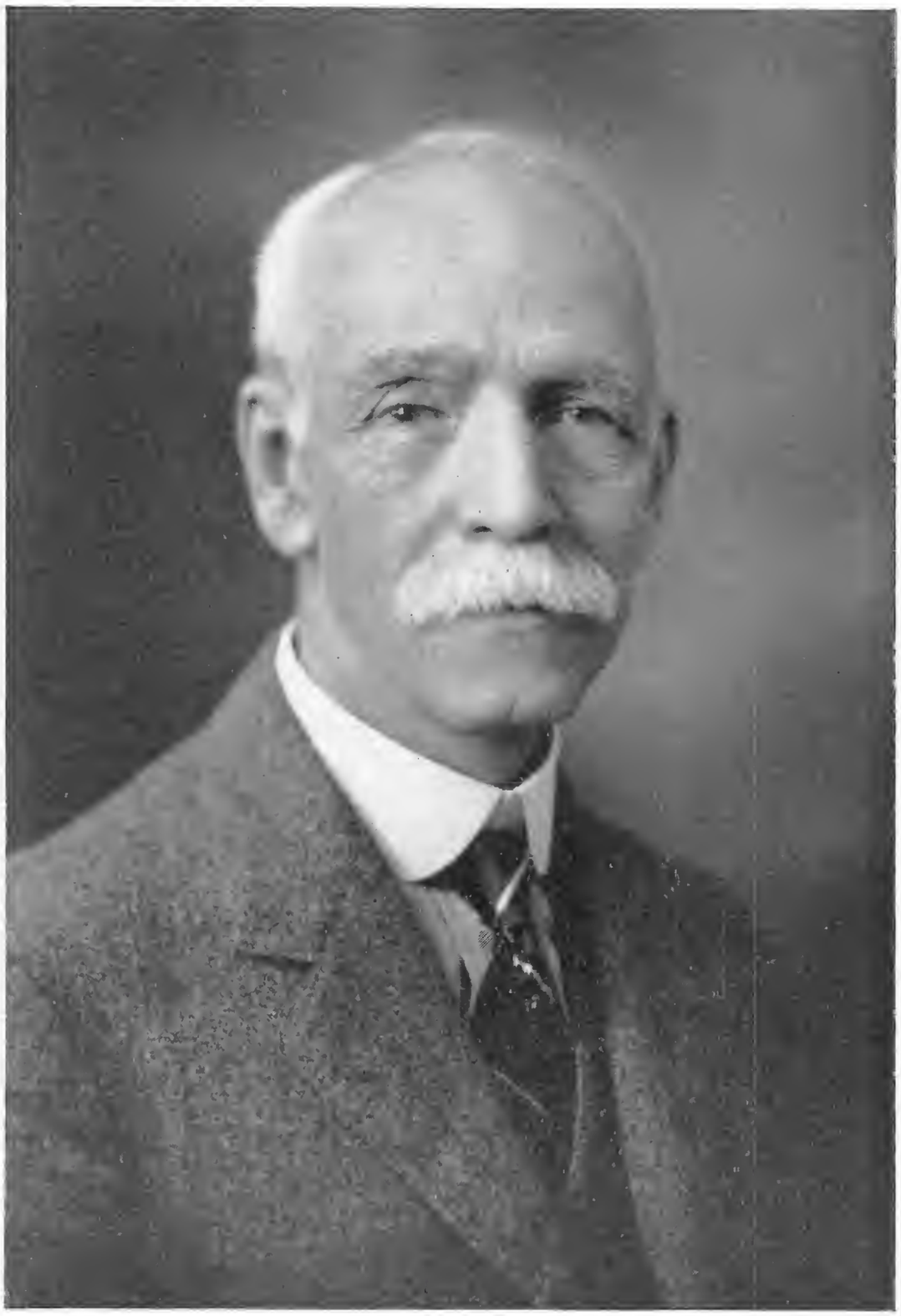


HENRY CLINTON FALL

The Pan-Pacific Entomologist

Vol. XVI, No. 1 January, 1940

HENRY CLINTON FALL*

On November 14, 1939, the Pacific Coast Entomological Society lost by death one of its oldest and most distinguished members, Dr. Henry Clinton Fall. A charter member of the Society in 1901, chairman of its first meeting, vice-president from 1902 to 1910, and corresponding member from his retirement in 1917 until his death, Dr. Fall has left an indelible imprint on the organization and in the hearts of its members.

Dr. Fall was born in Farmington, N. H., on December 25, 1862, the son of Orin Tenny and Mary Anne Hayes Fall. He attended preparatory schools in Dover, N. H., and in 1884 graduated with the degree of Bachelor of Science from Dartmouth College. In 1929 he was honored by the further degree of Doctor of Science bestowed by his Alma Mater. His interest in insects began at a very early age and was encouraged and stimulated by his mother. It is said that at the age of sixteen years he had progressed to the state where he was considering the advisability of starting a pinned collection of insects. With his mind still undecided he captured a large longicorn beetle, *Prionus pocularis* Dalm., which influenced him in favor of the enterprise.

Dr. Fall's professional life was devoted to education, particularly in the field of mathematics. His career began in Illinois at the Chicago Manual Training School and was continued in California where he was head of the Science Department of Pasadena High School from 1896 to 1911. He came to this state in 1889 because of ill health and it was here that he gained recognition as a great Coleopterist. His first scientific article, "California Notes," appeared in the Entomological News for 1893 and was inspired by a visit from Dr. George Horn. It made known some observations on the habits and distribution of several species of little known southern California beetles. This article was followed in the succeeding years by one hundred and twenty-five or more papers, many of which were of a revisional

*Read before the Pacific Coast Entomological Society at its meeting of December 2, 1939.

or monographic nature and all of which were written on his own time, time which is wasted by many men. The best known of his revisions were those of *Apion* (1898), *Acmæodera* (1899), *Lathrididæ* (1899), *Ptinidæ* (1905), *Diplotaxis* (1909), *Pachybrachys* (1915), *Gyrinus* (1922), *Agabus* (1922), and *Hydroporus* and *Agaporus* (1923). Among his faunal works are several of special interest to western entomologists and to students of geographical distribution. These include his lists of the Coleoptera of the southern California islands (1897) and the Coleoptera of southern California (read before the Pacific Coast Entomological Society in 1901 and published by the California Academy of Sciences in the same year), as well as his reports on the Coleoptera of New Mexico (with Cockerell, 1907) and Alaska (1926). The latter report was published by the Society in the Pan-Pacific Entomologist.

The early work of Dr. Fall in southern California served as a stimulus for many western coleopterists, particularly Dr. E. C. Van Dyke, Dr. F. E. Blaisdell, Dr. A. Fenyes, Mr. Ralph Hopping, and Mr. J. O. Martin. These men were assisted by his careful determinations and reciprocated by providing much of the material upon which his early monographs were based. However, Dr. Fall, himself, was a good collector and field systematist. He collected in nearly all parts of the country at some time or other, but more especially in New England, Florida, California, and Alaska. He assembled what was, at the time of his death, the finest private collection of Coleoptera on this continent. It is said to have contained more than two hundred thousand mounted specimens representing some twenty thousand species and including about fourteen hundred types. These last were kept in separate boxes arranged in chronological order. All of his specimens were beautifully and carefully mounted, neatly labelled, and perfectly arranged, reflecting his methodical and systematic mind. The majority of the species had been determined by careful comparison with types, a fact which greatly enhances their value. Even while he was residing in California, Dr. Fall spent the majority of his summers in the East studying the type specimens of the species described by LeConte, Horn, and other early workers. After his retirement from active teaching in 1917, most of his time was spent in the study and arrangement of his

collection and in assisting others with determinations and type comparisons. His collection was left to the Museum of Comparative Zoology, where it will be housed near that of his great predecessor, Dr. LeConte. One of the things which Dr. Fall had long planned to do, and which now, unfortunately must remain undone, was the presentation to the California Academy of Sciences of a duplicate set of the numerous species which he described from this state. This action would have been of inestimable service to the western systematists and it is to be regretted that the plan was never consummated.

In addition to his more serious studies, Dr. Fall at one time or another, made collections of butterflies and of postage stamps. He was also fond of tennis and enthusiastic over parlor games, which he played with a good deal of skill. One of the older entomologists once recounted to the writer an incident which occurred at the Fall home in Pasadena. My friend, who considered himself quite skillful at cribbage, had been playing all evening without winning a game. Finally, in desperation, he exclaimed that Dr. Fall was inordinately lucky and that anyone could win who drew such excellent cards. With a smile, Dr. Fall suggested that they exchange the hands which they had just played and with which he had so easily won. They did so and once more he completely overwhelmed his opponent.

Although future generations of entomologists will place the name of Henry C. Fall beside that of John L. LeConte and George Horn as one of the greatest North American Coleopterists, he will be remembered by the members of the Society as a fine, scholarly gentleman, beloved by the older generation as a friend, colleague, and good companion on camping and collecting trips, and by the younger generation for the constant encouragement and patient help he so freely gave to all who asked.

Dr. Fall died at the age of 76 at the home of his sister, Mrs. Carl A. Richmond, at Tyngsboro, Mass., where he had resided since his retirement in 1917. Honorary pallbearers were Nathan Banks, William J. Starr, Frank A. Richmond, and Dr. W. M. Lougee. Active bearers were Dr. P. J. Darlington, R. W. Sherburne, C. H. Queen and R. C. Turner. He was interred in Pine Grove Cemetery, Farmington, N. H.—E. Gorton Linsley.

A NEW GEOPHILUS FROM SAN NICHOLAS ISLAND, CALIFORNIA

BY RALPH V. CHAMBERLIN
University of Utah

From Professor T. D. A. Cockerell I recently received for identification two chilopods collected on islands off the coast of California. A specimen taken on San Miguel Island by Anna Duszen is a female of *Ethopolys xanti* (Wood), a species widespread on the California mainland. The second specimen, taken on San Nicholas Island by Harry Allen, is a female of an interesting and apparently previously unknown species of *Geophilus*, which is described below.

Geophilus nicolanus Chamberlin, new species

Color of type specimen dark brown, the anterior segments and head, and the posterior segments lighter brown or fulvous. *Cephalic plate* very slightly wider than long, widest at middle; sides convex, the posterior margin straight or nearly so and the anterior margin convex. Frontal suture distinct. Median piece of labrum strongly sclerotized, dark in color, bearing five or six short conical teeth; the lateral pieces pectinate as usual. First maxillæ with telopodite of two articles; two external lappets well developed. *Antennæ* three times as long as the cephalic plate, with the ultimate article much shorter than the two preceding taken together. *Prebasal plate* not exposed, the cephalic plate overlapping the basal plate, the exposed portion of which is about three times as wide as long. *Prehensors* when closed equalling, or but slightly surpassing, the anterior margin of the head. Anterior margin of coxosternum forming a very obtuse reentrant angle, smooth, chitinous lines incomplete at anterior end. None of the articles dentate within. Claw stout, smooth. *Dorsal plates* bifurcate. Last plate somewhat shield-shaped, with posterior angle truncate. *Ventral plates* in anterior region decidedly wider than long. A few sternites preceeding the ultimate nearly as long as wide. Ventral pores across posterior border. *First spiracle* large, subelliptic, the second of similar form and size, the third much smaller, it and the following circular. *Last ventral plate* very wide, wider than long in about the ratio 15:8; sides convex, converging caudad, the caudal margin mesally incurved. Coxal pores numerous, arranged along and beneath the border of the ventral plate, twenty to twenty-four exposed on each side. Anal legs in the female slender, with the claw normal. *Anal pores* not visible. Sixty-three pairs of legs in female holotype. Length, 62 mm.

Locality: San Nicholas Island, California. One female collected by Harry Allen and transmitted by Professor T. D. A. Cockerell.

THE DIPTEROUS GENUS MICROPHORUS. I. PHYLOGENY

(Diptera Empididæ)

BY A. L. MELANDER

College of the City of New York

This paper is dedicated to Elizabeth Thompson, whose interest in science made possible the collection of many of the specimens enumerated herein. In 1922 the writer received a grant from the Elizabeth Thompson Science Fund for the purpose of studying the insects of Mount Rainier, in the State of Washington. With this assistance an extended trip was made with pack horses beyond the usual tourist roads. The alpine regions of Mount Rainier have been visited by the writer on six additional collecting trips, and on nearly every occasion specimens of *Microphorus* have been encountered. They are small black Empid flies, sometimes to be secured in great numbers by the sweeping net in the meadow slopes. Representatives mounted from many collecting localities along the Pacific slope when later examined proved to belong to several species, some of which were undescribed. The present study is an attempt to visualize the evolutionary development of this genus through an evaluation of the degrees of relationship of the several species to each other.

The genus *Microphorus* was erected in 1827 by Macquart, who then called it *Microphor.* In 1834 he corrected the name to *Microphorus*, giving its etymology as the little plunderer. Because the source of the term is thus the Greek *phōr*, spelled with the long omega, and not the commonly encountered *phŏr*, carry, which is spelled with the short omicron, the accent belongs on the penult, and the genus name is to be pronounced Mi-cro-phó-rus.

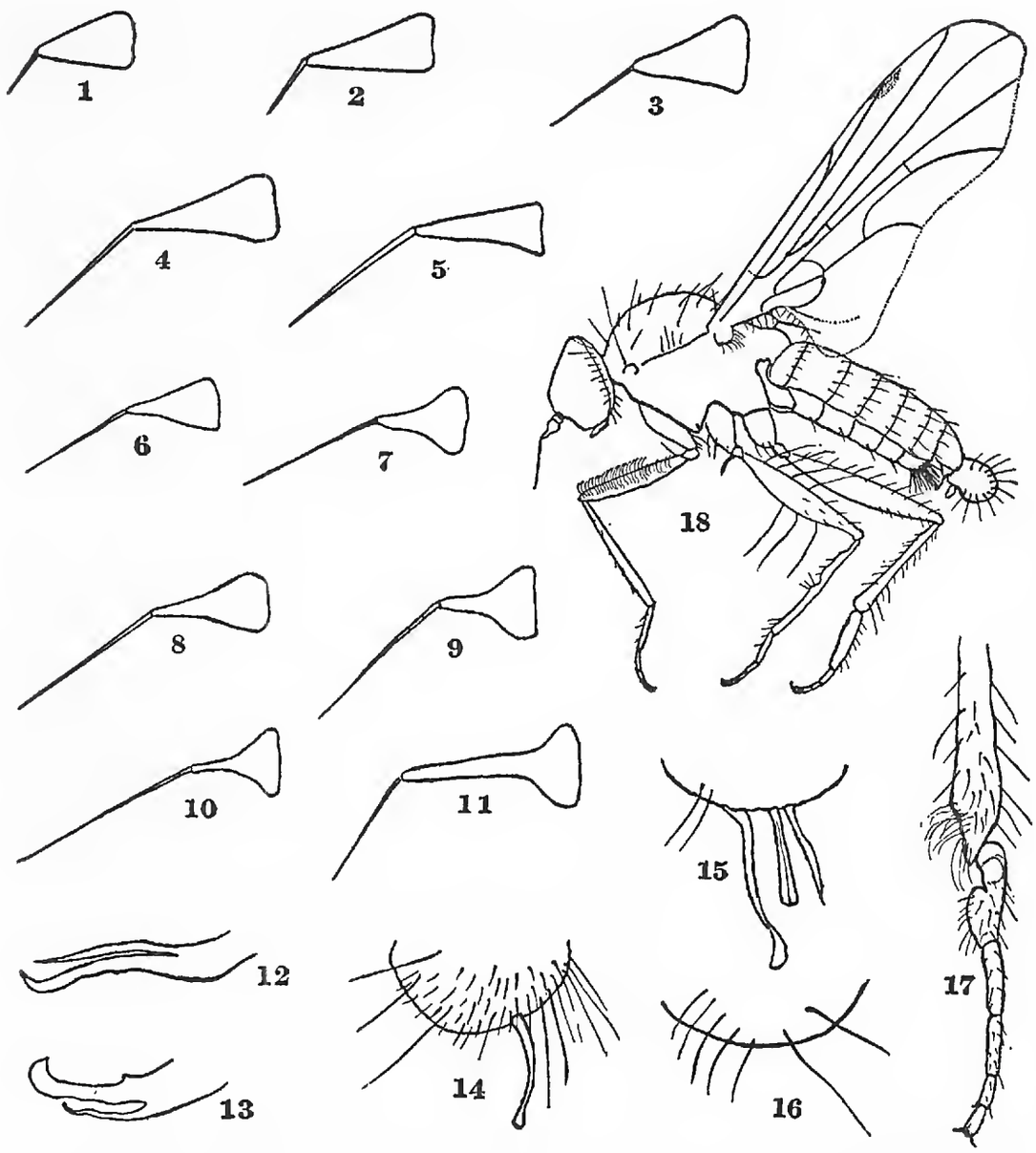
This genus has been confused in the minds of many. Of the American species which at one time or another have been referred to *Microphorus* the following assignments can be made. *Microphorus drapetoides* Walker is described in such general terms as to be unrecognizable; it may be an *Anthepiscopus. M. scapuliferus* Bigot, from Chile, has been placed by Collin in *Atrichopleura*, and Bigot's *M. semifulvus* in *Platypalpus.* In 1902 I used *Holoclera* in the sense of *Microphorus.* Coquillett, in his analysis of Empid genera in 1903, located in *Microphorus*

the diverse species *Anthepiscopus flavipilosus* Coquillett, *Anthepiscopus stentor* Melander, *Trichina atripes* Melander, *Euthyneura crocata* Coquillett, *Euthyneura aperta* Melander and *Sciodromia palliata* Coquillett; and transferred two typical species of *Microphorus*, *M. atratus* Coquillett and *M. sycophantor* Melander, to *Anthalia.*

It would seem from the confusion regarding the identity of *Microphorus* that the genus would be hard to recognize. That is not the case, for the species can be picked out at a glance. All our species are small, black-bodied and black-haired, with gibbous thorax, the males with large holoptic head and with the genitalia massive and curiously twisted to the right. Among the Empididæ they are set off by the small basal and anal cells of the wing. Because of their striking sex dimorphism it has been more difficult to associate females with their appropriate males than to place either in the genus. The allied genus *Microphorella* contains even smaller species, both sexes dichoptic, with pubescent eyes and with the anal angle of the wing greatly reduced.

Classification of the species within a genus may be presented as a visualization of the phylogeny of the group. While obviously nothing can be proved of the happenings of the past with regard to the actual origin of species, it is possible, by a study of correlated characters, to picture the groupings of species and their relations to each other.

Some characters, possessed in common by a series of species, may be regarded as ancestrally generalized; other characters, possessed by relatively few, may be considered to be recently specialized. Applying this working principle to *Microphorus* we see that *cirripes* (fig. 18) alone of all the species has the front femora of the male fringed with curled hairs. This unique fringe may therefore be regarded as a highly specialized character. Since *cirripes* further is the only species that possesses a much warped wing and has developed the bristle armature of the fifth ventral segment to the extreme, it is probable that *cirripes* is a very recently evolved species, measured by the wide terms of biological time. Other recent species, as indicated by the unique possession of specialized characters, are *bilineatus* which has two polished thoracic vittæ, *tacomæ* which has the seventh tergite polished, and *discalis* which has the largest discal cell in the genus.



Figs. 1 to 11, third joint of antenna and arista: 1, *M. obscurus;* 2, *obscurus* and *bilineatus;* 3, *ravus;* 4, *ravidus;* 5, *strigilifer;* 6, *evisceratus* and *isommatus;* 7, *cirripes* and *tacomæ;* 8, *sycophantor;* 9, *atratus* and *robustus;* 10, *armipes;* 11, *discalis.* Figs. 12 and 13, end of penis: 12, *robustus;* 13, *armipes.* Fig. 14, right lobe of fourth sternite, *evisceratus.* Fig. 15, right lobe of fifth sternite, *evisceratus.* Fig. 16, left lobe of fourth sternite, *isommatus.* Fig. 17, end of hind leg, *strigilifer.* Fig. 18, *M. cirripes.*

The figures are drawn freehand and therefore are to be regarded as diagrammatic.

A comparison of structures possessed in common by *cirripes* and any of the other species of *Microphorus* shows that *ravidus* and *strigilifer* are the closest relatives of *cirripes*. These three species form a group differentiated from the congeners by the structure of the middle legs of the males, which possess three strong femoral bristles and a distorted tibia, a correlation not to be found elsewhere in the genus.

Other index characters which show group relationship are the numerous minute acrostichal hairs of *obscurus* and *bilineatus*, and the bilobed and spinose fourth ventral segment of the males of *isommatus* and *evisceratus*. That these groupings are natural is further indicated by the correlation of other characters with the index characters mentioned. The numerous acrosticals developed only in the species *obscurus* and *bilineatus* are associated with a conical third antennal joint (figs. 1, 2), shortened style, piercing proboscis, clavate hind tibiæ and swollen hind metatarsi. The same combination of characters occurs also in the European species *anomalus*. All of our other species of *Microphorus*, all of which are limited to the western states, manifest a peculiar formation of the antennæ, the third joint becoming more or less constricted beyond its base and the style lengthening to an arista (figs. 3-11). This tendency to constriction reaches its culmination in *discalis*, where the distal part of the third joint is a strap-like elongation (fig. 11). Since constricted antennæ are distinctive of *Microphorus*, while the related genera have the conical form, it follows that the *obscurus-bilineatus-anomalus* group represents an ancestral condition, at least as concerns antennal structure.

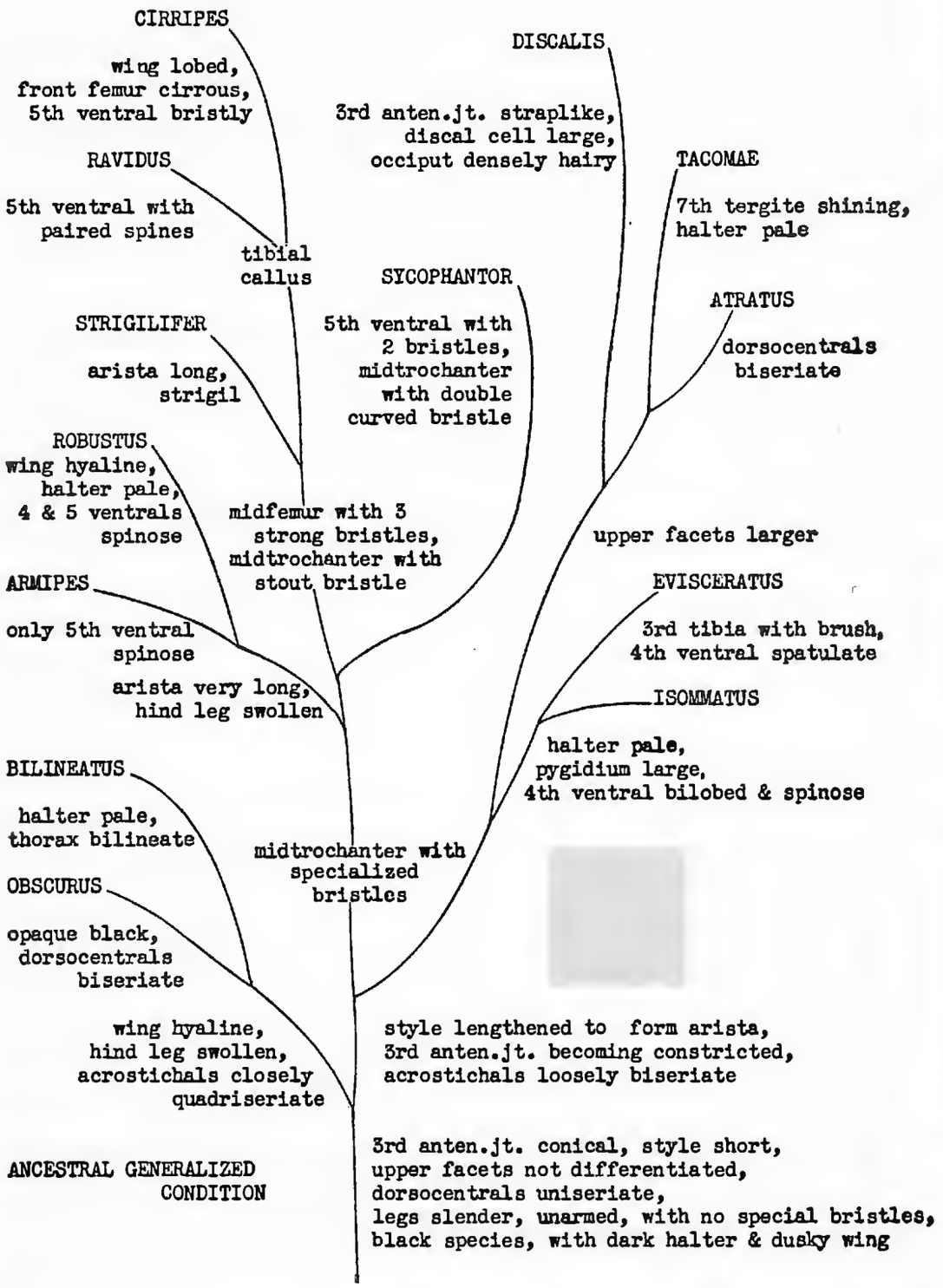
Secondary sexual characters are highly developed in the male of *Microphorus*. The genitalia are unusually large, distorted and always flexed to the right; the terminal abdominal segments often develop spines, or groups of bristles, or expanded plates; the legs may be distorted or swollen, and usually show some distinctive arrangement of stout blunt bristles not possessed by the females. Such departures from the conservative female structure may be regarded as specializations, and the greater the departure the higher the degree of specialization. When pictured as a phyletic tree the generalized species should form the lower and shorter branches and the specialized species should show the greater evolutionary growth.

It will be noted that in this genus there are certain tendencies which outcrop in various lines of ascent. The swelling of the hind legs of the archaic *obscurus-bilineatus* group is paralleled in *robustus* and *armipes*. There is a tendency in several species to transform the ventral hairs immediately in front of the pygidium into short spinous bristles. The nearly conical third antennal joint of the highly specialized *ravidus* is suggestive of the primitive conical antennæ of *obscurus*. Bleaching of the halteres has been accomplished independently in various species. Also, several species show the tendency to elongation of the discal cell, while others develop a curvature of the third vein.

Taxonomy always faces the problem of deciding what characters are homoplastic and what characters show genetic relationship. The parallelisms in the development of the structures mentioned in the preceding paragraph do not indicate a common origin. Personal interpretations vary with the individual entomologist to an extent that what might appear to be a natural identification key to one taxonomist might be considered an artificial key by another. The tabulation of the females of *Microphorus* as presented in the second paper of this series is not a natural classification. The species did not arise phyletically as listed in the table, nor are natural groupings indicated by the relative length of the sections of the fifth vein or the number of dorsocentral bristles and hairs. But the tabulation of the males probably has more genetic basis, made possible by a greater diversity of index characters displayed by this sex. In some species of this genus the males are more abundant than the females. With their ferocious and bloodthirsty natures, the males may display a rivalry, which may have been responsible for the spectacular array of secondary sex characters developed by this sex, and such characters have great value in the diagnosis of species. As to atavic index characters, first suggested by Osten Sacken in 1894, speciation in this small genus is apparently too recent to afford much use of such ancestral traits. Atavic indices are those inconsequential structures which have escaped the action of natural selection, and hence persist unmodified through the ages. The short style of the *obscurus-bilineatus-anomalus* group is an example of atavic index; but the stiffened bristle of the middle trochanters of certain males, while a group index indicating relationship, is too specialized a character to be considered an atavic index.

PLATE I

PHYLOGENY OF THE AMERICAN SPECIES OF MICROPHORUS



Showing the probable course of evolution in *Microphorus*, the stages at which specializations were introduced and the degrees of relationship of the various species to each other.

Microphorus affords good illustrations of the varying speed of evolution in developing different structures. *M. obscurus*, for example, possesses an archaic antennal structure coupled with modernized swollen hind legs. *M. evisceratus* has produced a most remarkable deformity of the abdomen while retaining the small ommatidia of its remote ancestors. The excavation of the hind metatarsus of *strigilifer* is undoubtedly a recent acquisition, geologically speaking, developed amidst the conservative pattern of the hairs of the legs. *M. strigilifer* shows a rudimentary deformity of the middle tibiæ of the male, which later developed into a pronounced callus in the species *ravidus* and *cirripes*. Comparing the three species, *strigilifer*, *ravidus* and *cirripes*, *strigilifer* would be rated as the most recent if the structure of the hind legs alone were used as the criterion; while its middle legs would indicate that it is older than either of the two other species. Judged by the front legs, *cirripes* is clearly the youngest species. An expansion of the wings near the middle of the hind margin might suggest a close relationship between *strigilifer* and *cirripes*, but this expansion is another instance of homoplasy, since it is only a superficial similarity, centering at the end of the intercalary vein in *cirripes* and at the end of the fifth vein in *strigilifer*.

(To be continued in next number)

SYNONYMY IN A CENTRAL AMERICAN HOPLIA

(Coleoptera, Scarabæidæ)

BY L. B. BOYER

Stanford University, California

The name *Hoplia argentata* Nonfried[1] is a homonym of *H. argentata* (*Scarabœus argenteus*) Geoffroy[2], a synonym of *H. cœrulea* (*Scarabœus cœruleus*) Drury[3]. Moser has previously relegated *H. tricolor* Nonfried[4] into synonymy with *H. argentata*[5].

Inasmuch as *argentata* is a homonym of a name already used, the correct name of the species must be *H. tricolor* Nonfried.

[1]Nonfried, A. F., Deut. Ent. Ztschr. (1891), p. 259, 1891.
[2]Geoffroy, E. L. (in Fourcroy, A. F., Entomologia Parisiensis, 1:8, 1785.
[3]Drury, Drew, Illustrations of Natural History, 2:63, pl. 32, fig. 4, 1773.
[4]Nonfried, A. F., Berlin. Ent. Ztschr., 40:228, 1895.
[5]Moser, J., Stettin. Ent. Ztg., 79:338, 1918.

A NEW GENUS OF EMBIOPTERA FROM THE WEST INDIES

BY EDWARD S. ROSS

California Academy of Sciences

The following description is presented at this time to make the name available for use by Mr. Consett Davis of Australia in a paper to appear before my revision of the North American Embioptera, now in press. A fuller consideration, accompanied by illustrations of the characters of the component species will be included in this revision.

Genus Mesembia Ross, new genus

Oligotoma, Myers, 1928, Bull. Brooklyn Ent. Soc., 23:89.

Males: Winged; medium to large sized. *Head* with eyes large; mandibles small, short, apices acutely pointed, non-dentate. *Wings* large; venation oligotomoid; pigment bands broad, dark; hyaline stripes narrow, clearly, sharply defined. *Hind basitarsi* with but one bladder. *Terminalia* with tenth tergite divided sub-medially, each of the thus-formed hemitergites bearing distinct caudal process; process of hypandrium not prominent; left cercus two-segmented, the basal segment with an echinulate nodule on inner side; left cercus-basipodite not prominent, ventral. *Females*: No mature examples available for study.

Genotype: *Oligotoma hospes* Myers, ibid., fig. 1.

Distribution: West Indies.

The two-segmented echinulate left cercus in combination with the oligotomoid wing venation will distinguish *Mesembia* from all other known genera. Besides its type, *hospes* of Cuba, this genus also contains a new species from Haiti which will be described later.

Obituary Notices

Among the well-known and beloved members of the world entomological fraternity who have passed away during the year 1939, are: Walther Horn, Director of the Deutsches Entomologisches Institut, on July 10, 1939, at the age of 59; Commander J. J. Walker, editor of the Entomologist's Monthly Magazine, on January 12, 1939, at the age of 87; W. E. Britton, State Entomologist of Connecticut, on February 15, 1939, at the age of 70; H. H. Karny, versatile Austrian entomologist, on August 7, 1939, at the age of 53; and Royal N. Chapman, newly appointed dean of the Graduate School of the University of Minnesota, in November, 1939.—By R. L. Usinger.

NOTES ON SOME BUPRESTIDÆ OF SOUTHWESTERN OREGON

(Coleoptera)

BY FRANK M. BEER

Grants Pass, Oregon

During the winter of 1938-39 and the following spring and summer, a number of unusual Buprestidæ were taken in southwestern Oregon which may be of interest to collectors. Along with this, some observations were made on the habits of others, which, I believe, are worthy of mention.

The flora of the Rogue River Valley[1] is generally considered to be predominantly Californian. The mountainous country on the southern border of the valley is, topographically, a westward extension of the Sierra Nevada and Cascade ranges and their connection with the Coastal range. It is here that many of the semi-desert plants of the Sierra and Great Plain region gain entrance and extend into this area. Thus, with their host plants present, it is not surprising that a number of typical Californian Buprestids should be found here.

POLYCESTA CALIFORNICA LeC.

Though this species has been reported as common from southern Oregon and from a number of hosts, it is interesting to note that willow (*Salix sp.*), hitherto unlisted, is also one of its host plants.

ACMÆODERA PLAGIATICAUDA Horn

Although this species has not been reported from southern Oregon, it is not surprising to find that it occurs here. Two specimens were dug from manzanita (*Arctostaphylos viscida*) about two miles east of Murphy, Josephine County, Oregon. Later, two specimens were collected from the same host near Trail, Jackson County, Oregon. One was dug from a wood scar, the other was taken while feeding on a cluster of young leaves. The larvæ stay near dead wood and are generally found very close to the ground.

[1] Piper and Beattie, The Flora of the northwest Coast, p. iii.

ACMÆODERA CONNEXA LeC.

During the middle of February while collecting in a burn that had occurred in the fall of 1931, seven adult specimens and a number of larvæ of this species were dug from the heart-wood of oak (*Quercus garryana*). The trees varied in size from about three to six inches in diameter and still had solid wood. The collection was made on Humbug Creek, two and one-half miles from Applegate, Jackson County, Oregon. Very little variation in markings was noted. At various times during the spring, specimens almost identical were collected near Grants Pass from one of our fire weeds (*Epilobium* sp.) and from a composite (*Monolopia major*) from Copper, on the upper Applegate River.

ACMÆODERA SINUATA var. SEXNOTATA Van Dyke

Five specimens of this unusual variety were taken in the valley; all were typical and showed little or no variation in markings. Two specimens were dug from chaparral (*Ceanothus cuneatus*), one being collected about two miles east of Murphy, Josephine County, Oregon, on an exposed hillside of the Applegate Valley, the other under identical conditions about one mile west of the city of Rogue River, Jackson County, Oregon. Later, three specimens were swept from the above reported host growing near Grants Pass.

ACMÆODERA ANGELICA Fall

Fourteen specimens of this little Buprestid were collected at various places throughout the valley. Five were dug from the heart wood of chaparral (*Ceanothus cuneatus*), and others were collected in flight near, or swept from, the dead branches of the host plant.

MELANOPHILA INTRUSA Horn

This is by no means a common species in our locality. It is found on pines which are dying, and usually only on trees that yet have a little life as shown by the fact that spring buds had developed a short distance. A number of specimens were observed on young fire-scorched pines, but none was seen on nearby trees which had been completely killed.

MELANOPHILA OCCIDENTALIS Obenberger

It seems surprising to find this species so far north, as Sloop[2] reports it only from California, recording specimens taken from Orange County. However, as reported by Van Dyke[3] and Linsley[4] and as shown by Sloop[5], these forms have a special sensory pit which makes them sensitive to acrid odors and fumes, and since they have been known to travel long distances to fires, etc., it is not really surprising that we should find the species here. As Sloop stated, the adults and larvæ were collected from oak. Both Oregon white oak (*Quercus garryana*) and California black oak (*Q. californica*) are hosts, as is also Madroña (*Arbutus menziesii*). I suspect that careful examination of our boxes of *Melanophila* would prove this species to be confused with *acuminata*, and that they may be rather widely distributed in our western region. The species can readily be determined by dissection of the genitalia.

MELANOPHILA CONSPUTA LeC.

The larvæ of this species are very common in the charred, fire-killed limbs of second-growth yellow pine (*Pinus ponderosa*) and lodgepole pine (*P. contorta*). They are very common where the trees are scattering, as in the fringe type stand. Pupating insects have been found near the heart-wood of limbs in all cases. More recent observations have shown this species to be very common just after a fire, and they were observed to oviposit on both the trunk and limbs. However, no larvæ or pupating specimens have been found other than in the limbs.

CHRYSOBOTHRIS CYANELLA Horn

This is another little insect that is very common in our region, extending its range from the valleys to the summits of the Cascades and Siskiyous. Chamberlin[6] reports yellow pine (*Pinus ponderosa*) as the probable host, but the larvæ are found to inhabit the woody roots of the wild buckwheat (*Eriogonum nudum*) on which they are so often collected. There are numer-

[2] Sloop, K. D., Univ. of Calif. Publ. Ent., Vol. VII, p. 10, 1937.
[3] Van Dyke, E. C., Pan-Pacific Ent., Vol. III, p. 41, 1926.
[4] Linsley, E. G., Pan-Pacific Ent., Vol. IV, p. 138, 1933.
[5] Sloop, K. D., Univ. of Calif. Publ. Ent., Vol. VII, p. 2, 1937.
[6] Chamberlin, W. J., Catalogue of Buprestidæ of N. Amer., p. 145, 1926.

ous larvæ, but relatively few reach maturity because of a parasite which destroys over half the larvæ, or did so this past winter.

Chrysobothris dolata Horn

Two specimens, both males, were reared from a limb of Douglas fir (*Pseudotsuga taxifolia*) which was picked up at Prospect, Jackson County, Oregon. This is a new host plant for this uncommon insect.

Chrysobothris calcarata Chamberlin

Three males and a single female were collected on chaparral (*Ceanothus cuneatus*) near Wilderville, on the banks of the Applegate River. No females were known to Chamberlin[7] at the time he described the species. The female antennæ are coppery-bronze, serrate from the fourth segment and narrowing toward the tip; the first segment is as long as the next two combined as in the male. The upper surface is much less pubescent. The last ventral segment is rather completely rounded, similar to that of *C. harrisi* Hentz. The "wide smooth line running from the base to almost one-half way to the front" of the pronotum is not entirely constant in all cases, but with several specimens it can be determined. An odd act exhibited by this species is a unique way of flicking the abdomen as the insect crawls around on small twigs in the sun.

It is rather an unusual circumstance that this species should occur this far north since the type specimen was taken at Prescott, Arizona.

[7] Chamberlin, W. J., Pan-Pacific Ent., Vol. XIV, p. 12, 1938.

A Record of Physocephala affinis Williston as a Parasite of Adult Bembix comata Parker

The sand wasp, *Bembix comata* Parker, which nests in the sand flats at Emeryville, California, is frequently parasitized by the conopid fly, *Physocephala affinis* Williston, which can be collected nearby on sweet clover blossoms. The habits of the fly at this locality are similar to those recorded in a recent paper[1] for the same species as a parasite of *Bembix occidentalis beutenmuelleri* Fox.—By G. E. Bohart and J. W. MacSwain.

[1] Bohart, G. E., and J. W. MacSwain, 1939, Bull. South. Cal. Acad. Sci., 38:93-95.

NEW SIPHONAPTERA FROM CALIFORNIA

BY M. A. STEWART

University of California, Davis, California

Family PULICIDÆ

Anomiopsyllus congruens Stewart, new species

This species is apparently most closely related to *A. falsicalifornicus* Fox, 1929.

Head. Labial palpi slightly exceeding fore-coxæ in length and a trifle shorter than maxillary palpi. Frontal tubercle located high up on the frons. Frontal row composed of three bristles; one of which is located on anterior margin of antennal groove, one on oral margin and the third half way between the other two. Maxillæ subacutely pointed distally. *Abdomen.* First abdominal tergite with three dorsal teeth on each side. Second tergite with but one tooth on each side.

In other respects this new species is like the other known representatives of the genus except for the modified segments. *Modified Segments.* Male. Movable process of claspers convex on anterior margin and rather symmetrically proportioned; there is no distal dilation as in *A. falsicalifornicus.* Distally this process bears a more or less horizontal row of three closely set teeth which is less oblique and with the teeth not so widely separated from one another as in *falsicalifornicus* (Fig. 1). Also with a smaller tooth on proximal posterior margin. One apparently aberrent male in our series with a fourth very small tooth on the clasper located below the inner tooth and in this same specimen with the proximal tooth moved upwards. A row of fine bristles on posterior margin of movable clasper. Tip of manubrium acutely pointed and bent dorsad. Ninth sternite truncate at tip; possessing two prominent teeth at ventro-posterior angle and with a row of about seven bristles slightly more than half-way up the horizontal arm. Female. Stylet acutely pointed with one long apical bristle; about three times as long as broad at base. Substylar flap also acutely pointed and clothed with numerous long, fine bristles. Spermatheca with a spherical body and a relatively thick tail. Seventh sternite broadly and evenly rounded on posterior margin and quite constant in contour (Fig. 2).

The holotype, a male, and the allotype were collected at the Frances Simes Hastings Natural History Reservation near Jamesburg, Monterey County, California, from *Spilogale gracilis* subsp. on November 19, 1938, by R. Holdenreid. The paratypes consist of thirty-five males and thirty-five females, with the same data as the types, two females collected from *Pero-*

myscus californicus subsp. at the same place on December 17, 1938, and January 5, 1939, by the same collector and one male and six females from *Neotoma fuscipes* subsp. at the same place collected by C. P. North on June 20, 1938. The holotype and allotype are deposited in the author's collection.

Hoplopsyllus tenuidigitus Stewart, new species

This species is known only from male specimens.

Head. Labial palpus reaching to about three-fourths the length of fore-coxæ. *Thorax.* Pronotal ctenidium composed of sixteen or seventeen spines. Chætotaxy of metepisternum and metepimeron variable. *Legs.* Longest apical bristle of first metatarsal segment as long as second segment. Longest apical bristle of second metatarsal segment as long as third, fourth and fifth segments together. *Modified Segments.* Upper process of immovable claspers bearing eight long, stout and very closely-set bristles on dorsal and anterior margins. Lower process very long and slender, being nine and one-half times as long as broad at base. Distal tooth of this process nearly one-fifth as long as the entire process; very heavily chitinized and about as wide as the rest of the process. This latter process with four long, thin bristles on distal half of its posterior margin (Fig. 3). Movable process of the claspers inconspicuous and somewhat lanceolate in shape. Ninth sternite dilated distally, broadly rounded at apex and bearing a single stout, curved spine and several short, stout bristles. Manubrium short, stout, curved dorsad and cut at an angle at the tip.

The holotype, which is deposited in the author's collection, was collected at the Frances Simes Hastings Natural History Reservation near Jamesburg, Monterey County, California, from *Sylvilagus audubonii* subsp. on July 4, 1938, by C. P. North. Two male paratypes were taken at the same place from the same host species on July 4, 1938, and July 5, 1938, also by Mr. North.

Family Dolichopsyllidæ

Subfamily Ctenophthalminæ

Atheropsylla Stewart, new genus

Readily distinguished from other known Dolichopsyllidæ by the character of its genal ctenidium, which consists of two spines located on anterior margin of antennal groove just beneath vestigial eye and inserted one above the other in such a way as to be strongly overlapping and nearly parallel to one another (Fig. 4). Antennal groove extending very high up on occiput. No

frontal notch or tubercle present. Frontal angle located high up on frons. Labial palpi slender and five-segmented. *Thorax.* Pronotal ctenidium composed of about fourteen spines. *Abdomen.* Three rows of stout bristles on each of the first seven abdominal tergites. The two posterior rows extending below stigmata. Three antepygidial bristles present on each side in both sexes. *Legs.* Four pairs of lateral plantar bristles and one pair of proximal median ones on fifth tarsal segment of all legs.

Genotype: *Atheropsylla bakeri* Stewart.

Atheropsylla bakeri Stewart, new species

Head. Frons short, sharply angled dorsally and nearly vertical below the angle (Fig. 4). Lower frontal row composed of three bristles and upper row of two very small, fine bristles. Above and behind the eye, on margin of antennal groove, an additional long bristle. Labial palpi reaching nearly to end of forecoxæ. Maxillary palpi nearly as long as labial palpi. Occiput markedly indented above antennal groove. A patch of very small hairs back of antennal groove. One occipital bristle behind first antennal segment and another behind second segment. Above the former there is one smaller bristle and above the latter are three smaller bristles. *Thorax.* Pronotal ctenidium composed of thirteen or fourteen spines. Mesosternum, metepisternum and metepimeron heavily bristled but the number of bristles and their arrangement are inconstant. *Abdomen.* Third to seventh abdominal sternites with a posterior row of three bristles on each side of the body and in front of these one or two small bristles. No dorsal teeth on abdominal tergites. Upper antepygidial bristle of each group shortest and the middle one longest. *Legs.* An oblique row of small spinelets about half way up inner side of anterior margin of metacoxa. Longest apical metatibial bristle equaling first metatarsal segment in length. Longest apical bristle of first metatarsal segment extending to apex of second segment. Longest apical bristle of second metatarsal segment equaling third and fourth segments together in length. Longest apical bristle of third metatarsal segment reaching to about one-half the length of fifth segment. *Modified Segments.* Male. Movable process of claspers symmetrically digitate, its posterior margin bearing a conspicuous row of fine bristles. This process extends a considerable distance beyond immovable process (Fig. 5). Immovable process very broad. Manubrium extremely narrow and long. Ninth sternite broad and very broadly rounded at apex, possessing two spine-like bristles (the more distal of which is broken off in the holotype) on distal ventral margin. Remainder of ventral margin clothed with a row of fine bristles. Vertical arm of ninth sternite broad and dilated proximally. Female. Body of spermatheca roughly rectangular; tail long and dilated close to body

(Fig. 6). Bursa copulatrix heavily chitinized and strongly bent anteriorly. Stylet about five times as long as wide at base and with a long apical bristle. Posterior margin of seventh sternite deeply and evenly concave; its upper lobe acutely angled.

The holotype, a male, and the allotype, both of which are deposited in the author's collection, as well as three male and two female paratypes were collected at the Frances Simes Hastings Natural History Reservation, near Jamesburg, Monterey County, California, from *Dipodomys venustus* subsp. on June 30, 1939, by C. P. North. Another male paratype was taken from the same host species in the same place by Mr. North, on June 12, 1938, and a female paratype from *Neotoma fuscipes* subsp. on June 20, 1938.

This new species is named in honor of the late Professor C. F. Baker, who was the first American siphonapterist.

Subfamily DOLICHOPSYLLINÆ

Foxella ignotus acutus Stewart, new subspecies

As would be expected, this new subspecies appears to be most closely related to *F. ignotus franciscanus* (Roths.), 1910.

Head. Lower genal row composed of three stout bristles; upper genal row with five bristles in the male and four in the female. Labial palpi extending to about three-fourths the length of fore-coxæ. There is one long bristle on the occiput behind middle of antennal groove. *Thorax.* Pronotal ctenidium composed of twenty spines. *Legs.* Longest apical bristle of first metatarsal segment as long as second segment. Longest apical bristle of second metatarsal segment extending to nearly one-half the length of fifth segment. *Modified Segments.* This subspecies is very readily distinguished from all other subspecies of *ignotus* by its modified segments. Male. Eighth tergite bearing about twenty-two stout bristles. Movable process of claspers long, slender and subacutely pointed at tip (Fig. 7). Immovable process of claspers somewhat conical in shape and extending slightly more than half way up the movable process. Ninth sternite long and both its anterior and posterior lobes bearing numerous bristles. Eighth sternite without a long apical or subapical bristle; however, with a distal clump of four stout bristles on ventral margin, anterior to which is another clump of four smaller bristles. Apex of eighth sternite symmetrically and acutely pointed; tip of vertical arm of this sternite evenly rounded and without an attenuated, dorsal projection. Female. Body of spermatheca spherical in shape and tail long and stout (Fig. 8). Stylet about twice as long as broad at base, acutely pointed, bearing a long apical bristle

and a somewhat shorter subapical one on ventral margin. Substylar flap heavily bristled. Posterior margin of seventh sternite of irregular outline in the dorso-posterior region (Fig. 8) and from there sloping regularly antero-dorsally.

The holotype, a male, and the allotype, both of which are deposited in the author's collection, were collected at the Frances Simes Hastings Natural History Reservation, near Jamesburg, Monterey County, California, from *Thomomys bottæ* subsp. on May 26, 1938, by C. P. North. Only these two specimens are known.

Family HYSTRICHOPSYLLIDÆ

Atyphloceras longipalpus Stewart, new species

This species appears to be more closely related to *A. felix* Jordan, 1933, than to any other known representative of the genus.

Head. Labial palpi with more segments than in any previously described species: nine in the female and eight in one palpus and nine in the other in the male. These palpi extending beyond foretrochantera. Three rows of frontal bristles. Maxillary palpi nearly as long as labial palpi. Maxillæ long and acutely pointed. Frontal tubercle about even with anterior bristle of upper frontal row. *Thorax.* Pronotal ctenidium composed of twenty or twenty-one spines. *Abdomen.* Number of dorsal teeth on abdominal tergites (the two sides together) as follows: In the male, seven bristles on first tergite; ten on second; ten on third; eight on fourth; seven on fifth; and six on sixth. In the female, six bristles on first tergite; ten on second; eight on third; seven on fourth; eight on fifth; and two on sixth.

Aside from these characters and differences in the modified segments, this species is very similar to the other known species of the genus.

Modified Segments. Male. Both margins of movable process of claspers above pedicel slightly convex; apex bluntly rounded and posterior margin bearing four long bristles (Fig. 9). Immovable process cone-shaped and bearing eight stout bristles. Manubrium attenuated and acutely pointed. Horizontal arm of ninth sternite shaped somewhat like a bean-pod and bearing two short, stout, sharply pointed bristles on postero-ventral margin. Female. Spermathecæ very similar to those of *A. echis* Jordan and Rothschild, 1915, but with shorter tails (Fig. 10). Dilated portion of bursa copulatrix roughly rectangular in shape. Posterior margin of seventh sternite possessing a conspicuous ventral lobe broadly rounded at its upper angle and very slightly convex

at its posterior margin. Stylet two and one-half times as long as broad at base and only slightly narrowed at tip. Eighth tergite with eight spine-like bristles.

The holotype, a male, and the allotype (the only specimens known), which are deposited in the author's collection, were collected at the Frances Simes Hastings Natural History Reservation near Jamesburg, Monterey County, California, from *Spilogale gracilis* subsp. on November 19, 1938, by R. Holdenreid.

Atyphloceras felix Jordan

Atyphoceras [sic!] *felix* Jordan, Novitates Zoologicæ, 39:69, 1 fig., 1933.

Only the male of this species was described by Jordan. In his description it is stated that the labial palpus is seven-segmented. In our specimens the labial palpi of both the males and the females may have either seven or eight segments. We have in our collection twenty-two males and twenty-eight females collected at the Frances Simes Hastings Natural History Reservation, near Jamesburg, Monterey County, California, on *Peromyscus californicus* subsp., *P. truei* subsp. and *Microtus californicus* subsp. from June 18, 1938, to January 11, 1939. The female of this species is accordingly described below.

Head of spermatheca subglobular in shape and tail relatively stout (Fig. 11); thus closely resembling the female of *A. bishopi* Jordan, 1933. Dilated portion of bursa copulatrix shaped much like the pod of a bean, as in *bishopi*, but distorted at times in such a way as to give a somewhat triangular shape. Posterior margin of seventh sternite, in most of our specimens, with two well defined lobes; a lower one with a more or less straight margin rounded at upper corner and separated by a deep conspicuous sinus from the small rather acutely pointed upper lobe, this latter extending posteriorly nearly as far as lower lobe. Margin of this sternite variable, however. Upper lobe very sharply pointed in some specimens, rounded and much smaller in others and, in one specimen, lacking and thereby greatly resembling this segment in *A. longipalpus* Stewart. Eighth tergite with a vertical row of about six spine-like bristles, the lower four of which are very short. Stylet about three and one-half times as long as broad at base and only very slightly narrowed apically.

The allotype, which is deposited in the author's collection, was collected from *Peromyscus californicus* subsp. on June 18, 1938, by C. P. North.

Corypsylla setosifrons Stewart, new species

This species is described from a single female which is sufficiently distinct from all known representatives of the genus to warrant its description as a new species.

Head. Upper genal spine extending beyond anterior margin of antennal groove and broadly rounded at tip. Second spine about the same length as first spine (not longer as in *C. ornatus* Fox, 1908) and cut off obliquely at tip. Third genal spine slightly longer and also cut off at an angle at tip. Fourth spine longest, extending to prosternum, and greatly enlarged at tip which terminates in an acute angle. Fifth spine narrower than third and symmetrically pointed. Sixth genal spine as long as fifth; well defined and shaped much like a scimitar. With five bristles, rather than four as in *ornatus*, above upper genal spine. Also with five stout bristles on anterior margin of antennal groove. Labial palpus extending to four-fifths the length of fore-coxæ. Dorsally on each side of occiput with a somewhat oblique row of three bristles and a more posterior slightly oblique row of four bristles. With one conspicuous bristle back of basal segment of antenna and two bristles, the anterior of which is the smaller, posterior to club. *Thorax.* Pronotal ctenidium with sixteen normal spines and below it a continuation composed of nine shadowy spines on each side. Mesonotum very deeply concave on its ventral margin. Chætotaxy of mesothorax as in *ornatus.* Metepimeron bearing one anterior bristle and a row of four posterior bristles. *Abdomen.* Dorsal teeth on both sides of abdominal tergites as follows: First tergite, four teeth; second tergite, six teeth; third tergite, six teeth; fourth tergite, seven teeth; fifth tergite, six teeth; and sixth tergite, four teeth. Two bristles on second abdominal sternite, four on third, six on fourth, and six on fifth, sixth and seventh. *Modified Segments.* A vertical row of four bristles below antepygidial bristles. Eighth tergite bearing a vertical row of five bristles. With two horizontally arranged bristles on dorsal margin of eighth sternite. Posterior margin of seventh sternite curved concavely (Fig. 12). Spermatheca slightly vermiform and with the tail longer than body. Stylet long and cylindrical in shape.

The holotype, a female, which is deposited in the author's collection, was collected at the Frances Simes Hastings Natural History Reservation, near Jamesburg, Monterey County, California, on *Scapanus latimanus* subsp. on July 9, 1938, by C. P. North.

Trirachipsylla Stewart, new genus

Head. Easily distinguished from other known fracticipate fleas by the genal ctenidium of three spines, the more anterior

two of which overlap one another (Fig. 13). Two rows of frontal bristles with a large single bristle in between. Frontal tubercle present. Occiput bearing three rows of bristles. Eye present but lightly pigmented. Bristles of second antennal segment short. Maxillæ very acutely pointed. Last four segments of labial palpi short. *Abdomen.* First five abdominal tergites possessing dorsal teeth. With three antepygidial bristles on each side of abdomen. *Legs.* Hind coxæ heavily clothed with fine hairs in apical half. Bristles on posterior margins of tibiæ arranged in groups of twos and threes. With four pairs of lateral plantar bristles and one median pair between first lateral pair on fifth tarsal segments of all legs.

Genotype: *Trirachipsylla digitiformis* Stewart.

Trirachipsylla digitiformis Stewart, new species

Head. Posterior genal spine much narrower than the two overlapping anterior spines. Genal process acutely pointed posteriorly. Eye lightly pigmented. Lower genal row composed of three stout bristles; the upper one of which is located above the eye. Upper genal row with five bristles. With a long, heavy bristle immediately below next to the upper bristle of the upper genal row and between the two genal rows. Occiput bearing three rows of bristles. Along posterior margin of antennal groove, extending from base of second antennal segment to apex of the groove, a thickly set row of very minute spine-like bristles. Maxillæ long and drawn out to a very fine point. Labial palpi five-segmented, strongly chitinized and extending to about two-thirds the length of fore-coxæ. *Thorax.* Pronotal ctenidium composed of sixteen spines, in front of which is a row of about ten long, stout bristles. Chætotaxy of metasternum, metepisternum and metepimeron variable. *Abdomen.* Bristles on abdominal tergites relatively long and stout. Arrangement of dorsal teeth on abdominal tergites as follows: Male, seven teeth on both sides together on first tergite, seven on second tergite, five on third tergite, six on fourth tergite, and two on fifth tergite; female, six teeth on first tergite, seven on second tergite, five on third tergite, and two each on fourth and fifth tergites. *Legs.* No spinelets on inner sides of hind coxæ but the apical halves bearing numerous short, fine bristles. Four pairs of lateral plantar bristles and a median pair between the first lateral pair on fifth tarsal segments of all legs. Longest apical bristle of second metatarsal segment about as long as third and fourth segments together. With numerous stout, lateral bristles on metatibiæ. *Modified Segments.* Male. Movable process of claspers long and symmetrically digitate, bearing four conspicuous bristles at ventro-posterior angle. Upper two of these bristles stoutest (Fig. 14). Immovable process of claspers bilobed. Lower lobe bearing three very fine bristles. Upper lobe with one long, stout bristle with a smaller bristle and

a hair above it and a smaller bristle below it. Manubrium sharply pointed and curved dorsad at tip. Eighth sternite narrow with one large bristle about mid-way on ventral border, five spine-like bristles distally and a clump of four bristles anterior to the latter. Female. Spermatheca large; head subspherical and tail stout and obliquely cut at tip (Fig. 15). Seventh sternite not incised on its posterior margin, which slopes regularly anteriad. In one specimen in our collection this sternite is scalloped ventroposteriorly. Stylet long and tapering toward the tip which is cut off squarely; with one long apical bristle. Substylar flap clothed with a few stout bristles.

The holotype, a male, was collected at the Frances Simes Hastings Natural History Reservation, near Jamesburg, Monterey County, California, from *Perognathus californicus* subsp. on November 9, 1938, and the allotype from the same host species at the same place on October 29, 1938, by R. Holdenreid. These are deposited in the author's collection. The paratypes consist of eighteen males and thirty females collected on *Perognathus californicus* subsp. from October 27, 1938, to December 7, 1938, and one female from *Peromyscus truei* subsp. on January 5, 1939. All of these paratypes were collected by Mr. Holdenreid at the Frances Simes Hastings Natural History Reservation.

Peromyscopsylla hemisphærium Stewart, new species

Head. Most of the specimens at hand have three spine-like bristles in the row of bristles on the anterior margin of the frons, but some have three on one side and four on the other and others have four spine-like bristles on each side of the head. Lower frontal row composed of three bristles, the middle row of two widely separated bristles and the upper row of two bristles located above frontal spine-like bristles. With two spines in genal ctenidium; the lower one extending farther posteriad than the upper. Labial palpus extending to about one-half the length of fore-coxæ. Maxillæ drawn out into a very fine point distally. *Thorax.* Pronotal ctenidium consisting of twenty-five or twenty-six (more commonly twenty-five) spines. With a row of about eight bristles anterior to pronotal ctenidium. *Abdomen.* The number of dorsal teeth on abdominal tergites variable but with teeth present on first five tergites. Posterior row of bristles on each abdominal tergite extending below stigma. Males usually with three antepygidial bristles on each side of abdomen, but some with three on one side and four on the other and others with four on each side. When there are four antepygidial bristles on each side, the next to the upper bristle is by far the longest and the upper bristle is slightly shorter than the lower bristle. When there are three antepygidial bristles on a side, the middle bristle

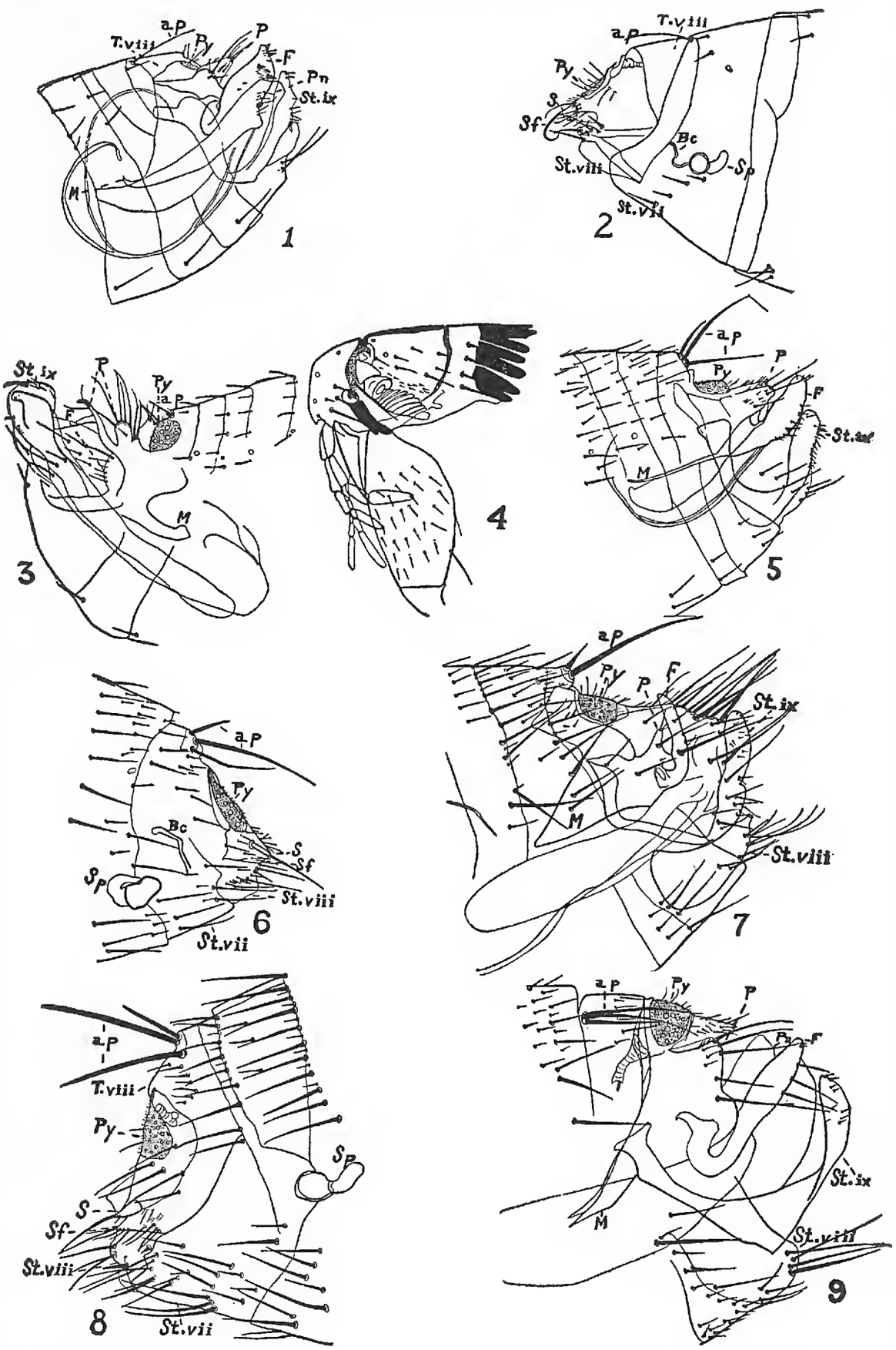
is the longest and the upper is the shortest. Females usually with four antepygidial bristles on each side but sometimes with three on one side and four on the other. *Legs.* Metatibiæ with three long bristles in dorsal comb. A pair of medianly placed bristles inserted between first pair of lateral plantar bristles on last tarsal segment of all legs. *Modified Segments.* Male. Movable process of claspers hemispherical in outline and bearing three long and three shorter bristles on posterior margin (Fig. 16). Immovable process broadly rounded anteriorly and reaching to apex of movable process. Ninth sternite narrow and sharply curved dorsad at tip, which is acutely pointed; bearing very numerous fine bristles on ventral margin. Vertical arm of this sternite with an acute anterior process in its upper third and terminating proximally in a sharp point. Manubrium long, straight and slender and greatly narrowed towards the tip. Female. Stylet about twice as long as broad at base; narrowed towards apex and with one long apical and one ventral subapical bristle. Substylar flap very heavily bristled ventro-posteriorly. Head of spermatheca elliptical and tail long and vermiform (Fig. 17). Bursa copulatrix with a bulbous termination. Eighth tergite bearing a vertical row of four spines. Posterior margin of seventh sternite variable in outline; most of our specimens with a semi-rounded ventral lobe and a deep regularly concave sinus separating it from a prominent evenly rounded upper lobe. Occasionally this sternite is not posteriorly incised at all and in one specimen the ventral lobe has a prominent, triangular, almost tooth-like, projection on its upper part.

The holotype, a male, was collected at the Frances Simes Hastings Natural History Reservation, near Jamesburg, Monterey County, California, from *Peromyscus truei* subsp. on January 10, 1939, and the allotype from the same place and same host species on January 5, 1939, by R. Holdenreid. The paratypes consist of sixteen males and twenty females taken from *Peromyscus boylii* subsp., *P. californicus* subsp., *P. truei* subsp., *Microtus californicus* subsp., and *Reithrodontomys megalotis* by Mr. Holdenreid and C. P. North at the Frances Simes Hastings Natural History Reservation.

The author is indebted to Dr. J. M. Linsdale, who is in charge of the research work being conducted at the Frances Simes Hastings Natural History Reservation, for submitting the specimens described above.

LEGEND FOR FIGURES

Ap—antepygidial bristles; Bc—bursa copulatrix; F—movable process of claspers; M—manubrium; P—immovable process of claspers; Pn—penis; Py—pygidium; S—stylet; Sf—substylar flap; Sp—spermatheca; St.vii—seventh sternite; St.viii—eighth sternite; St.ix—ninth sternite; T.viii—eighth tergite.



Figs. 1 and 2, male and female, *Anomiopsyllus congruens*, n. sp.; 3, male of *Hoplopsyllus tenuidigitus*, n. sp.; 4 and 5, male, and 6, female, *Atheropsylla bakeri*, n. sp.; 7 and 8, male and female, *Foxella ignotus acutus*, n. subsp.; 9, male of *Atyphloceras longipalpus*, n. sp.

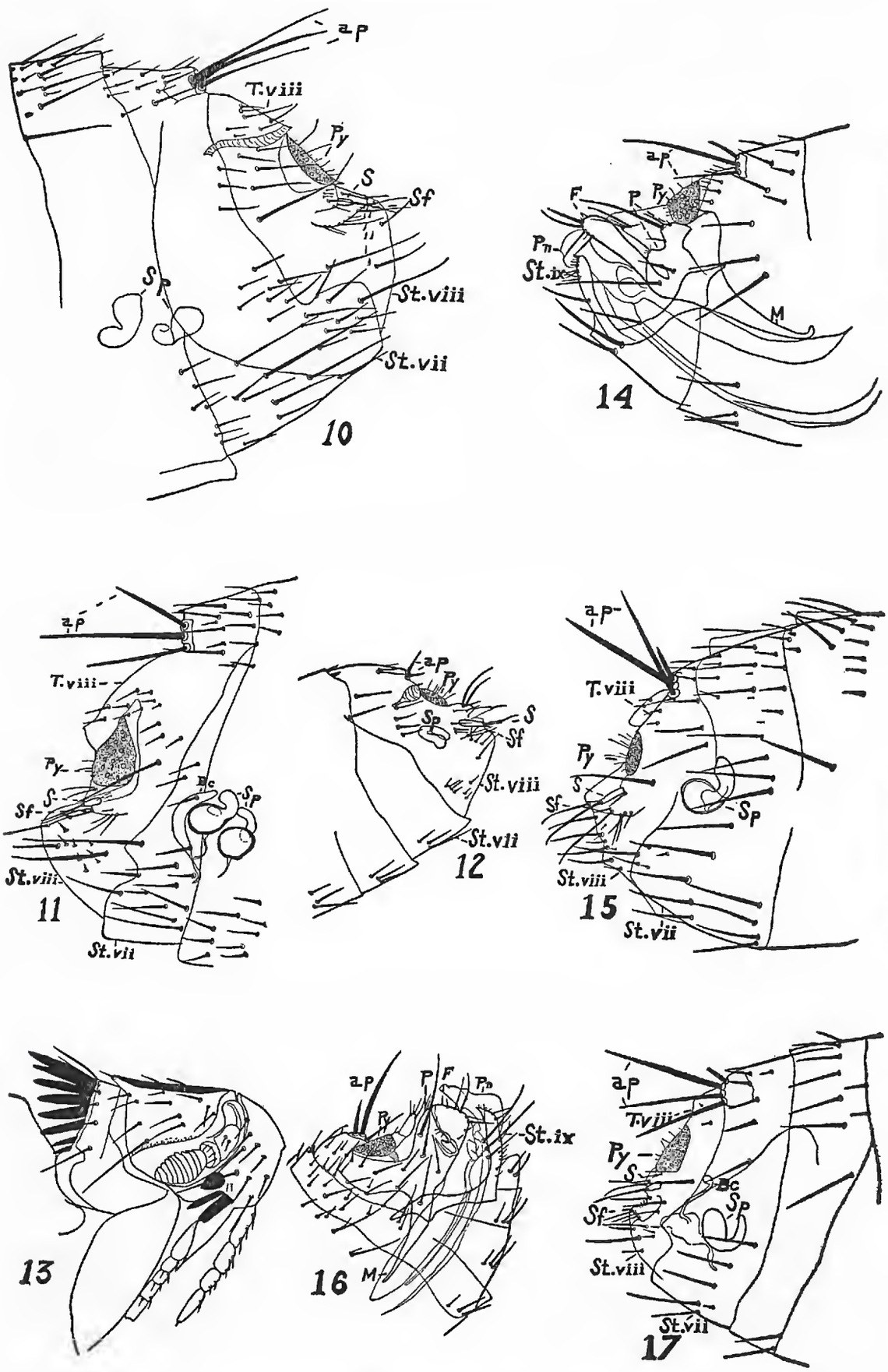


Fig. 10, female of *Atyphloceras longipalpus*, n. sp.; 11, female of *Atyphloceras felix* Jordan; 12, female of *Corypsylla setosifrons*, n. sp.; 13 and 14, male, and 15, female, *Trirachipsylla digitiformis*, n. sp.; 16 and 17, male and female of *Peromyscopsylla hemisphærium*, n. sp.

GYMNALEURODES, A NEW GENUS OF ALEYRODIDÆ FROM CALIFORNIA

(Homoptera)

BY W. W. SAMPSON AND E. A. DREWS

University of California, Berkeley

Gymnaleurodes Sampson and Drews, new genus

Pupal case elliptical to subovate in outline; margin of the case crenulate, the submarginal area not separated from the rest of the body. Several rows of tooth-like structures found behind the margin, the outer twice as long as the inner. Dorsum without papillæ or pores. Vasiform orifice cordate; the operculum transversely elliptical, filling about one-half of the orifice. Lingula spatulate, with distal extremity exposed beyond operculum, lobed and without spines. No caudal furrow present. Marginal fringe consisting of numerous glass-like rods. Abdominal spines not over four.

Genotype: *Gymnaleurodes bellissima*, new species.

This genus differs from *Aleyrodes*, in that the margin of the pupal case is not crenulated in the same manner, the operculum is not of the same shape; also the shape and spination of the lingula differ. In addition this genus is somewhat like *Trialeurodes*, except that there is no elevation of the case. There are no pores or papillæ, no caudal furrow, and no notch at the posterior edge. There is some resemblance to *Pealius*, but the operculum is not of the same size and shape; there is no caudal furrow, the vasiform orifice and lingula are not of the same form.

Gymnaleurodes bellissima Sampson and Drews, new species

Pupal case. Case laterally constricted cephalically, with a slight inward indentation at caudal end. Color of case a dirty yellow, with some pale reddish-brown markings on dorsum; color much more clear and striking in live specimens. Specimens parasitized by fungi slightly darker in appearance. No indication of wax on dorsum. Dorsum imbricated, particularly toward the edge, irregularly toward the top, more regularly toward the edge. Cephalothorax laterally constricted, rounded in front. Four irregular rows of small pores or setæ on abdomen, with a group of three pores concentrated cephalically and laterally on each side of vasiform orifice. Vasiform orifice cordate, with anterior margin straight; about twice its length from posterior margin. The hair on each side of the orifice about one and one-half the diameter of its base away from the orifice; length of hairs approximately one-quarter the width of orifice. Lingula usually with three lobes on

each side; apparent projection of tip of lingula due to transverse fold caudad of third lobe of lingula. Two rows of teeth found behind the margin. Ten dentations to 0.1 mm. of margin. First row of teeth projecting over syncline of crenulations; second row of teeth over syncline of first row. Marginal fringe of shiny crystaline rods about one-half the width of pupal case. Rods of the marginal fringe thicker and appearing white at 3 points, the first being at central posterior area and the other two located at middle of sides of thorax. Pupal case closely applied to host; dorsum only slightly elevated. Width of pupal case 0.9 mm.; length 1.15 mm.

Adults: Not known.

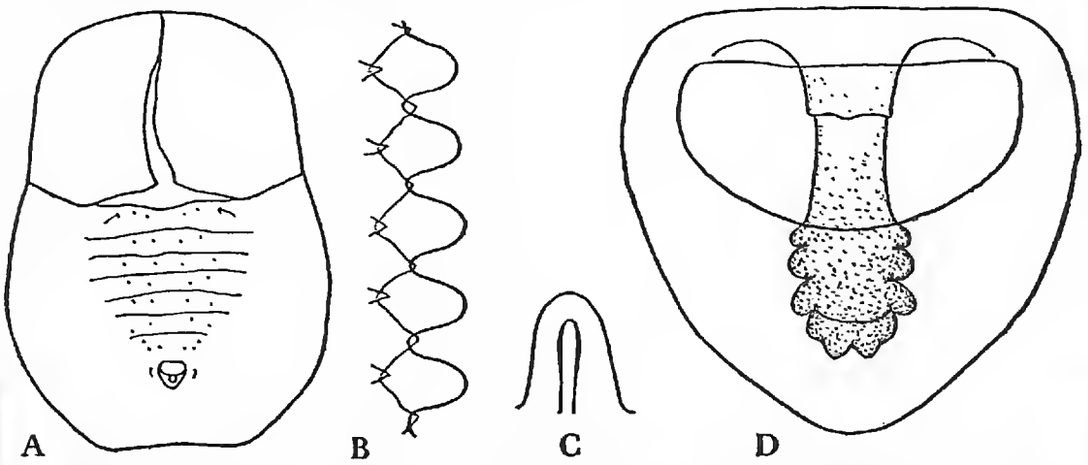


Fig. 1. *Gymnaleurodes bellissima* Sampson and Drews; a. pupal case; b. pupal case margin, 0.5 mm.; c. marginal dentation; d. vasiform orifice.

Host: *Quercus* sp., from the underside of the leaf.

Holotype, No. 4935, Calif. Acad. Sci., Ent., and nine paratypes mounted in balsam and four natural mounts in the authors' collections taken by E. A. Drews along the highway about one-half mile from the Orange County line in Carbon Canyon, San Bernardino County, California, January 10, 1939.

Anystis agilis Banks, a Predacious Mite on Eggs of the Artichoke Plume Moth

The large reddish mite, *Anystis agilis* Banks, is a common species on the globe artichoke (*Cynara scolymus* L.) in the Half Moon Bay area, where it preys on newly laid eggs of the artichoke plume moth (*Platyptilia carduidactyla* (Riley), many collembolans, and the artichoke aphis (*Capitophorus braggii* (Gillette). It is a well known and common predator, but its predacious habits on eggs of the plume moth were considered of unusual interest. I am indebted to Dr. H. E. Ewing for the determination of the mite.—W. H. Lange, Jr.

A NEW VELIA FROM PERU
(Hemiptera, Veliidæ)

BY C. J. DRAKE AND H. M. HARRIS

Iowa State College, Ames, Iowa

Velia willei Drake and Harris, new species

Large, rather elongate; brown, the hind margin of the pronotum yellowish, and the tips of all femora and basal portion of posterior tibiæ blackish. *Head* dark brown, with the usual impressed lines. Eyes blackish. *Antennæ* dark brown, moderately long; segment I rather stout, somewhat curved and enlarged distally, II faintly enlarged distally, stouter than the apical two; proportions, I:II:III:IV = 50:40:37:40. *Pronotum* slightly more than one-fourth longer than broad, the hind margin rather broadly rounded; coarsely pitted, with distinct median longtitudinal ridge, the humeri slightly raised and prominent. *Legs* moderately stout, the tarsi dark. *Connexivum* distinctly produced behind. *Rostrum* reaching to middle of mesosternum, the apex black. *Venter* brown with blackish markings, the last two segments longer than the preceding, the apical one broadly, roundly excavated. *First genital segment* above densely clothed with long blackish hairs. *Second segment* strongly sharply tumid behind, with a conspicuous tuft of black hairs on each side. *Clasper* long, curved, and tapered distally, the apex slightly twisted.

Length, 7.2 mm; width, 1.6 mm.

Holotype, apterous male, Santa Eulalia river, Peru, March 29, 1935, J. E. Wille collector; authors' collection.

Velia willei belongs to the *Velia inveruglas* Kirkaldy group of species. It is unique in that the genital segments are very hairy and the suranal plate lacks the hooks characteristic of most of the other forms. However, the two tufts of hairs on the suranal plate are curved and tapered and strongly resemble suranal hooks.

A NEW PIESMID FROM INDIA
(Hemiptera)

BY CARL J. DRAKE

Iowa State College, Ames, Iowa

The writer is indebted to the authorities of the Vienna Museum for the privilege of studying a small collection of Tingitoidea from India. A new species of Piesmidæ is described below.

Piesma distans Drake, new species

Moderately large, whitish cinereous. *Head* long, juga and tylus subequal in length. Eyes moderately large, dark. Ocelli small, reddish. Rostrum dark at apex, extending to intermediate coxæ. Middle and hind coxæ not widely separated, also placed closely together as pair. Rostral channel deep on prosternum and anterior portion of mesosternum, from there to apex strongly raised so as to form a ridge-like plate which is narrowed posteriorly and shallowly grooved. *Legs* short, stout, grayish brown. *Antennæ* moderately long, grayish brown; segment I short, very stout; II shorter and much more slender than I; III very slender, one-fifth longer than IV; IV considerably swollen, brownish. *Pronotum* deeply pitted, becoming smoky brown behind, the carina on each side of median line in front prominent; lateral margins becoming widely explanate anteriorly, three cells deep in front, the outer margin broadly curved; hind margin broadly curved. *Elytra* divided into areas as other long winged members of genus, the costal area uniseriate; membrane distinct. Scutellum small.

Length, 3.00 mm.; width, 1.80 mm.

Holotype (male) and allotype (female) Bombay, India, October 20, 1901, collected by Dr. Urei, Vienna Museum. Two paratypes, taken with type, Drake collection.

The pronotum is not very thick. The explanate lateral margins and carinæ are typical of members of the genus *Piesma* LeP. and Serv. The characters of the head, except the length of juga, are also typical of the genus *Piesma*. This is the first record of this genus in India.

NEW LEPTURINI

(Coleoptera, Cerambycidæ)

BY RALPH HOPPING

Vernon, British Columbia

The two new species herein described have been in my collection for some time and were given to me by Dr. R. D. Bird of Oklahoma and Mr. Kenneth M. Fender of McMinnville, Oregon.

Toxotus spinosus Hopping, new species

Male. Length 14 mm. Entirely black except the abdominal segments. Head with antennæ having the third segment longer than the fourth; eyes moderately prominent and punctation fine

and irregular; line of the cheeks behind the eyes straight. Pronotum much longer than wide; rather deeply, broadly impressed transversely both apically and basally; median longitudinal impression shallow and not smooth; surface rather finely and irregularly punctured, with lateral tubercles obtuse. Elytra subcostate, 3 mm. wide at the base, with apices obliquely truncate, length 9 mm. Vestiture golden, especially on margins, the abdominal segments rufo-testaceous, with very long tibial spurs.

Female. Length 17 mm. Differs from the male only in its larger size and stouter form.

Holotype, male, bearing the label "McMinnville. Ore., 5/9/36." Allotype, female, bearing the label "Oak Ridge, V-31-24, G. R. Hopping." Paratypes, three males from McMinnville, Oregon, two of which are in the collection of Mr. Kenneth M. Fender. Four other specimens are before me from Dayton, Oregon, which is not far from McMinnville, and Oak Ridge is in the same region.

This species is nearest *vestitus* Hald., but differs in having a much broader and deeper transverse sulcus at the apex of the pronotum, the vestiture golden instead of ashy, and the abdomen rufous or testaceous. It is also decidedly more slender, the antennæ are longer and the spurs on the tibia are very long, extending beyond the tibia by fully half their length.

Typocerus oklahomensis Hopping, new species

Male. Length 12 mm. Black with four yellow transverse elytral bands and with legs and abdominal segments rufous. Head rather coarsely punctate between the eyes, with rather long tufts of golden vestiture behind the eyes; antennæ with segment three longer than four and segments six to eleven with large poriferous areas. Pronotum convex, not inflated on the margins, finely punctured, disc covered with golden decumbent pubescence, apical transverse sulcus deep, basal transverse sulcus abrupt and with the usual denser vestiture. Elytra sparsely punctured with four yellow spots or bands, the base narrowly margined with black. Basal band not reaching the lateral margin, second and third nearly reaching the sutural and lateral margins, the apical becoming mere spots, apices obliquely truncate and emarginate.

Female. Length 12.5 mm. Differs from the male only in being slightly more robust, and with the second and third testaceous bands connected at the suture.

Holotype, male, bearing the label "Latimer Co., Okla., 12-VI-1931, R. D. Bird." Allotype, female, bearing the label

"Latimer Co., Okla., 15.VI-1931, R. D. Bird." Paratypes, six males and two females, all from Oklahoma and all collected by Dr. Ralph D. Bird. Paratypes are deposited in the collection of the Academy of Sciences in San Francisco, the Canadian National Collection, the University of Oklahoma and that of the author.

In the key to the *Typocerus* in Part I of "The Lepturini of America North of Mexico," *oklahomensis* comes near *brunnicornis* but the apices of the elytra and general appearance are more like *zebratus* and *badius* than any of the other species of *Typocerus*. *Oklahomensis* differs from these latter in the finely punctate pronotum, the disc of which is rather densely covered with golden hairs. It also has the testaceous marking of the base of the elytra in the form of a broad band. I have seen one specimen from Florida which seems to be this species.

STORED-GRAIN BEETLES IN WESTERN WASHINGTON WITH SPECIAL REFERENCE TO THE TENEBRIONID, CYNÆUS ANGUSTUS LeC.

(Coleoptera)

BY MELVILLE H. HATCH

University of Washington

On July 28, 1939, in a flour mill at Seattle, Washington, the following species of beetles were taken: *Necrobia rufipes* DeG., *Dermestes cadaverinus* Fab., *Læmophlœus* (*Cryptolestes*) *ferrugineus* Steph., *Læmophlœus* (*Cryptolestes*) *pusillus* Schön., *Cynœus angustus* LeC., *Tribolium castaneum* Hbst., *Tribolium confusum* Duv., *Tenebrio obscurus* Fab., *Tenebrio molitor* L., *Ptinus tectus* Boisd., *Sitophilus granarius* L., *Sitophilus oryzæ* L.

Of these, the *Necrobia rufipes* DeG. is not a normal inhabitant of the mill, having been released from an empty ship that had docked at the mill the previous day, having just carried a load of copra from the Philippine Islands to Mexico.

The most interesting find was the single specimen of the tenebrionid, *Cynœus angustus* LeC., taken in meal on the floor of the mill. This species is cited by Leng (Cat. Col. Am. n. of Mex. 1920, p. 234) from Arizona and California and, in addition, is represented in the collection of the United States

National Museum by specimens from Texas and Colorado (C. F. W. Muesbeck *in litt.*). In California it occurs about the base of yuccas, according to a letter from Dr. F. E. Blaisdell, to whom I am indebted for the identification of my material. My first Washington specimen was collected at Seattle, May 19, 1928, by a student. My attention was first directed to the species a decade later by a series of over 30 specimens taken in April, 1938, in a house in Seattle. At the same time a specimen was given to me by Mr. Joseph Bruzas, found about a log by one of his high school students at Bothell, just north of Seattle. Two specimens were collected by my students near Seattle in May, 1939, and a single specimen was taken in the laboratory at the University on August 1, 1939. Finally, I have a specimen secured at night at Naches in eastern Washington, July, 1939, in company with *Tenebrio molitor* L. and other night flying insects. In view of my twelve years' experience in collecting beetles in Washington, these records look as though we had to do with a recently introduced and rapidly multiplying species and one of possible economic importance.

The identification of this species among the Ulominæ is not difficult with the aid of Horn's key and descriptions (Tr. Am. Philos. Soc. XIV (II), 1870, p. 363-364, 369), where the failure of the hind angles of the pronotum to overlap the humeri apparently gets one by the second dichotomy. In the later revisions of this key (LeConte and Horn, Class. Col. N. A. 1883, p. 381; Bradley, Man. Gen. Beetles Am. n. of Mex. 1930, p. 192-193), however, the second dichotomy involves the base of the pronotum being "margined" or "not margined" and is invalid. *Gnathocerus*, *Cynæus*, *Tharsus*, *Alphitobius* (in part), and *Hypophlœus*, among those genera said to have the base of the pronotum not margined, possess a distinct margin, and *Eutochia*, in which the base of the pronotum is said to be margined, has one species (*picea* Melsh.) with it unmargined and the other (*crenata* LeC.) with it margined.

A noteworthy character of *Cynæus angustus* LeC., which it has in common with *Tharsus*, is the prominent canaliculation of at least the posterior portion of the elytral epipleuræ. In other genera in which the epipleuræ are abbreviated behind, they are either more or less flattened (*Uloma*, *Metaclisa*, *Eutochia*) or are narrow and vaguely canaliculate (*Hypophlœus*).

PACIFIC COAST ENTOMOLOGICAL SOCIETY

H. M. Armitage	E. G. Linsley	P. C. Ting
Vice-President	*President*	*Secretary*

Proceedings

One Hundred and Fifty-first Meeting, March 20, 1938.

Meeting held at 2 p. m. in the entomological laboratories of the California Academy of Sciences. The following members were present: C. D. Duncan, E. G. Linsley, A. E. Michelbacher, G. F. Ferris, E. O. Essig, E. R. Leach, E. C. Van Dyke, J. A. Downes, Karl D. Snyder, Albert R. Mead, W. H. Lange, C. D. Michener, G. E. Bohart, T. Aiken, D. D. Jensen, J. L. Gressitt, W. C. Reaves, D. P. Furman, I. McCracken, J. C. Chamberlin, J. B. Steinweden, F. M. Frost, E. Smith, A. Smith, W. Hovanitz, R. C. Dickson, K. L. Mæhler, G. R. Wilson, H. L. McKenzie, S. F. Bailey, M. Embury, R. M. Bohart, E. S. Ross, R. L. Usinger, M. A. Cazier, and W. M. Upholt. Visitors were present as follows: T. D. A. Cockerell, R. W. Chaney, N. W. Frazier, P. S. Lange, H. J. Rainwater, D. E. Howell, J. H. Freitag, A. D. Cameron, M. Clark, K. McKeehan, Mrs. T. D. A. Cockerell, R. K. Goodlive, J. R. Walker, W. Robinson, D. Tillotson, A. Bridge, E. Gehrhardt, H. B. Leech, F. B Herbert, N. Stahler, J. J. DuBois, W. W. Sampson, E. M. Drews, F. L. Blanc, E. E. Ivy, B. Walker, L. Phillips, and Mrs. E. C. Van Dyke.

The minutes of the previous meeting were read and approved.

After the transaction of business, Dr. Duncan announced that the program for the day was a symposium on Palæoentomology, and introduced the first speaker, Dr. Ralph Chaney, of the department of Palæontology, University of California.

Dr. Chaney spoke upon the fossil insect record. He emphasized the paucity of insect fossils and gave as reasons for the incompleteness of the record the following facts: (1) that deposition normally takes place only in the lowlands, (2) that the structure of many insects is unsuitable for preservation, and (3) that only certain types of rock are suitable for insect preservation. He pointed out that apparently ideal conditions prevailed at Florissant, Colorado, where the insects were preserved in deposits of fine ash. Dr. Chaney concluded with a few remarks upon the main gaps in the fossil record. The absence of insects prior to the Carboniferous he suggested might be due to the fact that the insects were developing in the uplands, or that they had not yet developed hard parts. The fact that so many of the Carboniferous insects which we know were aquatic was considered a false impression resulting from the type of deposition prevailing in that period. Dr. Chaney also pointed out that flower-loving insects are not evident until the Cretaceous although they must have existed long before that era.

After a general discussion of Dr. Chaney's remarks, Dr. Duncan introduced the second speaker, Dr. T. D. A. Cockerell, of Boulder, Colorado. Dr. Cockerell stated that insects were good horizon indicators and that the cockroaches of the various horizons of the Carboniferous were different. He also pointed out that except for a few interesting exceptions insects were not found in marine deposits. Among the fresh water deposits he considered Lake Florissant the finest and attributed this fact to the presence of some factor which killed insects in large numbers, possibly fumes from the volcano which deposited the beds of ash. Comparing the Miocene fauna of Florissant with that of the same area today, he emphasized the fact that there were no tachinid flies then, although they are very abundant now, that tipulids were equally abundant then and now, and that bibionids were far more numerous in the Miocene. Tsetse flies, now found only in equatorial Africa, occurred in Colorado at that time. In comparing the nearby Green River deposits with those of Florissant, he stated that certain moth-like fulgorids were abundant in the former locality but absent from the latter. Dr. Cockerell then concluded his remarks with an account of a visit to Œningen, where he collected some of the insects described by Heer.

Following a general discussion, Dr. Duncan introduced the last speaker, Prof. E. O. Essig, who spoke upon the Pleistocene deposits of California. Prof. Essig stated that in the La Bræa tar pits, most of the insects which had been recovered were beetles, among the most interesting of which were four genera of Carabids, including *Amara* and *Calosoma*, one species of *Dytiscus*, and a number of tenebrionids, among which were four species of *Coniontis* and nine species of *Eleodes*. Most of these beetles represent species still living today. At the McKittrick and Carpenteria deposits, Prof. Essig stated that water beetles and dragonflies prevail. The only truly fossil insect known from California is a dragonfly, which was collected by Dr. Chaney, and described by Cockerell, the two previous speakers. Prof. Essig concluded his talk with a number of stereopticon slides of the La Bræa and Carpenteria deposits as well as insects from these areas. Following the showing of the slides, the meeting was adjourned.—E. G. LINSLEY, Secretary.

One Hundred and Fifty-second Meeting, April 9, 1938.

Annual field meeting held at Alum Rock Park, Santa Clara County, California. Members present: C. D. Duncan, E. G. Linsley, H. E. Burke, R. C. Hackley, E. O. Essig, A. S. Smith, E. Smith, E. S. Ross, C. D. Michener, J. A. Downes, A. E. Michelbacher, and N. Stahler. Visitors present: Mrs. E. G. Linsley, Mrs E. O. Essig, A. Souza, A. Martoza, J. Walker, H. B. Leech, Mrs. H. B. Leech, J. W. Tilden, and E. Drews.

The group assembled at 10 a. m. and spent the remainder of the morning collecting along the sides of the Alum Rock Canyon. After luncheon about half of the members collected aquatic insects and the others spent the time in social discourse. Although the weather was delightful the season was not very far advanced and the collecting relatively meager.—E. G. LINSLEY, Secretary.

One Hundred and Fifty-third Meeting, September 24, 1938.

Meeting held at 2 p. m. in the entomological laboratories of the California Academy of Sciences. The following members were present: C. D. Duncan, E. G. Linsley, B. E. White, E. P. Van Duzee, C. D. Michener, J. A. Downes, W. V. Pelle, E. L. Kessel, B. B. Kessel, P. C. Ting, J. O. Martin, F. E. Blaisdell, E. C. Van Dyke, E. R. Leach, A. E. Michelbacher, S. F. Bailey, H. H. Keifer, G. F. Ferris, E. S. Ross, R. L. Usinger, E. Smith, A. Smith, E. O. Essig, and J. B. Steinweden. Visitors were present as follows: N. Stahler, N. Roberts, P. Pennebaker, J. R. Walker, N. W. Stanger, K. Hagen, and N. E. Good.

The minutes of the previous meeting were read and approved.

Upon the recommendation of the membership committee the following persons were unanimously elected to membership in the Society: Dr. N. E. Good, Miss Ruth C. Whitney, Mr. J. J. DuBois, and Mr. Nathan Stahler.

Dr. Linsley reported for the editorial committee that Dr. Ferris, Dr. Blaisdell, and Prof. Essig had been renominated to succeed themselves as rotating members of the committee to serve until 1941. They were unanimously elected by the Society. Dr. Linsley also reported that it was the recommendation of the editorial committee that membership in the Society include a subscription to the Pan-Pacific Entomologist, that the treasurer of the Pan-Pacific Entomologist become the treasurer of the Society, that the annual dues for the Society be $3.00, and that members be billed at the same time as subscribers to the journal, rather than in September, as previously. After a general discussion of the matter, Mr. Martin put the recommendation in the form of a motion, it was seconded, and duly passed by the Society.

Dr. Van Dyke called attention to the death of Mr. George Wilson, a long-time, faithful member of the Society. Dr. Van Dyke reminded the group that for a great many years, through the kind efforts of Mr. Wilson, the Society had been enabled to hold its meetings in the offices of the State Department of Agriculture in the Ferry Building. Dr. Van Dyke suggested that a full report of his life be drawn up by someone who knew him well, for incorporation in the Society files. Dr. Duncan asked Mr. Ting to serve in this capacity for the Society. Mr. Steinweden pointed out that short accounts of Mr. Wilson's life had been published in the Pan-Pacific Entomologist, Journal of Economic Entomology, and Monthly Bulletin of the State Department of Agriculture.

Dr. Blaisdell exhibited some very fine drawings of genitalia of Tenebrionidæ. He pointed out that the genitalia offered characters of great phylogenetic significance and that a study of these structures revealed that our present classification of this family was unsound. The male genitalia divide the group into two main sections, and also offer characters useful in separating tribes. On the basis of female genitalia, Dr. Blaisdell stated that he was able to distinguish subgenera.

Dr. Ferris spoke of his recent trip to Chiriqui Province in Panama. He described the broad, densely forested coastal plain, the high savannah country behind the coastal plain, and the Volcan de Chiriqui, elevation 11,600 ft. On the summit of the volcano Dr. Ferris found many familiar northern plants, including *Lupinus*, *Ceanothus*, *Castilleia*, *Vaccinium*, *Berberis*, and *Arctostaphylos*. In conclusion, he stated that he had returned with a collection of about 450 scale insects, representing perhaps 200 species, a high percentage of which appeared to be new. In response to a question by Prof. Essig, Dr. Ferris stated that aphids appeared to be scarce in the tropics.

Mr. Keifer described his work on eriophyid mites, pointing out the apparently large fauna occurring in this State. He said that he had not yet discovered a satisfactory method for making good permanent mounts of his species.

Dr. Bailey spoke of his recent trip east in which he visited many entomological institutions and experiment stations and spent some time at Washington studying thrips.

Mr. Ting described a similar trip which he had made and spoke of his studies of coleopterous larvæ and weevils, particularly *Dyslobus*. He stated that his studies of both the adults and larvæ of the Rhinomacerini convinced him that this tribe belongs in the Anthribidæ, rather than in the Curculionidæ, near *Rhynchites*.

Mr. Downes reported on his eastern summer trip, which was designed primarily to meet the various entomological workers in the country. He spoke of his journey through the southwest to Florida, of visits to Harvard, Cornell, and the United States National Museum, and of an auto trip to Ottawa in the company of Dr. Snodgrass.

At the conclusion of Mr. Downes' remarks, the meeting was adjourned.—E. G. LINSLEY, Secretary.

One Hundred and Fifty-fourth Meeting, December 3, 1938.

Meeting held at 2 p. m. in the California Academy of Sciences in San Francisco, President C. D. Duncan in the chair. The following members were present: C. D. Duncan, E. G. Linsley, J. O. Martin, E. O. Essig, J. J. du Bois, E. S. Ross, K. D. Snyder, G. E. Bohart, H. M. Armitage, E. Smith, R. G. Pisano, F. E. Blaisdell,

N. E. Good, P. C. Ting, G. F. Ferris, R. E. Blackwelder, R. L. Usinger, D. D. Jensen, J. L. Gressitt, T. H. G. Aitken, W. W. Lester, A. Smith, A. E. Michelbacher, E. P. Van Duzee, J. A. Downes, E. C. Van Dyke, C. D. Michener, and Mr. and Mrs. C. H. Atkins. Visitors were present as follows: A. Mallis, S. Smith, J. P. Harville, G. Mansfield, A. Rabinovitch, R. P. Allen, B. E. Rees, J. W. Tilden, W. E. Simonds, J. D. Gilby, R. A. Smith, and W. Wheeler.

The minutes of the previous meeting were read and approved.

Mr. Usinger, speaking on behalf of the membership committee, recommended in view of long, faithful, and distinguished service to the Society that Dr. Edwin C. Van Dyke, Dr. Frank E. Blaisdell, and Mr. Edward P. Van Duzee be given honorary membership. The Society unanimously approved the recommendation although Dr. Ferris deplored the fact that the title was very inadequate to express the true gratitude, appreciation and respect which the organization feels toward these men.

The committee also recommended election to membership of Mr. William Simonds, Mr. Willis Wheeler, Mr. Adolph Rabinovitch, and Dr. Robert C. Miller.

Professor Essig announced with regret the resignation of Mr. Van Duzee after twelve years as editor of the Pan-Pacific Entomologist. He also announced that the Publication Committee had appointed Mr. Usinger as the new editor. Upon the suggestion of Dr. Linsley, the Society gave a rising vote of thanks to Mr. Van Duzee for his services.

Dr. Michelbacher presented to the Society's historical files a bound set of letters that he had received from Prof. Essig while the latter was in Europe. Dr. Duncan expressed the appreciation of the Society for this gift.

Prof. Essig reported the following nominations for officers for the coming year: President, E. G. Linsley; Vice-President, H. M. Armitage; Secretary, P. C. Ting, and Treasurer, E. R. Leach. The Society unanimously elected these men to office.

Dr. Duncan then turned the meeting over to the new officers and Dr. Linsley expressed the appreciation of the Society for Dr. Duncan's services as president during the past several years.

Dr. Linsley then introducd the speaker of the day, Mr. E. S. Ross, who gave an account of his recent automobile collecting trip through Lower California in the company of Dr. and Mrs. A. E. Michelbacher between June 13 and August 10, 1938. Using about one hundred natural color slides of scenery and plant life of the peninsula, generalizations were made on the geographic nature of the peninsula as well as travelling and collecting conditions. Of particular interest were the scenes of the Cape region, an area which had received abundant rains prior to the arrival of the

party. Here plant-life had taken on a spring-like activity with abundant green foliage and many blossoms. As would be expected, insects were secured here in greater numbers than elsewhere on the arid peninsula. About 3000 miles were traveled in Lower California, and nearly 50,000 specimens of insects were secured, many of which will be presented to the California Academy of Sciences.

Following Mr. Ross' talk, Dr. Van Dyke exhibited examples of *Brachypsectra* which had been taken on the trip and reviewed the interesting history of this rare group of beetles.

After a general discussion, the meeting adjourned.—E. G. LINSLEY, Secretary.

One Hundred and Fifty-fifth Meeting, March 4, 1939.

Meeting held at 2 p. m. at the California Academy of Sciences in San Francisco, President E. G. Linsley in the chair. The following members were present: E. G. Linsley, H. M. Armitage, E. O. Essig, P. C. Ting, R. L. Usinger, G. F. Ferris, E. P. Van Duzee, C. D. Duncan, E. C. Van Dyke, E. R. Leach, T. H. G. Aitken, J. A. Downes, E. S. Ross, P. H. Timberlake, K. A. Salman, R. C. Miller, W. H. Wheeler, C. D. Michener, J. O. Martin, N. E. Good, W. H. Lange, Berta B. Kessel, E. L. Kessel, M. A. Embury, B. E. White, A. Rabinovitch, A. E. Michelbacher, R. G. Dahl, J. J. DuBois, W. W. Lester, A. C. Smith, D. D. Jensen, J. L. Gressitt, W. E. Simonds, J. B. Steinweden. Visitors were present as follows: J. Lamiman, D. Ilse, A. Mallis, E. A. Drews, Kiyoto Urin, W. Okamoto, Pauline Lange, L. Jeppson, Mrs. B. E. White, Helen Druecker and Phyllis Penebaker.

The minutes of the previous meeting were read and approved.

Due to the resignation of Mr. H. L. McKenzie, there was a vacancy in the Permanent Historical Committee and the President appointed Professor E. O. Essig to this position. A membership committee was appointed consisting of Dr. Stanley Bailey, Chairman, Dr. Carl Duncan, Dr. Robert Usinger and Mr. E. S. Ross. An annual field trip committee was also appointed with Dr. A. E. Michelbacher, Chairman, assisted by Mr. Charles Michener and Mr. Arthur Smith.

Upon the recommendation of the membership committee, Mr. K. S. Hagen and Mr. R. G. Dahl were elected to membership in the Society.

Preceding the main speakers of the day various members and visitors gave short discussions of entomological observations or research under way as follows: Mr. A. Mallis stated that the crazy ant, *Prenolepis longicornis*, is now established in California and is often found in high-story business buildings. Mr. E. S. Ross displayed an interesting collection of Histeridæ from gopher burrows including several new species and urged that more collecting

be done in such habitats. Mr. P. H. Timberlake, when asked to discuss his work on the genus *Perdita* of bees, stated that he had seventy-five species in manuscript, fifty of which are new to science. He said one hundred and fifty species are known now, primarily from the dry regions, in North America and estimated that from four to five hundred species probably exist in North America. Mr. George Bohart told of his recent studies of *Bembix occidentalis* subsp. *beutenmuelleri* and displayed parasitized specimens from Antioch, California. He gave the following observations concerning the parasites: a Bombyliid fly oviposits near the wasp's burrow, a Mutillid oviposits in the prepupa, and a Conopid fly oviposits in the adult wasp. Dr. E. G. Linsley spoke of Dr. Carl Duncan's recent paper on the Vespoid wasps.

The main talks of the day formed a Symposium on the Principles of Geographical Distribution, the first speaker being Professor G. F. Ferris. Professor Ferris spoke on distribution and systematics and pointed out that there are two approaches to the subject, namely, the relationship of systematic entomology to distribution and the relationship of distribution to systematic entomology. He stated that the distribution of plants and animals falls into patterns with differences due to the age of the groups and that these patterns can be used as a basis for systematic work. Professor Ferris suggested that a genus is not merely a concept but that it actually exists in nature and the included species are expressions of certain biological factors. He gave as an example, the 525 species of scale insects which have been placed by various authors in the genus *Aspidiotus* stating that after close study and making allowances for species transported commercially they break up into geographical patterns which are genera. Professor Ferris states that many factors must be considered before conclusions are formed as to the natural geographical patterns and generic relationships in the Coccidæ. Host distribution, the age of the group, and the distribution of related groups are all important factors.

Dr. E. G. Linsley spoke on the distributional views of W. D. Matthew emphasizing the following points from his theory: In geological time there has been an alternation of elevations and changes in climate but the ocean bottoms have remained permanent. At the present time a rise of six hundred feet would unite all continents into a single mass with the possible exception of Australia and a submergence of six hundred feet would isolate the southern continents. Matthew holds that the most advanced forms will be found in the locality of origin and the generalized forms will be found elsewhere. He suggests that environmental conditions migrate and the primitive species follow, while the remain-

ing forms are adapted or become extinct. Matthew also discusses the possibility of over-sea migration by means of natural rafts, pointing out that large masses of floating debris have been observed over one hundred miles away from the mouths of such large rivers as the Amazon and Ganges.

Dr. E. C. Van Dyke spoke on "Land Bridges." He pointed out that fossil insects are known from the Paleozoic era and that spiders existed in the Devonian era and it may be assumed that they lived upon insects. Insect fossil remains at present are too few to determine the exact locality of origin for any group. Fossil Mollusca are good indices for periods of geological history, but do not help much in land distributional studies. Dr. Van Dyke suggests that too great a significance should not be put on mammal records as insects existed long before mammals appeared. Geologic records show that the northern continents were connected during the Mesozoic era. South America had continental connections only for a very short time. During all of the Paleozoic and two-thirds of the Mesozoic the Panama region was submerged. Many generic groups are restricted to South America and migrated to North America during the Tertiary period. A migration of European species to Africa took place during the Pliocene. Dr. Van Dyke believes many small families and genera evolved in South America during the Mesozoic and have remained restricted there. Certain related genera, and occasionally related species, are found in the cave faunas of both the Pyrenees of Spain and in Kentucky.

Dr. Robert L. Usinger spoke on the Theory of Continental Drift. He pointed out that this theory is accepted more generally in Europe than in America. Professor Alfred Wegener in 1915 was the first to establish this theory, pointing out that only a slight readjustment is necessary to perfectly fit the opposite Atlantic shore lines of Africa and South America together. Dr. Usinger mentioned a recent book by A. I. Du Toit, "Our Wandering Continents," in which the author considers the absence of marine strata deposits in the east of South America, and in the west of Africa an indication of their being connected. Further evidence of land connection lies in the convincing fact that at least three different fault lines are continuous with each other when the shore lines of eastern South America and Western Africa are matched together. Dr. Usinger further pointed out that the southern tips of Australia, Africa, and India all show evidence of glaciation and that recent measurements of longitude show that the continents have moved during the last one hundred years. The distance moved is said to be greater than that of any probable error in measurements.

After a short discussion the meeting adjourned.—P. C. TING, Secretary.

One Hundred and Fifty-sixth Meeting, April 21, 1939.

Meeting held in the home of Mr. E. R. Leach at 8 p. m. Mr. Leach displayed his exceptionally fine collection of Lucanidæ of the world. A very enjoyable time was had by everyone present.

The following members were present: E. G. Linsley, P. C. Ting, R. L. Usinger, E. P. Van Duzee, E. R. Leach, W. M. Upholt, B. C. Cain, K. S. Hagen, R. G. Dahl, G. E. Bohart, E. C. Van Dyke, A. E. Michelbacher, E. O. Essig, J. J. DuBois, C. D. Michener, F. E. Blaisdell, Sr., and M. A. Cazier. The following visitors were also present: Mrs. F. E. Blaisdell, Sr., Mrs. E. C. Van Dyke, Mrs. E. P. Van Duzee, Bill Ferguson, Francis Mathews, W. F. Barr, Dorothy Lœwen, Virginia Leach, N. W. Stanger, Mrs. E. O. Essig, and Mrs. A. E. Michelbacher.—P. C. TING, Secretary.

One Hundred and Fifty-seventh Meeting, April 23, 1939.

Annual field meeting held at Mt. Diablo, Contra Costa County, California.

The following members were present: E. G. Linsley, P. C. Ting, E. C. Van Dyke, H. M. Armitage, E. O. Essig, R. L. Usinger, N. E. Good, E. P. Van Duzee, E. S. Ross, T. H. G. Aitken, M. A. Cazier, C. D. Duncan, and A. E. Michelbacher. Visitors were present as follows: Mrs. E. C. Van Dyke, Mrs. E. P. Van Duzee, Mrs. E. O. Essig, Mrs. H. M. Armitage, Jane Armitage, Kenneth Street, Mrs. A. E. Michelbacher, Betsy S. Schneider, Ernest Schneider, H. Graves, George Mansfield, J. W. Tilden, Dorothy W. Good, Henry Stabo, J. Gustafson, Mary Louise Zingheim, Dorothy Markwad, June Brubaker, Robert Brownscombe, Paul Jorgensen, Karl D. Snyder, Marie Pelletier, Mrs. P. C. Ting, Irwin Ting, Mrs. J. R. Douglas, J. R. Douglas, Mrs. E. G. Linsley, and S. E. Flanders.

Despite rather poor weather several rather rare insects were collected. Messrs. M. A. Cazier, E. S. Ross and T. H. G. Aitken were successful in taking two species of *Cremastocheilus* while digging in ants' nests. *Rhinomacer comptus* was collected on the staminate cones of digger pine by Dr. E. C. Van Dyke and *Nemocestes*, probably *montanus* Van Dyke, was collected crawling on the surface of shallow sandstone caves by M. A. Cazier and T. H. G. Aitken. This is the first record of the Curculionid genus *Nemocestes* occurring on Mt. Diablo.—P. C. TING, Secretary.

One Hundred and Fifty-eighth Meeting, September 30, 1939.

Meeting held at 2:00 p. m. in the entomological laboratories of the California Academy of Sciences, San Francisco, President E. G. Linsley in the chair. Members present: E. G. Linsley, E. O. Essig, G. F. Ferris, R. C. Miller, C. D. Duncan, R. L. Usinger, E. P. Van Duzee, E. S. Ross, P. C. Ting, W. E. Simonds, A. C.

Smith, E. A. Smith, C. D. Michener, N. E. Good, F. E. Blaisdell, R. G. Dahl, W. H. Lange, T. H. Aitken, N. Stahler. Visitors present: E. J. Campen, R. Bartges, G. Mansfield, F. Driver, W. F. Barr, T. F. Kelley, S. R. Piazza, Elizabeth Truesdell, Florence Schultz.

The Society unanimously elected to membership the following: Mr. O. B. Cope, Mr. B. Brookman, Mr. J. W. Tilden, Miss Ernestine I. Smith, and Miss Marjorie Poff.

The program consisted of brief notes by various members of the Society on summer collecting, new publications, or research under way as follows:

Mr. E. G. Linsley exhibited volume I of the new Nomenclator Zoologicus by Sheffield A. Neave which includes a list of generic names used since the time of Linnæus.

Professor G. F. Ferris displayed drawings intended to accompany a morphological study of the Tipulidæ and called attention to need for such work. He mentioned similar studies which were under way on the Mecoptera and Neuroptera.

Professor E. O. Essig described the Yosemite Field School of Natural History with which he has been connected for ten years. The school is limited to twenty students and continues for seven weeks each summer. The first part of the course is devoted to general natural history and the latter part to some specialized ecological study generally at a high altitude. Dr. R. L. Usinger spoke on the conveniences of the school and the excellent opportunity provided for prolonged scientific work in otherwise inaccessible regions. Dr. Usinger made a particular study of the insect fauna of high Sierra lakes and also of the hemipterous genus *Platylygus*, the species of which are restricted to specific pines.

Dr. C. D. Duncan described a summer trip of the Nature Study School of San Jose State College to Mono County, California, where they studied the flora and fauna in some rather recent lakes formed in the bottoms of three different volcanic craters. He suggested that these conditions offered excellent opportunities for ecological studies. Dr. Usinger suggested that perhaps the age of the volcanic craters could be determined from Indian legends in that region.

Dr. F. E. Blaisdell reported on the longevity of the tenebrionid, *Cryptoglossa verrucosa*, which he had maintained for six and one-half years on a diet of rolled oats.

Mr. E. P. Van Duzee spoke of the Academy's recent acquisition of the Graham Hyde collection of butterflies from South Africa.

Mr. E. S. Ross, who assisted Dr. E. G. Linsley on the University of California summer 49 course at Idyllwild in the San

Jacinto Mountains, California, described the collecting conditions there and told of capturing the rare coccinellid, *Coccinella bridwelli* Nun.

Mr. C. D. Michener mentioned the following intertidal insects which occur at Half Moon Bay, California: A tipulid which oviposits at zero tide level with the resulting larvæ being submerged in salt water for several hours each day, a eurystethid beetle, several staphylinids and carabids, an ephydrid fly and several chironomids.

Dr. N. E. Good described the work of the U. S. Public Health Service on bubonic plague. They maintain four well equipped field trucks which cover all of the western states. All ectoparasites taken from rodents collected in the field are shipped to San Francisco where they are tested on guinea pigs for plague infection. Dr. Good reports that the following western states are infected with bubonic plague: California, Oregon, Idaho, Wyoming, New Mexico and Arizona.—P. C. TING, Secretary.

One Hundred and Fifty-ninth Meeting, December 2, 1939.

Meeting held at 2:00 p. m. in the entomological laboratories of the California Academy of Sciences, San Francisco, President E. G. Linsley in the chair. Members present: E. G. Linsley, P. C. Ting, E. S. Ross, E. O. Essig, G. F. Ferris, F. E. Blaisdell, R. L. Usinger, E. R. Leach, E. P. Van Duzee, H. H. Keifer, D. Moulton, M. A. Stewart, C. D. Michener, T. A. Aitken, J. O. Martin, J. W. Tilden, L. B. Boyer, O. B. Cope, W. E. Simonds, B. Brookman, J. J. du Bois, G. E. Bohart, K. S. Hagen, R. G. Dahl, W. H. Lange, W. H. Wheeler. Visitors present: G. S. Manfield, E. J. Campan, N. W. Stanger, T. F. Kelley, T. E. Laningham, J. E. Hare, W. C. Ferguson, W. L. Swisher, D. D. Ahmad, L. W. Grabe, E. R. Nippress, A. M. Dunlop, Mrs. E. P. Van Duzee, C. C. Anderson, G. F. Smith, W. A. Fitschen, W. J. Perry, Florence Schultz, R. Bartges, P. Harvey.

Dr. E. G. Linsley announced the death of Dr. H. C. Fall and read a summary of the life of that great coleopterist. It was moved and seconded that the obituary be published along with a picture of Dr. Fall in the next issue of the Pan-Pacific Entomologist. It was also moved and seconded that the secretary write a letter of condolence on behalf of the Society to Mrs. Richmond, who is Dr. Fall's closest living relative.

The following were unanimously elected to membership in the Society: Dr. Paul Harvey, Mr. Rex Bartges, and Mr. John W. Johnson.

Dr. R. L. Usinger, editor of the Pan-Pacific Entomologist and Mr. E. R. Leach, treasurer, were called upon for their yearly reports.

Professor E. O. Essig announced the following nominations for officers for the coming year: President, E. G. Linsley; Vice-President, H. M. Armitage; Secretary, P. C. Ting; Treasurer, E. R. Leach. The Society unanimously elected these men to office.

President E. G. Linsley appointed a new membership committee consisting of Dr. C. D. Duncan, chairman; Dr. M. A. Stewart, and Mr. C. D. Michener. President Linsley also appointed a committee as follows to consider changes in the constitution: Professor G. F. Ferris, chairman; Dr. R. L. Usinger, and Mr. E. S. Ross.

President Linsley then called attention to Professor Essig's appointment to the Advisory Committee to the National Research Council; also that Professor Essig will participate in a symposium on the History of Entomology at the coming annual meeting of the Entomological Society of America which is being held at Columbus, Ohio, on December 27-29, in conjunction with the American Association for the Advancement of Science.

Mr. E. P. Van Duzee announced, after some discussion, that the entomological laboratories of the California Academy of Sciences will now be open on Saturday afternoons for social gatherings of interested entomologists.

Dr. C. D. Duncan exhibited a collection of very fine insect photographs taken by Mr. L. A. Brubaker of San Jose State College.

Mr. Dudley Moulton was the first speaker in a symposium on the subject of "Special Methods of Mounting for Temporary and Permanent Preservation of Insects." Mr. Moulton spoke on the technique for study and permanent preservation of Thysanoptera pointing out that the small number of specialists in the Order was due to the difficulty in mounting and studying such minute and delicate winged insects. Mr. Moulton uses an aspirating tube and beating sheet for collecting thrips. His specimens are killed in a solution of glycerin, alcohol, and acetic acid which keeps them pliable until permanently mounted in balsam. He stated that some of his balsam slide mounts of thrips are more than thirty years old and are in perfect condition. Mr. Moulton's slide collection is arranged in a most systematic manner and is being indexed and correlated by numbers with his library so that all his available material and literature can be brought together within a few minutes. He exhibited several remarkable microphotographs of thrips and several curious galls formed by these insects. Mr. Moulton has half of the slightly more than four hundred known genera of thrips represented in his private collection.

Professor E. O. Essig spoke on the permanency of paper used for insect labels and scientific literature. Many of the very old

books such as the works of Aldrovandus were made of linen rag paper and are still in excellent condition. Most of our literature today is printed on an inferior grade of paper which will probably disintegrate within a few hundred years. He mentioned that the University of California makes a practice of printing several copies of all their publications on the finest grade of linen rag paper. He also suggested the mounting of some of the old more valuable collections of pinned insects on slides to insure their permanency. He told of the success of the British Museum's attempts to remount the Walker collection of Trichoptera on slides. He mentioned the desirability of plotting the position of the type specimen on the slide label when several specimens are mounted on a single slide. Professor Essig houses his own collection of aphids in small boxes of twenty-five slides each. Only a single species is kept in each box which facilitates incorporating additional specimens. In this manner it is easy to insert a new box when needed in its proper phylogenetic place. His system is essentially the same as the unit tray system used for pinned insects. In comment, Dr. Ferris spoke of some advantages of the envelope system for filing slides and Dr. Miller exhibited Wistar Institute trays.

Dr. M. A. Stewart spoke on the technique used in mounting Siphonaptera. He believes that KOH is the only satisfactory agent for clearing fleas. He punctures the specimen on the midventral line to facilitate the penetration of the KOH. Dr. Stewart mounts his specimens in balsam, a single specimen to a slide, and houses them horizontally on modified Wistar trays. He called attention to the fact that in warm climates the specimens will drift in the mounting fluid, if the slides are stored in a vertical position.

Mr. H. H. Keifer spoke on the mounting technique for Acarina and Microlepidoptera. He stated that most of the difficulty in making permanent slide mounts of mites is due to their small size. Such minute species as most of the eriophyids cannot be run through several reagents without injury and loss of specimens. The most practical method is to mount them directly in a modified Berlese fluid. One of the ingredients, chloral hydrate, is a very good clearing agent, particularly when slightly heated, but is not a permanent mounting medium. Some of the larger mites can be cleared in KOH and treated in the usual manner. Mr. Keifer mentioned that some of the earlier workers, such as Nalepa and Hotchkiss, dismissed the difficulties of permanent preservation by discarding their specimens after they were described. In discussing Microlepidoptera he mentioned that it is not always necessary to spread their wings, but that it was important to empale them on minute pins soon after they are killed because they do not relax well.—P. C. TING, Secretary.

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DIAGNOSES OF TEN NEW CHILOPODS WITH A NEW GENUS OF SOGONIDÆ AND A KEY TO THE SPECIES OF LOPHOBIUS

BY RALPH V. CHAMBERLIN

University of Utah, Salt Lake City

Of the eleven chilopods described in this paper, ten are named for the first time, while the eleventh was previously incompletely diagnosed. The types of all these species are in the author's collection.

Cryptops sinesicus Chamberlin, sp. nov.

Head overlapped by the first dorsal plate; without sulci. First plate not sulcate. Prehensors with claws of normal length; anterior margin of prosternum smooth and nearly straight, slightly obtusely inbent to middle line, two setæ on each side just proximad of it. Paired dorsal sulci complete from third tergite caudad. Last ventral plate caudally widely rounded with middle part of margin straight or truncate. Last coxæ caudally subtruncate or slightly convex; pores of moderate size, numerous in an area rounded behind and not reaching caudal margin by a considerable distance, along ventral plate and reaching dorsal plate at proximal end of area; caudal margin setose, two or three setæ also proximad of end, one or more in prorigerous area. Anterior spiracles rather large, longitudinally subelliptic. Femur and tibia slightly notched on median line at distal end, rounded each side of notch but with no suggestion of processes; uniformly coarsely setose ventrally and laterally, the setæ finer on dorsal surface. Metatarsus with a series of eight teeth of which the most distal is abruptly much more robust, teeth decreasing in size proximad. First tarsal joint with a series of four teeth. Length, about 14 mm.

Locality. One specimen intercepted April 28, 1938, by quarantine inspector at Honolulu in soil about *Litchi chinensis* D. from China.

This species agrees in many features with *C. navis* Chamberlin from Singapore, Straits Settlement, but may readily be distinguished in having eight teeth on the metatarsus instead of five, etc.

Nipponobius cepeus Chamberlin, sp. nov.

Articles of antennæ 20, all rather short, with the ultimate nearly equal in length to the two preceding taken together. Ocelli 1 + 3, 2, those of lower series and the first or single ocellus much smaller, the single ocellus contiguous with the next one which is the largest. Prosternal teeth 2 + 2, pale. Ventral spines of anal legs, 0, 1, 2, 1, 0; dorsal spines, 1, 0, 2, 0, 0; claw single. Ventral spines of penultimate legs, 0, 1, 2, 1, 0; dorsal, 0, 0, 2, 0, 0; an accessory claw or spine present. Coxal pores small, circular, few in number. Claw of female gonopods tripartite, the teeth short; basal spines 2 + 2.

Locality. Japan. One female taken by plant quarantine inspector at Honolulu, April 11, 1938, in packing material about *Vandateres grandiflora.*

This species differs from *N. migrans* Chamberlin, the genotype, in having the claw of the anal legs single instead of double.

Oabius rodocki Chamberlin, sp. nov.

A brown-colored form related to *O. sastianus* in having the ventral spines of the anal legs normally 0, 1, 3, 3, 1 but differing in having the dorsal spines of the penultimate legs 1, 0, 3, 1, 0 instead of 1, 0, 3, 1, 1 and in having a slight dorsal lobe at the distal end of the fifth joint or metatarsus of the penultimate legs in the male. Antennæ short. Ocelli few, in three series. Posterior angles of eleventh and thirteenth dorsal plates slightly produced. Dorsal spines of the anal legs 1, 0, 3, 1, 0; the claw single. Ventral spines of the penultimate legs 0, 1, 3, 3, 2; the claw double. Only the last pair of coxæ laterally armed (female) or these also unarmed (male holotype). Last three pairs of coxæ dorsally armed. Ventral spines of the first pair of legs 0, 0, 1, 2, 1. Coxal pores small, circular, decreasing in size proximad on each coxa, in female allotype numbering 3, 4, 4, 4. Claw of female gonopods tripartite, the lobes short. Basal spines 2 + 2. Length of male holotype, 7.5 mm.; of female allotype, 10 mm.

Locality. Idaho: Spaulding. Taken under moist leaves in woods on November 18, 1939, by R. E. Rodock.

Oabius (Nyctobius) boyeranus Chamberlin, sp. nov.

Color pale brown, the head lighter; antennæ brown, the legs yellowish, the posterior pairs brightest. Antennæ short and attenuated, composed of twenty short articles. Ocelli 1 + 3, 2, the single ocellus largest, the anterior smallest. Prosternal teeth 2 + 2, uniform, small and pale; the median incision V-shaped. Legs with

tarsi relatively long, with suture more evident than usual. Ventral spines of anal legs 0, 1, 3, 2, 0; dorsal, 1, 0, 3, 0, 0, the coxal spine minute; armed with two claws. Ventral spines of penultimate legs, 0, 1, 3, 2, 1; dorsal, 0, 0, 3, 1, 0; claws 3. None of the posterior coxæ laterally armed. Dorsal spines of thirteenth legs, 0, 0, 3, 2, 2. Ventral spines of first legs 0, 0, 0, 0, 0. None of anterior legs with third joint ventrally armed. Coxal pores small, few in number. Length, about 10 mm.

Locality. Oregon: Boyer. One male taken in August, 1933.

The species is unique in the spining of the legs, which readily separates it from *decipiens* and *ineptus*, two Pacific Coast forms likewise having the anal legs bearing two claws.

Oabius mimosus Chamberlin

Oabius mimosus Chamberlin, 1938, Ann. Mag. Nat. Hist., (11) 2:631.

Claws of female gonopods tripartite, the lobes short; basal spines 2 + 2, the inner spine of each pair smaller. Third joint of all legs armed both dorsally and ventrally. Ventral spines of anal legs 0, 1, 3, 2, 0, dorsal spines 1, 0, 3, 1, 0; claw single. Ventral spines of penultimate legs 0, 1, 3, 3, 1; dorsal, 1, 0, 3, 1, 1; a minute accessory claw present. Dorsal spines of thirteenth legs, 1, 0, 3, 1, 1. Last two pairs of coxæ laterally armed. Ventral spines of first legs 0, 0, 1, 2, 1. Prosternal teeth 2 + 2, small and pale, equal, the median incision narrowly and acutely V-shaped. Single ocellus and first of seriate ocelli much the largest, the latter few, in two series. Antennæ short, composed of the usual twenty articles. Length, 8 mm.

Locality. Oregon: Boyer. Collected by Prof. J. A. Macnab in July, 1937.

This description is given here because most of the description in the place of first publication was inadvertently dropped out in the course of publication.

Pokabius piedus Chamberlin, sp. nov.

Yellow throughout. Antennæ moderate, composed of twenty articles. Ocelli 1 + 5, 5, the single ocellus larger, the others small and loosely arranged. Prosternal teeth very small, 2 + 2. Coxal pores small, circular, few. None of the dorsal plates with posterior angles produced. Last three pairs of coxæ dorsally armed, but spine of thirteenth pair minute; none armed laterally. Ventral spines of anal legs, 0, 1, 3, 2, 0; dorsal, 1, 0, 3, 1, 0; claw single. Ventral spines of penultimate legs, 0, 1, 3, 3, 1; dorsal, 1, 0, 3, 1, 1;

a minute accessory claw present. Ventral spines of first legs, 0, 0, 0, 2, 1. In the anal legs of the male the fourth joint modified much as in *nankus*, being extended at proximal end above into a conspicuous subconical process channeled down its ectodorsal side, the channel continuing as a longitudinal furrow on the joint; third joint not produced at distal end. Length, about 11 mm.

Locality. Utah: St. George. One male taken March 4, 1928, by A. M. Woodbury.

In the form of the process of the fourth joint of the anal legs of male, as well as in having none of the posterior coxæ laterally armed, resembling *disantus*; but in the latter there is a conspicuous dorsal lobe on the third joint that is lacking in *piedus*.

Lophobius sororis Chamberlin, sp. nov.

Color yellow throughout, the head and posterior segments sometimes darker, more orange. Antennæ short, articles twenty to twenty-two. Ocelli in a narrowly elliptic patch; the single ocellus moderately enlarged, contiguous with patch; usually about fourteen or fifteen in number, *e.g.*, 1 + 5, 5, 3. Prosternal teeth very small and pale, 2 + 2; the special seta on margin ectad of outer tooth on each side; median sinus narrowly V-shaped. Coxal pores small, round, uniseriate, *e.g.*, 2, 3, 3, 3. Ventral spines of anal legs, 0, 1, 3, 2, 0, or occasionally 0, 1, 3, 2, 1; dorsal spines, 1, 0, 3, 0, 0 (male) or 1, 0, 3, 1, 0 (female); claw single. Ventral spines of penultimate legs, 0, 1, 3, 3, 2; dorsal, 1, 0, 3, 1, 1; claw with small accessory claw on posterior side and a spine on anterior side. Dorsal spines of twelfth legs, 1, 0, 3, 1, 1. Ventral spines of twelfth and thirteenth legs, 0, 0, 2, 3, 2. Last five pairs of coxæ dorsally armed, last pair alone laterally armed. Dorsal spines of first legs, 0, 0, 3, 2, 2; ventral, 0, 0, 2(1), 3, 2. Claw of female gonopods tripartite, the lobes short. Basal spines 2 + 2, the spines subcylindrical with obliquely acute apex. Length, 9-10 mm.

Locality. Nevada: Ruby Valley. Numerous specimens under leaves on ground under growth of willow, June 15, 1935, R. V. Chamberlin, collector.

Resembling *collium* of the Salt Lake Valley, etc., but a smaller form differing in spining of legs, as indicated in the key, as well as in the form of the fourth joint of the anal legs of the male. It may be placed with reference to the previously known species by means of the key given below.

Lophobius apachus Chamberlin, sp. nov.

Light brown, the head and antennæ and the caudal end with last legs brighter yellow or orange. Lateral margins of head smooth, without breaks. Antennæ composed of twenty or twenty-one articles which are moderate or short in length. Ocelli 1 + 4, 5, 4, 2, in a narrowly elliptic patch; the single ocellus enlarged, contiguous with the patch. Prosternal teeth 2 + 2; median sinus large and V-shaped; ectal seta in the usual outer position, of ordinary form. None of dorsal plates with posterior angles produced. Ventral spines of anal legs, 0, 1, 3, 2, 1; dorsal, 1, 0, 3, 1, 0; claw single. Ventral spines of penultimate legs, 0, 1, 3, 3, 2; dorsal, 1, 0, 3, 1, 1; claw single. Last four pairs of coxæ dorsally armed, the anal pair alone laterally armed. Ventral spines of first legs, 0, 0, 2, 3, 2; dorsal, 0, 0, 3, 2, 2. Coxal pores small, round, 3, 3, 3, 3(or 2). Anal legs of male rather slender, the fourth joint not swollen, but with a shallow longitudinal furrow above, the fifth joint also flattened or weakly longitudinally furrowed above; none of the joints lobate. Length, 15 mm.

Locality. Arizona: Duncan, September 5, 1939. Three males of which two are not fully grown.

This species is unquestionably close to *L. arizonæ* Chamberlin, described from Tucson, Arizona. It would seem to be sufficiently distinct in having the claw of the penultimate legs single, whereas in *arizonæ* there are two small but distinct accessory claws; also in having the dorsal spines of the first legs 0, 0, 3, 2, 2 instead of 0, 0, 2, 2, 2.

The following key will aid in separating the species now referred to *Lophobius*.

Key to Species of Lophobius

1 (24) All anterior legs, or all but first one or two pairs, with third joint bearing two ventral spines.
2 (23) Ventral spines of penultimate legs, 0, 1, 3, 3, 2.
3 (6) Anal legs armed with two claws.
4 (5) Ventral spines of anal legs 1, 3, 3, 1(0); ocelli in two series ..... *lasalanus* Chamberlin
5 (4) Ventral spines of anal legs 1, 3, 2, 1; ocelli in from three to five series..... *socius* (Chamberlin)
6 (3) Anal legs with claw single.
7 (16) Dorsal spines of twelfth legs 1, 0, 3, 1, 1 or 0, 0, 3, 1, 1.
8 (13) Ventral spines of anal legs normally 0, 1, 3, 2, 0.
9 (12) Ventral spines of twelfth and thirteenth pairs of legs 0, 0, 3, 3, 2.

10 (11) Last three (or two) pairs of coxæ laterally armed.....*collium* Chamberlin
11 (10) Only the last pair of coxæ laterally armed..... *loganus* Chamberlin
12 (9) Ventral spines of twelfth and thirteenth pairs of legs 0, 0, 2, 3, 2.....*sororis*, sp. nov.
13 (8) Ventral spines of anal legs normally 0, 1, 3, 2, 1.
14 (15) Last article of anal legs furrowed along mesal side; fourth joint in male with a conspicuous dorsal lobe at distal end .....*franciscæ* Chamberlin
15 (14) Anal legs not thus modified.....*pungonius* Chamberlin
16 (7) Dorsal spines of twelfth legs 1, 0, 3, 2, 2 or 1, 0, 3, 1, 2.
17 (20) Ventral spines of anal legs 0, 1, 3, 2, 1.
18 (19) Penultimate legs with claw single.....*apachus*, sp. nov.
19 (18) Penultimate legs with three claws.....*arizonæ* Chamberlin
20 (17) Ventral spines of anal legs normally 1, 3, 2, 0.
21 (22) Trochanter of thirteenth legs armed; last two pairs of coxæ laterally armed (spine rarely absent from penult.); fourth joint of anal legs of male only weakly elevated at distal end above..... *helenæ* Chamberlin
22 (21) Trochanter of thirteenth legs without spine; only last coxæ armed; fourth joint of anal legs elevated into a conspicuous process at distal end above.....*stenenus* Chamberlin
23 (2) Ventral spines of penultimate legs 0, 1, 3, 3, 1 (lobe at distal end of fourth joint of anal legs of male conspicuous) ..... *castellopes* (Chamberlin)
24 (1) First seven pairs of legs with the third joint bearing a single ventral spine.....*eremus* Chamberlin

Gosibius ameles Chamberlin, sp. nov.

Dorsum, head and antennæ brown, in part of chestnut shade. Legs yellow, the posterior pairs darker. Antennæ of moderate length, distally filiform, composed typically of about thirty segments. Ocelli 1 + 4, 2, 2, the single ocellus a little enlarged, ocelli of bottom row very small. Prosternal teeth 2 + 2, small, the special seta hair-like. Posterior angles of ninth, eleventh and thirteenth dorsal plates produced. Coxal pores small, round, 3, 4, 4, 4. Only the anal coxæ armed laterally and dorsally. Ventral spines of anal legs, 1, 3, 3, 1; dorsal, 1, 0, 3, 2, 0; claws 2. Ventral spines of penultimate legs, 0, 0, 3, 3, 2; dorsal, 0, 0, 3, 2, 2. Ventral spines of first legs, 0, 0, 1, 2, 1. Claw of female gonopods long, strictly entire. Basal spines 2 + 2. Length, 12 mm.

Locality. Utah: near Verdure. Two females taken April 18, 1928, by R. V. Chamberlin.

Of the known species *ameles* is apparently nearest to the Californian *G. monicus*, but is a smaller form differing in having only the coxæ of the last legs armed dorsally and laterally; in having the dorsal spines of the anal legs 1, 0, 3, 2, 0 instead of 1, 0, 3, 2, 2, etc.

Sepedonophilus hodites Chamberlin, sp. nov.

Yellow throughout excepting the claws of the prehensors which are dark brown or in part blackish. Cephalic plate much longer than broad, somewhat narrower behind than in front, the corners rounded and the lateral margins weakly arcuate. No frontal suture. Cephalic plate widely overlapping the basal plate, which is also overlapped by the tergite, the exposed portion being therefore very short. A small circular clypeal area far forward contrasting sharply by its clearness or lack of color from the surrounding region, its polygonal areas smaller and less clearly defined. In a transverse line on a level with caudal end of this area are two stout setæ on each side of middle. Side pieces of labrum well separated by the median piece. Maxillæ I without external lappets. Inner angle of coxa of second maxillæ not especially produced. Claws of prehensors when closed extending much beyond the front margin of the head. Anterior margin of prosternum with the usual two short, conical processes or teeth. Inner side of prehensors bearing a minute tooth below trochanteral suture, a larger one at distal end of femuroid, and one at base of claw joint which is largest of all, conical and acute. Tergite of first pediferous segment bisulcate but the sulci less sharply impressed than on the second and succeeding tergites. First spiracle large, vertically elliptic, larger than the second which is circular and intermediate in size. Last ventral plate very wide, strongly converging caudad; the sides convex, the caudal margins weakly convex. Coxæ of last legs each with a single, relatively large pore opening beneath the ventral plate and a few much smaller ones. Anal legs of male inflated, ending in slender claws. Pairs of legs, forty-nine. Length, about 18 mm.

Locality. Australia. One male taken by quarantine inspector at Honolulu, June 25, 1938, in soil about *Cymbidium lowianum.*

Distinguished from other known species by the number of pairs of legs, the character of the coxal pores, details of the mouthparts, etc.

Gosipina Chamberlin, gen. nov.

Resembling *Sogona* in general characteristics but differing in having only a single pit on each anal coxa as in *Timpina.*

Genotype: *Gosipina bexara*, sp. nov.

Gosipina may be placed with reference to the other known genera of the family by means of the following key:

Key to the Genera of Sogonidæ

1 (4) Coxæ of anal legs with a single pit on each side.
2 (3) Tarsus of anal legs consisting of a single joint; prebasal plate not exposed.....*Timpina* Chamberlin
3 (2) Tarsus of anal legs two-jointed; prebasal plate exposed. .....*Gosipina*, gen. nov.
4 (1) Coxæ of anal legs with two pits on each side.
5 (6) Anal legs ending in a claw.....*Garrina* Chamberlin
6 (5) Anal legs without claw.....*Sogona* Chamberlin

Gosipina bexara Chamberlin, sp. nov.

Cephalic plate longer than wide, narrowed in front of middle; frontal suture not evident; with a distinct median longitudinal sulcus. Prebasal plate narrowly exposed at the middle, the basal plate broad and long. Antennæ distally filiform, moderately compressed proximad of middle. Claws of prehensors when closed scarcely attaining front margin of head. All joints of prehensors short, not armed within. Chitinous lines fine but complete. Spiracles small, circular, very gradually decreasing in size from the first caudad. Tergites bisulcate. Last dorsal plate broad, shield-shaped. Ventral pores fine, in a narrow transverse band running across sternite just behind middle as in *Sogona minima*, the poriferous area not depressed or sharply limited. Last ventral plate very wide; sides convex and converging caudad; caudal margin straight. Coxal pits large, one on each side, this covered by last plate which is slightly emarginate opposite it as in *Timpina texana.* Anal legs in male moderately swollen, with the last article abruptly reduced in diameter and ending in a slight terminal, setigerous lobe in place of a claw; seven articles inclusive of coxa. Pairs of legs, sixty-three. Length of male holotype, about 18 mm.

Locality. Texas: Bexar County, November 9, 1936. One male received from the U. S. Bureau of Entomology and Plant Quarantine.

A NEW PERGANDEIDA FROM THE COLORADO DESERT

(Homoptera, Aphididæ)

BY R. C. DICKSON

University of California Citrus Experiment Station, Riverside, California

This species was collected on *Suæda suffretescens* Wats., about one mile east of Indio, California, on March 26, 1939. It proved so interesting when mounted, that a trip was made to the same place two weeks later, but only one additional specimen was taken.

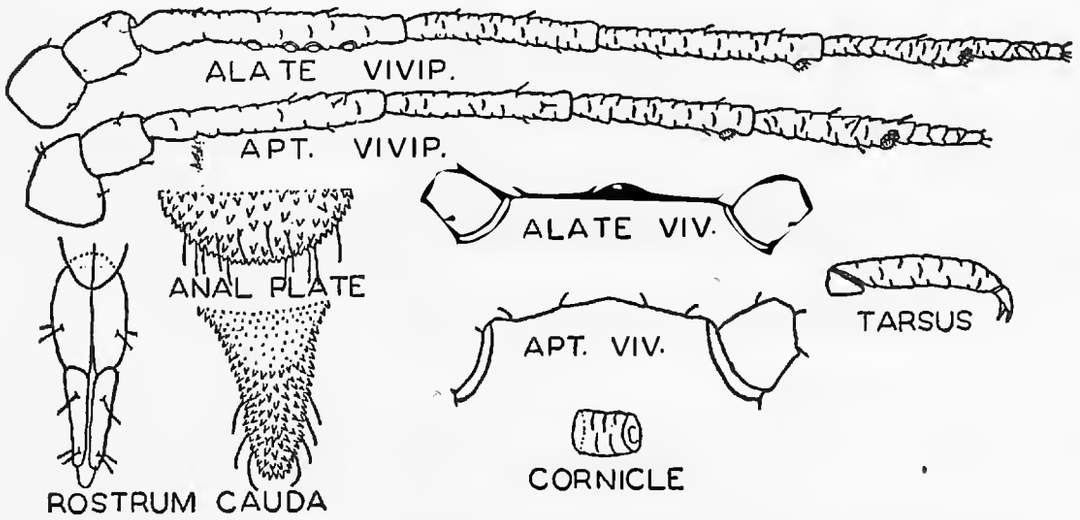
The author desires to express his appreciation for the help received from E. O. Essig, M. A. Palmer and G. F. Knowlton.

Pergandeida cahuillæ Dickson, new species

Alate Viviparous Female. Color not closely observed before mounting, dull green with head, thorax, femora, tips of tibiæ, tarsi, and anal plate dark. Body aphis-like in shape, length 1.25 to 1.53 mm. to base of cauda. Head without frontal tubercles, width across eyes 0.28 to 0.32 mm., ocular tubercles present. Antennæ about one-half body length; III, 0.15 to 0.21 mm.; IV, 0.11 to 0.14 mm.; V, 0.13 to 0.22 mm.; VI, 0.09 to 0.13 + 0.05 to 0.06 mm.; total 0.65 to 0.79 mm. Primary sensoria present on V and VI, margins ciliate, that on VI with 4 to 6 auxilliary sensory pits near it. Secondary sensoria large, circular, causing a slight enlargement of that part of the segment on which they are situated; 4 or 5 in an irregular row on the distal two-thirds of segment III, absent from other segments. Hind tibiæ, 0.58 to 0.71 mm.; hind tarsi, 0.09 to 0.12 mm. Cornicles small, cylindrical, with a slight constriction just before the tip, 0.03 to 0.04 mm. in length; cauda conical with 3 or 4 hairs on each side, hard portion 0.09 to 0.11 mm. long; anal plate circular, entire, armed with about 16 setæ. Rostrum slenderly obtuse, reaching third coxæ, segment IV + V, 0.08 to 0.09 mm. Wings hyaline, venation normal, fore wing with media twice-branched, the second fork two-thirds to three-fourths of distance from first fork to wing edge, length 1.69 to 1.88 mm.; hind wings with media and cubitus present. Prothoracic tubercles present; lateral tubercles on abdominal segments 1 to 7 inclusive. All setæ on body and antennæ small and inconspicuous.

Apterous Viviparous Female. Color not closely observed before mounting, dull dark green approximating the color of the host leaves. Body length 1.22 to 1.36 mm. to base of cauda; width across eves 0.31 to 0.34 mm.; ocular tubercles present. Antennæ usually slightly less than one-half body length; III, 0.13 to 0.17 mm.; IV, 0.09 to 0.13 mm.; V, 0.10 to 0.13 mm.; VI, 0.09 to 0.10 + 0.04 to 0.05 mm.; total, 0.58 to 0.68 mm.; secondary sensoria absent.

Hind tibiæ, 0.52 to 0.65 mm.; hind tarsi, 0.09 to 0.12 mm. Cornicles cylindrical, slightly constricted just before tip, forming a weak flange, 0.03 to 0.05 mm. in length. Rostrum slenderly obtuse, segment IV + V, 0.08 to 0.09 mm. long. Cauda conical, with 3 (or occasionally 4) hairs on each side, length of hard portion, 0.08 to 0.09 mm.; anal plate circular, armed with about 16 setæ; prothoracic and lateral abdominal tubercles as in alate form.



Descriptions are from eight alate and seventeen apterous viviparous females mounted on eight slides. A single alate viviparous female has been designated as type and is deposited with the California Academy of Sciences in San Francisco. The remainder of the specimens are designated as paratypes and are distributed as follows: one slide each in the collections of E. O. Essig, G. F. Knowlton and M. A. Palmer, and four in the author's collection.

It was suspected that this might be *Longicaudus suædæ* Mimeur* imported from north Africa on *Suæda* with rooted date palms, so a slide of the California species was sent to Professor Palmer, who compared it with a slide of Mimeur's species in her collection. This comparison and a study of Mimeur's description show that the alate viviparæ of the California species differ from those of the African species in having shorter and more cylindrical cornicles, a smaller cauda, shorter antennæ in proportion to body lengths, segments III and VI shorter and segments IV and V longer in proportion to total antennal length; filament one-half base of VI rather than more than one-half; and in having four or five sensoria on III rather than five to eight. *Longicaudus* is considered by some authors to be a synonym of *Pergandeida.*

*Mimeur, J. M., 1934. Aphididæ du Maroc (Troiseme Note). Memoires de la Société des Sciences Naturales du Maroc. No. XL, 19-22.

THE DIPTEROUS GENUS MICROPHORUS. II. TAXONOMY

(Diptera, Empididæ)

BY A. L. MELANDER

College of the City of New York

(Continued from page 11)

The following identification tables deal with the known Nearctic species of *Microphorus*. Because the tables contain the more important diagnostic characters, the accompanying descriptions of the species have been abridged to include only characters supplementary to the tables.

TABLE OF THE NORTH AMERICAN SPECIES OF MICROPHORUS

MALES

1. Middle trochanters with one or two strong spine-like bristles or spikes; acrostichals biseriate, dorsocentrals uniserial; upper facets distinctly larger than lower ones.....2
–. Middle trochanters and femora not armed beneath with long stiff bristles or spines.....7
2. Hind metatarsi not notched, longer than the two following joints 3
–. Hind metatarsi shorter than the two following joints together and deeply notched below (fig. 17); abdominal hairs pale; third, fourth and fifth ventrals each with paired stiff bristles; arista as long as antenna.....*strigilifer*, sp. n.
3. Hind tibiæ clavate, hind metatarsi much swollen; middle trochanters with stiff double bristle; front femora not bearded; arista about twice as long as third antennal joint.....4
–. Hind tibiæ not clavate and not strongly pectinate, hind metatarsi not swollen; arista relatively shorter.....5
4. Fourth and fifth ventral segments with preapical spines; halteres brown; wings subhyaline.....*robustus* Melander
–. Only fifth ventral segment with preapical spines; halteres black; wings dark.....*armipes* Melander
5. Middle femora with three long strong bristles beneath near the middle; middle tibiæ with a strong flexor swelling or callus just beyond the middle; middle trochanters with one or two stout curved spinous bristles.....6
–. Middle femora not spinose; middle tibiæ without callus; middle trochanters with two slender curved bristles; third antennal joint strongly constricted beyond base, shorter than arista (fig. 8); fifth ventral with only two minute bristles near each side; wings normal.....*sycophantor* Melander

6. Third antennal joint subconical, nearly as long as arista (fig. 4); fifth ventral with a preapical group of three stout setæ near each side; wings normal; front femora not bearded ..... *ravidus* Coquillett

–. Third antennal joint strongly constricted beyond base, shorter than arista (fig. 7); fifth ventral apically with a large patch of stiff bristles; wings with anal angle lobed, intercalary vein strongly arched before the posterior crossvein, the wing widened at the tip of the intercalary vein, ultimate section of fifth vein much curved, the wing narrowed at its ending; front femora with an up-curled fringe of hairs along the outer side. (See fig. 18) ..... *cirripes*, sp. n.

7. Fourth ventral segment expanded laterally into a lobe which bears spinous bristles (figs. 14, 16); pygidium large; third antennal joint constricted, style long; facets all moderately small, the upper ones not much larger than the lower; halteres pale 8

–. Ventral segments not lobate; pygidium small or moderate; upper facets distinctly larger than the lower ones 9

8. Sections of fifth vein subequal; hairs of tibiæ not scopiform; lobe of fourth ventral without spatulate process (fig. 16) ..... *isommatus* Melander

–. Penultimate section of fifth vein longer than ultimate; hairs of hind tibiæ rather coarse and dense; lobe of fourth ventral with long spatulate process (fig. 14) ..... *evisceratus*, sp. n.

9. Third antennal joint conical, much longer than style (fig. 2); acrostichals in four rows, dorsocentrals irregular and short, six scutellars; abdominal hairs sparse and long; hind tibiæ clavate, hind metatarsi swollen; wings hyaline, veins thin; proboscis porrect and sharp 10

–. Third antennal joint much constricted just beyond base; hind legs not enlarged; wings somewhat infumated; proboscis retracted and fleshy 11

10. Thorax with a shining vitta between the acrostichal and dorsocentral hairs; halteres pale ..... *bilineatus* Melander

–. Thorax opaque black, at most a grayish vitta indicated between the acrostichal and dorsocentral hairs; halteres black ..... *obscurus* Coquillett

11. Third antennal joint longer than arista, constricted near base, the distal three-fourths almost strap-shaped (fig. 11); occiput densely hairy; four loose rows of acrostichals; discal cell long, the last section of fourth vein shorter than preceding ..... *discalis*, sp. n.

–. Third antennal joint shorter than arista, the distal half constricted (figs 7, 9); occiput moderately hairy; two rows of acrostichals; discal cell ending before tip of first vein, the last section of fourth vein longer than preceding 12

12. Halteres black; dorsocentrals irregular; abdominal hairs longer than segments; seventh tergite small and pollinose like other segments; third vein nearly straight.....*atratus* Coquillett
–. Halteres pale; dorsocentrals regular, uniseriate, five to seven in number; abdominal hairs short, about as long as segments; seventh tergite large and shining; third vein sinuous.....*tacomæ*, sp. n.

Females

1. Third antennal joint distinctly longer than the style; acrostichals in more than two rows.....2
–. Third antennal joint equal to or shorter than the arista; acrostichals in two rows.....4
2. Third antennal joint evenly conical (figs. 1, 2); acrostichals numerous; wings hyaline, the sections of the fifth vein equal....3
–. Third antennal joint elongate, strongly constricted beyond base, the distal portion almost strap-like (fig. 11); acrostichals loose and irregular; wings lightly infumated, the discal cell large.....*discalis*, sp. n.
3. Thorax with two gray stripes between the small acrostichals and dorsocentrals; halteres pale.....*bilineatus* Melander
–. Body and halteres black.....*obscurus* Coquillett
4. Discal cell apically with parallel sides, the oblique vein proximally strongly curved, sections of fifth vein equal; two scutellar bristles.....*cirripes*, sp. n.
–. Discal cell tapering before its apical crossvein, the oblique vein nearly straight or gently curved.....5
5. Halteres piceous; notum subshining black, the sparse pollen brown.....*armipes* Melander
–. Halteres pale; thorax more or less grayish pollinose and not at all shining.....6
6. Head, thorax and abdomen entirely and densely light gray pollinose; wings hyaline, stigma distinct; four or five strong acrostichals.....*ravus*, sp. n.
–. Body appearing more or less blackish.....7
7. Sections of fifth vein equal or subequal; proboscis not or but little projecting; five to seven dorsocentrals in a regular row..8
–. Last section of fifth vein shorter than preceding; proboscis usually somewhat projecting.....10
8. About seven pairs of acrostichals, about seven dorsocentrals; veins pale fuscous.....*isommatus* Melander
–. About five pairs of acrostichals, about six dorsocentrals; veins piceous.....9

9. Stigma much shorter than intercalary vein; pollen of body grayish.....*sycophantor* Melander

–. Stigma about as long as intercalary vein; pollen brownish. (Female unknown, but probably located here).....*robustus* Melander

10. About ten or more dorsocentrals in an irregular row, about nine or ten acrostichals in each row, usually six scutellars.....*atratus* Coquillett

–. Five or six dorsocentrals in a regular row, about eight acrostichals in each row, or less, two or four scutellars.....11

11. Third antennal joint distinctly constricted; stigma faintly brown; about eight acrostichals.....*tacomæ*, sp. n.

–. Third antennal joint subconical; stigma absent; about four acrostichals.....12

12. Vertex and upper occiput shining or subshining.....*ravidus* Coquillett

–. Vertex and upper occiput opaque pollinose.....*strigilifer*, sp. n.

1. Microphorus armipes Melander

Melander, 1927. Genera Insectorum, fasc. 185, p. 91.

Length 2.5 mm. Third joint of antennæ strongly constricted, half as long as arista (fig. 10); about ten dorsocentrals, eight acrostichals, four strong scutellars; abdominal hairs longer than the segments; fifth ventral with two long apical bristles on each side; pygidium small, the keel with six strong apical bristles; penis split, the upper fork slender, the lower hooked; middle femora with two strong bristles beneath near middle; hind metatarsi two-thirds as long as their tibiæ; stigma distinct, three times as long as wide; sections of fourth vein proportioned 1:2:3, sections of fifth vein equal.

Types: Seattle, Olga and Quilcene, Washington, in Melander collection. Fourteen males and ten females, all from Western Washington and Oregon, late June and July. Washington: Blewett Pass, Granite Falls, Index, Lilliwaup Falls, Mount Constitution, Pluvius, Vancouver. Oregon: Aurora, Corvallis, Mount Hood, Summit, Benton County (H. A. Scullen). All but the last collected by the author.

2. Microphorus atratus Coquillett

Coquillett, 1900. Proc. Wash. Acad. Sci. ii, p, 412.

Melander, 1902. Trans. Amer. Ent. Soc. xxviii, p. 333 (*Holoclera*).

Coquillett, 1903. Proc. Ent. Soc. Wash. v, p. 263 (*Anthalia*).

Proctor, 1938. Biol. Surv. Mt. Desert Reg. vi, p. 321 (occ. in Maine).

Length 2.5 mm. Upper facets coarse; third antennal joint short, two-thirds as long as arista (fig. 9); proboscis projecting nearly half the head-height; more than twelve dorsocentrals in more than one linear row, acrostichals irregular, about nine pairs, six scutellars; seventh abdominal segment small, pollinose like rest of the segments, no peg-like hairs on sternites; pygidium small, penis ending in two long reflexed closely approximating needle-like prongs; abdominal hairs conspicuous; hind metatarsi slightly shorter than remainder of tarsus; posterior crossvein nearly half as long as oblique crossvein, sections of fourth vein 1:3:4, sections of fifth vein nearly 2:1, second posterior cell wider than third at margin.

Type, Kodiak, Alaska, in the United States National Museum. A western species, especially abundant on Mount Rainier; 115 males and 56 females mounted, collected by the writer, July and August, in the following localities, except as noted. Alaska: Douglas (Eldred Jenne). Idaho: Coeur d'Alene Lake. Washington: Big Four Mountain, Nasel; and the following stations on Mount Rainier, Alta Vista, Berkeley Park, Chinook Pass, Fairfax Trail, Hanson Creek, Indian Henry Park, Mazama Ridge, Paradise Park, Sluiskin Falls, Summerland, Van Trump Park, Yakima Park. C. W. Johnson identified the species as occurring in Maine.

3. Microphorus bilineatus Melander

Melander, 1902. Trans. Amer. Ent. Soc. xxviii, p. 334, fig 99 (*Holoclera*).

Coquillett, 1903. Proc. Ent. Soc. Wash. v, p. 263.

Length 2 mm. Upper facets moderate; proboscis slender, without fleshy labella, palpi slender; thorax cinereous black; scutellum cinereous, dorsocentrals in more than single row; pygidium small; legs piceous, hind metatarsi one-third as long as tibia; stigma weak, three-fourths as long as intercalary vein; sections of fourth vein 1:5:6, of fifth vein equal.

Cotypes, Opelousas, Louisiana, in American Museum of Natural History and Melander collection.

4. **Microphorus cirripes** Melander, sp. nov. (Fig. 18)

Length 3 mm. Third antennal joint two-thirds as long as arista, the apical portion narrow (fig. 7); proboscis not projecting; dorsum thickly brownish-gray pollinose, seven irregular dorsocentrals, about three pairs of acrostichals, four scutellars, the lateral ones minute; vestiture of abdomen inconspicuous, the hairs not longer than segments, only fifth ventral setose; pygidium opaque, the penis shining, keel studded with radiating bristles; middle trochanters with stout curved double bristle; fringe of front femora close, consisting of fine brown hairs, those of distal half longer than the width of femur; callus of middle tibiæ strong and provided with a row of bristly hairs; stigma faint, about half as long as intercalary vein, posterior crossvein about one-fourth the curved first section of intercalary vein, sections of fourth vein about 1 : 2 : 3, of fifth vein subequal; halteres pale.

Female. Thoracic bristles somewhat stronger than in male, eight dorsocentrals, five sets of acrostichals; wings normal in outline, fifth vein not arched; legs normal, hairs inconspicuous, hind metatarsi slightly shorter than remainder of tarsus; abdomen normal, nearly bare, apex shining.

Holotype and allotype, Eagle Creek, Columbia Highway, Oregon, June 24, 1935, Melander collection. Twenty-eight males and thirty-five females, all western. Washington: Adna, Canyon Creek, Granite Falls, Husum, Lake Cushman, Lilliwaup Falls, Potlach, Quilcene, and Stehekin on Lake Chelan; all late July or early August. Vancouver Island: Goldstream, July 12, 1924. Oregon: Hood River, June 30, 1917; and August 1, 1917 (Leroy Childs). California: Dyerville, June 20, 1935. All except the last Hood River specimen collected by the author.

5. **Microphorus discalis** Melander, sp. nov.

Length 3 mm. Arista equal in length to the constricted part of the third antennal joint which is tapering, strap-like, and longer than in the other species (fig. 11); palpi hairy; dorsum of thorax atrous black, hairs long, pleuræ with slight cinereous tinge, seven coarse uniserial dorsocentrals, eight scutellars; hairs of abdomen conspicuous, as long as segments or longer, no spines or stiff bristles; seventh segment and pygidium very small; legs slender, femoral hairs forming a pecten above and below, hind tibiæ with pecten of hairs along exterior face; wings widest at base of discal cell, anal lobe more sharply rectangular than usual, veins firm, blackish, stigma elliptical, fuscous, equal to the intercalary vein, discal cell extending to tip of first vein, sections of fourth vein 1 : 6 : 4, of fifth vein 3 : 2; halteres and alulæ black.

Holotype, male, Muir Woods, near San Francisco, California, August 7, 1915; allotype, Dyerville, California, June 20, 1935; paratype, female, Vancouver, Washington, July 7, 1917; all in Melander collection.

This species is related to the European *M. velutinus* Meigen, but is more hairy and has distinctly longer antennæ. *M. velutinus* has the last two sections of the fourth vein nearly equal.

6. Microphorus evisceratus Melander, sp. nov.

Length 2.4 mm. Hairs of occiput sparse and short; third joint of antennæ about two-thirds as long as arista (fig. 6); proboscis not projecting; seven uniserial dorsocentrals, about eight sets of acrostichals, four scutellars; third sternite deeply emarginate, with a strong spine at each side, the large lobe of fourth sternite with marginal fringe of coarse hairs (fig. 14), the fifth sternite located between the lobes of the fourth, bilobed and bearing four strong projecting blunt spines of which the middle pair is fused (fig. 15); pygidium ventrally bearing at base a dense cluster of pale hairs setting off the usual two slender downward-projecting valves, penis tipped with a pair of divaricate bristles; vestiture of abdomen fine, not conspicuous; legs normal, hind metatarsi equal to the three following joints together; wings subhyaline, veins piceous, stigma three-fourths as long as intercalary vein; discal cell extending to tip of first vein, posterior crossvein half as long as the oblique crossvein, sections of fourth vein 1 : 2 : 3, of fifth vein 5 : 4, third vein arched; alulæ pale yellow, with pale hairs.

Type, Kendrick, Idaho, June 7, 1917. Two paratypes, one collected with the type, the other at Upper St. Regis River, Montana, July 28, 1918.

7. Microphorus isommatus Melander

Melander, 1927. Genera Insectorum, fasc. 185, p. 92.

Length 2 mm. Hairs of occiput short; third joint of antennæ about two-thirds as long as arista (fig. 6); proboscis fleshy, not projecting; seven uniserial dorsocentrals, about five sets of acrostichals; vestiture of abdomen short and sparse, each lobe of fourth ventral with an oblique row of five thorn-like submarginal setæ, lateral to which are two long setæ (fig. 16), penis tipped with two divaricate setæ; legs not ciliate, hind metatarsi only slightly longer than the two following joints together; wings subfuscous, veins thin and fuscous, stigma three-fifths as long as intercalary

vein, posterior crossvein one-third the oblique crossvein, sections of fourth vein 2 : 5 : 7, of fifth vein equal, third vein arched.

Types from London Hill Mine, Bear Lake, British Columbia, the holotype in the United States National Museum, paratype in the Melander collection. I have taken a male on Mount Rainier, Paradise Valley, August, 1917.

8. Microphorus obscurus Coquillett

Coquillett, 1903. Proc. Ent. Soc. Wash. v, p. 268.

Length 2 mm. Upper facets coarse; third antennal joint usually more than twice as long as deep (fig. 2), sometimes slightly under (fig. 1), the style one-half the length of the third joint or less; proboscis slender, without fleshy labella, palpi slender; notum and tergum of male velvety black, of female cinereous black; dorsocentrals and acrostichals small, about ten to the row, dorsocentrals in more than a single row, especially noticeable in female; pygidium small; hind metatarsi about one-third as long as tibia; veins thin, stigma two-thirds as long as intercalary vein, sections of fourth vein 1 : 4 : 6, of fifth vein equal.

Very close to the European *M. anomalus* Meigen, which however is somewhat larger, measuring 2.5 mm., and the male has all the hairs of the sternites equally long. *M. obscurus* has only the preapical hairs of the sternites conspicuous in the male.

Type from Franconia, New Hampshire, in the United States National Museum. The species is generally distributed along the Atlantic seaboard from June to early August. I have thirty-six males and fifty-one females before me, all but two collected by myself, representing the following localities. Connecticut: Redding, Woodbury. Massachusetts: Chester (C. W. Johnson). Vermont: Lynden. New Hampshire: Benton. New York: Cold Spring Harbor, Bear Mountain, Tuxedo. Virginia: Fairfax County (R. C. Shannon, May). Five additional females from Troy and Kendrick, Idaho, June, and Almota, Wawawai and Yakima, Washington, May, are indistinguishable from the eastern females of *obscurus*. Unfortunately no associated males were captured, so it cannot be stated with certainty whether these western females are *obscurus*, *anomalus*, or a new species.

9. Microphorus ravidus Coquillett

Coquillett, 1895. Proc. U. S. Nat. Mus. xviii, p. 409.
Melander, 1902. Trans. Amer. Ent. Soc. xxviii, p. 333 (*Holoclera*).
Coquillett, 1903. Proc. Ent. Soc. Wash. v, p. 263.

Length 2.4 mm. Third antennal joint less constricted than usual, twice as long as deep and subequal to arista in length (fig. 4); proboscis obliquely projecting, with fleshy labella; dorsum dull brownish pollinose, about six dorsocentrals, four sets of scattered acrostichals, four scutellars; fifth ventral segment with two or three claw-like spines on each side; vestiture of abdomen rather sparse, the hairs about as long as segments; the two stiff bristles of middle trochanters of male usually fused; discal cell ending distinctly before tip of first vein, blunt, the posterior crossvein three-fourths as long as the oblique vein behind it, sections of fourth vein 1: 3 : 4, of fifth vein equal, third vein with anterior curvature, no stigma; halteres pale.

Type: Los Angeles County, California, in the United States National Museum. Coquillett's cotype series contained also the species here described as *ravus*. I have nine specimens, all from California, late March to early June, adding the following localities: Lake Elsinore, Pinehurst, Riverside, and Alpine, the last collected by the late M. C. VanDuzee.

10. Microphorus ravus Melander, sp. nov.

Female, length 2.3 mm. Third joint of antennæ equal in length to arista, slightly constricted at middle, not much longer than deep (fig. 3); proboscis not projecting, fleshy; seven dorsocentrals, about six sets of acrostichals, four scutellars, the lateral small, one subhumeral; only last segment of abdomen somewhat shining, abdominal hairs sparse, short and black; legs normal, not ciliate, hind metatarsi equal to the two following joints; wings hyaline, veins piceous, stigma half as long as intercalary vein, discal cell ending just before tip of first vein, posterior crossvein half as long as oblique crossvein, sections of fourth vein 1 : 3 : 4, of fifth vein 5 : 4; alulæ pale, with pale hairs.

Type, Los Angeles County, California, March, collected by D. W. Coquillett and identified by him as his species *ravidus*. I have taken the species at Mount Vernon, Washington, July 3, 1924, and have received it from Blue Lake, Humboldt County, California, June 20, collected by J. Chester Bradley for Cornell University.

11. Microphorus robustus Melander

Melander, 1927. Genera Insectorum, fasc. 185, p. 91.

Length 3 mm. Proboscis not projecting, fleshy; seven or eight short dorsocentrals, five acrostichals, four scutellars; vestiture of abdomen mostly shorter than segments, fourth and fifth ventrals each with a single preapical peg-like spine toward each side; penis split, the two forks slender, the lower unciform; middle femora with five or six bristles along middle part beneath, hind metatarsi two-fifths as long as tibia; stigma four times as long as wide, sections of fourth vein 1 : 3 : 4, of fifth vein 7 : 6, or equal.

Only the type series known, all males, Swarthmore, Pennsylvania, June, collected by E. T. Cresson, Jr. Holotype in the Academy of Natural Sciences of Philadelphia. A female from Atherton, Missouri, June 2, 1901, received from Dr. C. F. Adams, may prove to be this species, although more probably it represents an undescribed southern species. It has six pairs of acrostichals and seven dorsocentrals. The stigma is evanescent. The thorax is more pollinose than that of male *robustus*.

12. Microphorus strigilifer Melander, sp. nov.

Length 3 mm. Upper facets moderate; third joint of antennæ three times the basal depth, slightly shorter than arista (fig. 5); dorsum brownish pollinose, with two faint cinereous vittæ, hairs irregular and small, about four or five dorsocentrals in each row, about two sets of acrostichals, four scutellars the lateral very small; vestiture of abdomen fine, not conspicuous, as long as segments, the paired submarginal lateral hairs of ventral segments stiff, those of last three segments spinous; both forks of penis blade-like; middle trochanters with strong double spine; middle femora swollen at basal two-thirds, beneath which are four setæ, another group of three flexor setæ just beyond the middle of femur; middle tibiæ somewhat swollen beneath at middle; hind metatarsi distinctly excavated (fig. 17); wings slightly infumated, widest at third posterior cell, stigma not developed, discal cell blunt, the two apical crossveins nearly equal, third vein with anterior curvature, sections of fourth vein 1 : 3 : 4, of fifth vein 3 : 2; halteres fuscous, the tip darker.

Five males and two females, all collected by P. H. Timberlake and the author on May 25, 1935, at Forest Home, Valley of the Falls, near San Bernardino, California.

13. Microphorus sycophantor Melander

Melander, 1902. Trans. Amer. Ent. Soc. xxviii, p. 334 (*Holoclera*).

Coquillett, 1903. Proc. Ent. Soc. Wash. v, p. 263 (*Anthalia*).

Length 2.4 mm. Third joint of antennæ three-fourths as long as arista (fig. 8); proboscis short, obliquely projecting, with fleshy labella; five to seven uniserial dorsocentrals, four pairs of acrostichals, four scutellars, hairs of thorax long; fifth sternite with two bristly hairs on each side, keel of pygidium margined with a dozen radiating hairs; middle trochanters with two curved bristles; stigma narrow, two-thirds as long as intercalary vein, sections of fourth vein 1 : 2 : 3, of fifth vein subequal; halteres of male usually black, sometimes brown or even yellowish, of female yellow.

Types, Moscow, Idaho, in the American Museum of Natural History and the Melander collection. The species is widely distributed and very common locally and seasonally. I have collected and mounted over one hundred males and forty females, May in the lower valleys, June in the intermediate levels, and July in the uplands. Colorado: Estes Park. Wyoming: Thumb Station, Yellowstone Park. Idaho: Craig Mountain, Kendrick, Lake Waha, Moscow Mountain, Troy, Worley. Washington: Almota, Colfax, Ewan, Kamiac Butte, Holland, Mount Adams, Pullman, Wawawai, Yakima. Oregon: Mount Hood. California: Yosemite. Two additional specimens add to the locality record: Banff, Alberta (C. G. Hewitt) and Crede, Colorado (S. J. Hunter, August).

14. Microphorus tacomæ Melander, sp. nov.

Length 2.4 mm. Upper facets only moderate in size; third joint of antennæ short, about three-fifths as long as arista (fig. 7); proboscis not projecting; about five pairs of acrostichals, four scutellars; fifth ventral with eight to ten stiff marginal setæ, seventh tergite twisted to left side of abdomen, pygidium stout, the bulbous base of penis with a single outstanding bristle on each side; hind femora with a row of twenty oblique hairs along lower outer edge, hind tibiæ rather strong, not ciliate; stigma about half as long as intercalary vein, posterior crossvein two-fifths as long as oblique vein, sections of fourth vein 1 : 3 : 4, of fifth vein 6 : 5, sometimes subequal in female.

Type, Indian Henry Park, Mount Rainier, Washington, August 2, 1922. I have taken over one hundred specimens, the sexes evenly represented, at various stations on Mount Rainier, during late July and through August, as follows: Alta Vista, Crystal Mountain, Eagle Peak, Mazama Ridge, Paradise Park, Sluiskin Falls, Squaw Lake, Summerland, Van Trump Park and Yakima Park. I have taken the species also at Stehekin, at the head of Lake Chelan, Washington.

ON THE STATUS AND HOME OF ANTHONOMUS GRACILIPES BOHEMAN

(Coleoptera, Curculionidæ)

BY ELWOOD C. ZIMMERMAN

Bernice P. Bishop Museum, Honolulu, T. H.

The large and widespread genus *Anthonomus* has not penetrated Oceania. However, two species of the genus have been reported as inhabiting Pacific islands. One of these is *Anthonomus gracilipes* Boheman, 1859, recorded from Tahiti; the other is *Anthonomus pumilus* Montrouzier, 1860, from the Loyalty Islands. The first of these species is certainly not a Pacific insect; the second may be a Pacific insect placed in the wrong genus, but I have not seen it and do not know what it is.

Through the courtesy of Dr. A. Roman and the cooperation of the Naturhistoriska Riksmuseum of Stockholm, I have been able to examine a paratype of Boheman's species recorded from Tahiti, and the results of my study follow.

In the report on the "Voyage de L'Eugenie," Boheman described *Anthonomus gracilipes* from "Insula Taiti." When I first saw this record, I considered that the type specimens were either incorrectly labeled or that Boheman had erroneously assigned some Tahitian weevil to *Anthonomus*. An examination of a paratype has shown conclusively that *A. gracilipes* is a typical *Anthonomus*. It is therefore evident that an error was made in recording the locality of the species. Boheman said that *A. gracilipes* was similar to his *A. rubricosus*, which he described on the preceding page, from "Rio Janeiro," Brazil. This clue is perhaps sufficient in itself to show that *A. gracilipes* is a South American insect. However, without additional specimens bearing correct locality data it is not possible to tell to what locality in America the species belongs. It is sufficient to show by this report that *A. gracilipes* is American and not Tahitian. However, together with his descriptions of *A. gracilipes and A. rubricosus*, Boheman described a species from Ecuador, one from Uruguay, and one from California. At one of the American collecting points of the cruise, *A. gracilipes* was collected. We should, therefore, transfer *Anthonomus gracilipes* Boheman to the American fauna (I believe South American) and thus remove another ambiguity and misleading record from the Oceanic coleopterous fauna. The species is redescribed below.

ANTHONOMUS GRACILIPES Boheman

Boheman, Eugenies Resa, p. 132, 1859.

Male: derm brownish yellow to reddish brown, the sternum somewhat darker than the elytra, appendages paler; densely clothed with white squamæ.

Head reticulate, bare on the crown near the pronotum, densely clothed elsewhere with elongate, slender, anteriorly directed squamæ borne from small, closely placed punctures; front slightly but distinctly flattened, with a small shallow median fovea on a line between the hind margins of the eyes; interocular area slightly narrower than the base of the rostrum (5:6), densely squamose; eyes as broad as the interocular area and distinctly longer than broad (7:5), distinctly and abruptly protruding from the sides of the head at their hind edges. *Rostrum* gently and evenly arcuate, about as broad as high at the base, slightly expanded from base to apex on the sides (base 5, apex 7), about one and three-quarter times the length of the pronotum; antennæ inserted at about the apical three-eighths, shallowly, subobsoletely sulcate from the base to the insertion of the antennæ, with slender setæ or setiform, prostrate, mostly medially inclined squamæ arising from shallow punctures in the sulci; densely, shallowly, subconfluently punctate, shiny and apparently bare beyond the antennæ. *Antennæ* with the small clavus of the scape hardly reaching past the fore corner of the eye, the clavus bearing a few hairs; scape with segment one about one-fourth longer and about twice as broad near the apex as the apex of two, two three times as long as broad and about one-third longer than three, three about as long as four, four to seven successively slightly shorter and broader, seven about as broad as long; club as long as the preceding five and one-half segments, distinctly four-segmented, the sutures between the segments well marked, the first two segments subequal in length, three about one-third shorter than two, four acutely pointed. *Prothorax* distinctly broader than long (3.1:2.3), broadest near the base; very slightly arcuate on the sides from the base to the middle and thence shallowly, concavely narrowed to the apex, apex truncate, two-thirds as broad as the base, the longitudinal dorsal contour almost evenly convex, but slightly depressed between the middle and the apex; densely and coarsely punctate, the interstices narrower than the punctures and giving a reticulate appearance, their surfaces smooth and shiny, the punctures becoming smaller anteriorly; densely squamose throughout, the squamæ arising from the punctures, narrow, sublanceolate, each two to four times as long as broad, prostrate, directed anteriorly. *Scutellum* strongly convex, distinctly protuberant, about one-fourth longer than broad, densely and finely squamose. *Elytra* about two-thirds as broad as long,

slightly more than three times as long as the prothorax, base only slightly convex on either side of the scutellum, distance across the base one-fourth greater than the base of the prothorax, slightly arcuate on the sides to the broadest part at the apical third, thence broadly rounded to the apex and very slightly or not subapically constricted; longitudinal dorsal contour strongly and evenly convex, rising far above the level of the pronotum and reaching the summit at or slightly before the caudal third; striæ shallow, with shallow punctures bearing microscopical setæ; intervals slightly broader than the striæ, finely alutaceous, shiny; the posterior calli very low and broad, not conspicuous; densely and evenly clothed with squamæ similar to but slightly smaller than those on the pronotum, not arranged in any design. *Legs* with the femora loosely clothed with narrow squamæ, the fore pair armed with a conspicuous, sharp, acute, triangular tooth at about the apical third, the middle pair armed with a small tooth, hind pair with an inconspicuous, minute, subobsolete tooth; tibiæ slender, setose, the fore and middle pair almost straight on the outer side, except for the basal arcuation, sinuous on the inner side, strongly unguiculate, hind pair rather stoutly mucronate; tarsi with the claws bifed, the inner teeth converging, contiguous distally, almost as long as the outer teeth. *Sternum* with the prosternum and coxæ densely squamose, the fore coxæ contiguous, the postcoxal and antecoxal areas equal in length; mesosternum and coxæ densely squamose, the triangular intercoxal process most densely squamose, the mesocoxæ slightly less than one-half as broadly separated as the breadth of a coxa; metasternum finely punctate, densely squamose, evidently somewhat more loosely so toward the median line, as long between the mid and hind coxæ as the length of the first ventrite along the median line, metacoxæ separated about as far as the breadth of a mesocoxa. *Venter* finely and obscurely punctate, coarsely hirsute; intercoxal process of the first ventrite subtruncate; ventrite I shorter than II plus III. *Pygidium* convex, finely punctate, hirsute. Length: 2.25 mm., excluding the head and rostrum; breadth: 1.1 mm.

The paratype at hand bears the labels "Taiti" and "Kinb."

If this were a North American species, it would be placed in the "squamosus" group of the genus. Unfortunately, I do not have access to a collection of South American *Anthonomus* with which to compare this species and cannot, therefore, place it as an ally of any of the South American species or give a synopsis of diagnostic characters whereby it may be distinguished from them.

A NEW TRIATOMA FROM LOWER CALIFORNIA

(Hemiptera, Reduviidæ)

BY ROBERT L. USINGER

University of California, Davis

Triatoma peninsularis Usinger, new species

Closely allied to the polytypic *protracta* complex but much smaller than *woodi*, the smallest form of that group, and with the head evenly convex above throughout its length, not impressed at base of tylus.

Head twice as long (excluding constricted neck region) as broad across eyes, 23::11½; anteocular portion twice as long as postocular portion to posterior constriction, 13::6½; antenniferous tubercles reaching two-fifths of the distance from eyes to apex of head; tylus narrow anteriorly, broadened well before level of insertion of antennæ and uninterruptedly continuous with vertex, there being no depression at the sides or base of the tylus; surface covered with distinct pits. *Eyes* small, shorter than postocular portion of head, 4½::5, and about one-fourth the width of interocular space. *Antennæ* three-fourths as long as head and pronotum together, 35::47; proportion of segments one to four as 4½:12:9½:9; first segment reaching a little more than half the distance to apex of head. *Rostrum* relatively slender, about half as wide at base of second segment as thickness of front femora; ratio of segments one to three as 8½:12:5½; apex beset with fine, erect bristles. *Pronotum* shorter than head, 21::26; broader than long, 28::21; and less than half as wide at anterior margin as across humeri, 13::28; antero-lateral angles scarcely produced, appearing as rounded lobes; sides feebly carinate and moderately sinuate; disk unarmed, rugose and with scattered small pits, especially on elevated regions. *Scutellum* about half as long as pronotum, 11::21, and broader at base than long, 14::11; disk sloping laterally from two posteriorly converging longitudinal carinæ, transversely rugose; posterior prolongation comprising less than half of the scutellar length, 5::11, broad at base and subacute and downwardly directed at apex. *Hemelytra* and *connexivum* as in *protracta*. *Under surface* smooth and polished, with very minute, scattered, pale hairs; thoracic pleurites transversely rugose; mesosternum with an ill-defined, rugose knob or elevation just behind front coxæ followed by a generally elevated area; metasternum strongly narrowed anteriorly so as to appear subpentagonal in outline, sublaterally feebly compressed on posterior half producing a rounded median longitudinal carina. Abdominal venter rather evenly rounded except for the compressed, subangular first seg-

ment. *Legs* rather short and stout, the front femora slightly more than one-fourth as thick as long, 5½::20; front and middle femora each with four very small, blunt spines subapically beneath, the hind femora inermous. Female genital plates strongly declivous, almost vertical, beset with erect ferrugineous bristles.

Color dark brown, the apical two antennal segments, tarsi and joints of the legs, base along labrum and apex of rostrum, metasternum at least anteriorly and transverse sutures of the connexivum pale, testaceous to fulvous. Eyes silvery black. Ocelli clear white,

Size: male, length 10.9 mm., width (pronotum) 2.54 mm., (connexivum) 3.54 mm.; female, length 11.36 mm., width (pronotum) 2.65 mm., (connexivum) 3.54 mm.

Holotype, male, No. 4973, Mus. Calif. Acad. Sci., Ent., and allotype, female, in my own collection, taken 20 miles northwest of La Paz, Lower California, Mexico, on July 16, 1938, by A. E. Michelbacher and E. S. Ross to whom I am indebted for these interesting specimens.

The closely allied *protracta* differs from *peninsularis* as follows: Head a little more than twice as long (excluding constricted neck region) as broad across the eyes, 34::15; a slightly arcuate transverse impression at base of tylus; head scarcely longer than pronotum, 35::33; mesosternal elevation well defined, transversely arcuate, being abruptly depressed and flat on the concave posterior side; metasternum not strongly narrowed anteriorly; first abdominal segment not strongly compressed between hind coxæ, rather evenly rounded; female genital plates deflected downward from the main dorsal axis of the body about 45°; size (*woodi*) 15-16 mm., (California *protracta*) 17-18 mm., (New Mexico and Colorado *protracta*) 22 mm.

Dineutus in California

(Coleoptera, Gyrinidæ)

A year or two ago, Mr. J. J. du Bois of Berkeley, California, gave me four specimens of *Dineutus* labelled "Mecca, Cal., VII. 15.34." Unfortunately the collector's name is unknown. The beetles are *Dineutus solitarius* Aubé, described from Mexico. It would be interesting to verify this Californian record by further collecting at Mecca, which is in Riverside County, just north of the Salton Sea.—Hugh B. Leech, Vernon, B. C.

RECORDS OF SOME COLEOPTERA FROM THE SAN JACINTO MOUNTAINS, CALIFORNIA

BY E. G. LINSLEY AND E. S. ROSS

University of California

During the latter part of May and June of 1939, the Division of Entomology of the University of California held a summer field course in the San Jacinto Mountains of southern California. A large number of interesting insects were collected in this area and since many of them were new, they will be described elsewhere. Among the rare or interesting previously described Coleoptera, the following seem worthy of special record:

Cupesidæ. A number of specimens of the rare *Cupes lobiceps* LeConte, the habits of which are apparently unknown, were taken at Piñon Flats in the early evening of May 22 by sweeping miscellaneous low herbage in an open, arid flat.

Melasidæ. More than twenty examples of the striking beetle *Palæoxenus dohrni* (Horn), previously known from but a few, scattered localities, were taken in the vicinity of Idyllwild, mostly under bark of old stumps of *Libocedrus decurrens.* At least one additional specimen was seen flying at dusk.

Buprestidæ. *Acmæodera latiflava* Fall is generally treated as a variety of *A. hepburni* LeConte. However, in a series of more than 500 examples taken at Piñon Flats there was no indication of intergradation with the LeConte species. The majority of the specimens were taken under very arid conditions at flowers of *Sphæralcea ambigua.* When the latter ceased to bloom, they were found on *Eriogonum*, *Encelia*, *Yucca*, and *Eriodictyon.* In view of the constancy of *latiflava* and the widely different conditions under which it is found (as compared to *hepburni*) it seems probable that it should be considered as a distinct species. *Pœcilonota bridwelli* Van Dyke, a rare species originally described from Imperial County, California, was taken on flowers in a canyon near Palm Springs. Another buprestid, *Chrysobothris quadrilineata* LeConte, previously known from New Mexico and Arizona, was found on *Juniperus californicus* at Piñon Flats.

Coccinellidæ. A series of the rare, black, *Coccinella prolongata bridwelli* (Nunenmacher) was taken at the type locality (Tahquitz Meadow) in colonies of *Aphis lupini* Gillette and Palmer on a small perennial lupine. Although the host plant of the aphid was very abundant, colonies of the insect were very scarce and were mostly found at or below the ground level. The beetle was found with but a small percentage of the colonies. According to E. O. Essig, who very kindly made the determination, the aphid has not been previously recorded from California. Another rare ladybird, *Hippodamia lunato-maculata lengi* Johnson, was taken in numbers on *Sphæralcea ambigua* at Piñon Flats.

Scarabæidæ. The rather uncommon *Valgus californicus* Horn was found in several localities in the Transition Zone in association with *Zoötermopsis* spp. under bark of *Pinus ponderosa* stumps.

Cerambycidæ. At Palm Springs, *Stenodontes* (*Nothopleurus*) *lobigenis* (Bates) was noticed causing rather severe injury to pepper trees along the streets. The larvæ mined in the heartwood and over a period of years have succeeded in hollowing out a large proportion of the trees. The weakened trees suffer severely from wind damage. Most of the boring is in the basal six feet of the trunk, and adults were found resting in the openings of their emergence holes in June. The flower-loving longicorn, *Anoplodera* (*Judolia*) *instabilis* (Haldeman), was abundant in the higher valleys on lupine, but the individuals represented a black phase similar to that found in the southern Rocky Mountains. Practically all of the males and the majority of the females taken were wholly black, the remainder being much darker than those found in the Sierra Nevadas and farther northward. A related but much rarer species, *Anoplodera* (*Judolia*) *scapularis* Van Dyke was found in large numbers on flowers of *Sphæralcea ambigua* at Piñon Flats. Another rare species, *Molorchus eburneus* Linsley, previously known by single specimens from Yosemite and Lake Tahoe, was found on *Abies concolor* on the Tahquitz Peak Trail.

COCOON-SPINNING THYSANOPTERA

BY STANLEY F. BAILEY

University of California, Davis

Among recent findings arising from studies of thrips, there is one of particular interest from the standpoint of the phylogeny of the order Thysanoptera. This fact is the discovery of the cocoon-spinning capacity. Kurdjumov (1913) was the first to report this habit, as observed in the larva of *Æolothrips fasciatus* (L.) in Russia. Secondly, unaware of Kurdjumov's finding, Reijne (1919-20) described the same habit in *Franklinothrips tenuicornis* Hood in Dutch Guiana (Paramaribo). Lastly, Karny (1926) described the same characteristic in an *Anaphothrips* species in Java (Buitenzorg).

In the spring of 1932 at Alhambra, California, the writer reared *Æolothrips kuwanaii* Moulton in the laboratory and discovered that it spins a cocoon for pupation. This observation is the first report of this habit among thrips in North America. Since this first observation, the writer has reared *Æolothrips fasciatus* (L.) and has confirmed Kurdjumov's finding. These two species have spun their cocoons in curled leaves of alfalfa in vials in the laboratory. In both instances the "silk" came from the anal end of the body and the cocoons were formed by the twisting and turning of the abdomen. The cocoons are not uniform in shape, but usually oval. The "silk" itself varies in diameter.

In addition to these species, three others, in two different æolothripid genera have a similar habit, namely, *Orothrips kelloggii* Moulton, *Ankothrips yuccæ* Moulton, and *Ankothrips gracilis* Moulton. All these species secreted the "silk" from the anus* and formed their cocoons in soil in vials in the laboratory. The cocoons have not yet been found in the field as considerable time and patience is necessary to locate them.

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*Snodgrass (1938) states "the Malpighian tubules of certain insects are known to produce just before the time of pupation a substance which is spun out of the anus in the form of silk threads, with which the cocoon is woven. This silk-forming function of the larval Malpighian tubules has been described in the neuropterous species *Mermeleon formicarius* and *Chrysopa perla*, in the curculionid *Phytonomus arator*, and in the chalcid *Euplectrus bicolor*." This is apparently the case also in these thrips.

In the spring and early summer in California, æolothripids are very abundant and by midsummer they have largely disappeared. Only occasionally is a specimen of *Æolothrips* collected during the hot, dry period. However at higher elevations they are to be seen during July and August. *Orothrips*, *Ankothrips*, and *Erythrothrips* in California have only one generation a year and, as far as is known to the writer at present, are all plant feeders. In view of the fact that *Æolothrips fasciatus* and *kuwanaii* (both of which are predaceous) are present over a longer period, it would seem probable that they have two generations (Kurdjumov found two generations in *fasciatus*). Insufficient observations have been made on *Dactuliothrips* (their larvæ have not thus far been collected) to make any definite statement, although the members of this genus almost certainly have the same type of life history as the other æolothripids in this area. *Melanthrips* does not occur in North America. European records of this latter genus do not mention the pupal stage; the pupa of the very common *M. fuscus* (Sulzer) is unknown. The collection dates, however, indicate that the seasonal history of *Melanthrips* (and *Rhipidothrips*) species is the same as *Æolothrips*. Biological data concerning the members of the fourteen other æolothripid genera are unknown.

In the Thripoidea and related groups of Terebrantia the genus *Anaphothrips* is the only one reported up to this time to exhibit the cocoon-spinning capacity. The species mentioned by Karny is unknown and to the writer's knowledge the generic identification was not based on adults. During the spring of 1939 the writer reared large numbers of a *Heterothrips* collected from wild grape flowers, which spun cocoons. This species has only one generation a year. The well-known pear thrips, *Tæniothrips inconsequens* (Uzel), has a life history (one generation a year) similar to the æolothripid genera *Ankothrips*, *Orothrips*, etc.—at least those known in California. It is to be noted that the larva of *T. inconsequens* (while not spinning a cocoon) forms an earthen cell with the tip of the abdomen. From intensive collecting and field observations, it is surmised that *Odontothrips loti* (Hal.) and *Oligothrips oreios* Moulton, each with one annual generation only, either spin cocoons or form a protective cell in the soil beneath their hosts.

When the above-mentioned species (with the exception of *Anaphothrips*) are examined one is impressed by the fact that they all have tarsal or tibial hooks, or projections on the head or antennæ. This is also true of *Merothrips* species concerning which no life history data are available.

From these observations, incomplete as they are, it would appear that the Terebrantia (or at least certain known species which spin a cocoon or form an earthen cell) have developed (or retained) hooks or other anterior projections. These projections doubtless are used in aiding the adult to emerge and are not to be confused with the raptorial function. Also, a generalization which appears to be indicated by these facts is that the cocoon-spinning capacity is a characteristic of the æolothripids and has been retained by certain thripoid representatives which have one generation annually. As further biological data is obtained on additional species and new forms are described, the relationship of the higher groups of the Terebrantia may become more evident.

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NOTES ON SOME CICINDELIDÆ

(Coleoptera)

BY RICHARD G. DAHL

Oakland, California

Since the appearance of the description of *Cicindela willistoni* subsp. *amargosæ* Dahl[1], several specimens of this form have been collected far from the type locality. It seems desirable at this time to record this increase in range as well as to sepa-

[1]Dahl, R. G., 1939, Bull. Brook. Ent. Soc., 34 : 221-222.

rate the subspecies from another distantly related form which, however, may be confused with it.

Two specimens in the M. A. Cazier collection were collected by Ira La Rivers at Reno, Nevada, in October, 1939. This is approximately 275 miles from the type locality. On May 29, 1939, P. C. Ting, M. A. Cazier, J. A. Downes and T. Aitken, collected eighteen specimens of *amargosæ* on saline flats at Gerlach, Washoe County, Nevada. And, on May 30, 1939, the same collectors collected five specimens at Cedarville, Modoc County, California. This increases the distance from the type locality, at Furnace Creek, Death Valley, California, to approximately 400 miles; the distance being measured directly between the two points. This known distribution places it as a likely representative of the Great Basin group, as outlined by M. A. Cazier[2] in his review of the *willistoni*, *fulgida*, *parowana*, and *senilis* groups.

The specimens from Gerlach, Nevada, vary slightly from those in the type series in that they are more cupreus. One dark blue-green specimen tends to grade into specimens from Cedarville, California, which are dark purple and coal black. The specimens from Reno, Nevada, are entirely coal black, except for white apical elytral spot.

The appearance of the black form at once suggests *Cicindela plutonica* Csy. However, *amargosæ* is readily separable from it by the following characters.

In *amargosæ* the labrum is faintly toothed and in all examples available is white. The maxillary palpi vary from glabrous to very sparsely pilose. The black form is sericeous black. The apical spot is wide and always present. The middle transverse band is never present. There is a distinct subsutural row of foveæ turning outward apically and joining with a row of distinct marginal foveæ.

In *plutonica* the labrum is distinctly toothed, and in a majority of the examples studied is black. The first joint of the maxillary palpi is densely pilose, the rest sparsely pilose. The elytra are dull black, with the apical spot thin or almost lacking. The middle transverse band is distinct or indistinct, but always present. There is a faint subsutural row of foveæ, but no marginal foveæ.

[2]Cazier, 1936, Bull. So. Calif. Acad. Sci., 35: 156-163.

A PRELIMINARY STUDY OF THE SUBGENUS LEPTOCHILUS IN NORTH AMERICA

(Hymenoptera, Vespidæ)

BY RICHARD M. BOHART

University of California, Los Angeles

The small and commonly red marked *Odynerus* of the subgenus *Leptochilus* are abundantly represented in North America, where the majority of the species are found in the arid regions of the southwest. However, they are scarce in collections because of their small size and unobtrusive habits. In a previous paper[1] I outlined the characters of the subgenus and redescribed an eastern species, *republicanus* D. T. The North American *Leptochilus* can be divided into about a dozen well defined species groups on the basis of structural characters. The present paper includes five of these groups and the others will be treated at a later date.

Much of the material used in the preparation of this paper was obtained through the cooperation of the U. S. National Museum, Museum of Comparative Zoology at Harvard, California Academy of Sciences, Academy of Natural Sciences at Philadelphia, University of Kansas, Washington State College, Oregon State Agricultural College, Colorado State College, and Pomona College. Individuals who were of greatest assistance through loan or donation of specimens were J. Bequært, P. H. Timberlake, G. E. Bohart, E. G. Linsley, and C. D. Michener.

My attention has been called by Jos. Bequært to the correct dates of *Leptochilus* and *Parodynerus* which I previously cited as 1852 and 1856.

Genus ODYNERUS Latreille, subgenus LEPTOCHILUS Saussure.

Leptochilus Saussure, 1853. Etud. Fam. Vesp., 1:233.

Parodynerus Saussure, 1855. Etud. Fam. Vesp., 3:245.

Microdynerus Thomson, 1874. Scandinaviens Hymenoptera, 3:58.

Zendalia Robertson, 1928. Flowers and Insects, p. 12.

KEY TO THE RUFINODUS GROUP

1. Pronotal angles projecting strongly outward and forward; first abdominal tergite almost invariably red marked; female clypeus

[1]Bohart, R. M., Notes on Odynerus with a key to the North American subgenera and description of a new subgenus. Pan-Pac. Ent., 15:97-104, July, 1939.

and mandibles of both sexes usually for the most part black; distance between apical teeth of male clypeus as great as length of third antennal segment (Pacific Slope) ..... *rufobasilaris*

–. Pronotal angles not strongly projecting forward and outward; distance between apical teeth of male clypeus less than length of third antennal segment 2

2. First tergite light red except at apex (first tergite very rarely black), pale markings whitish, mandibles usually reddish, first two tergites of female and first three of male usually apically banded (western U. S.) ..... *rufinodus*

–. First tergite black and yellow, or marked with dark reddish; pale markings often tending toward orange 3

3. Black and pale yellow; first five abdominal tergites (at least) apically banded (Arizona) ..... *trachysomus*

–. Markings tending toward orange; first and second tergites (at most) apically banded ..... *republicanus*

This group may be distinguished by the following sum of characters: The postscutellum has a distinct sharp transverse crest, the female mandible is four toothed, the inter-ocellar area has two oblique swellings, and the second sternite is more than twice as broad as long but lacks a basal median suture.

The four North American species may also be separated on the basis of the male genitalia as figured.

Odynerus rufinodus Cresson

Odynerus rufinodus Cresson, 1868. Tr. Amer. Ent. Soc., 1:181 (holotype, female, A.N.S.P.).

I have seen specimens from Texas, New Mexico, Kansas, Colorado, Utah, Wyoming, Arizona, and California. A rare form with black instead of red on the first tergite is known to occur with the red forms in Texas, Wyoming, and California. The subapical hooks of the male ædeagus project sharply backward in contrast to those of *rufobasilaris*. The parameres are similar to those figured for *republicanus*.

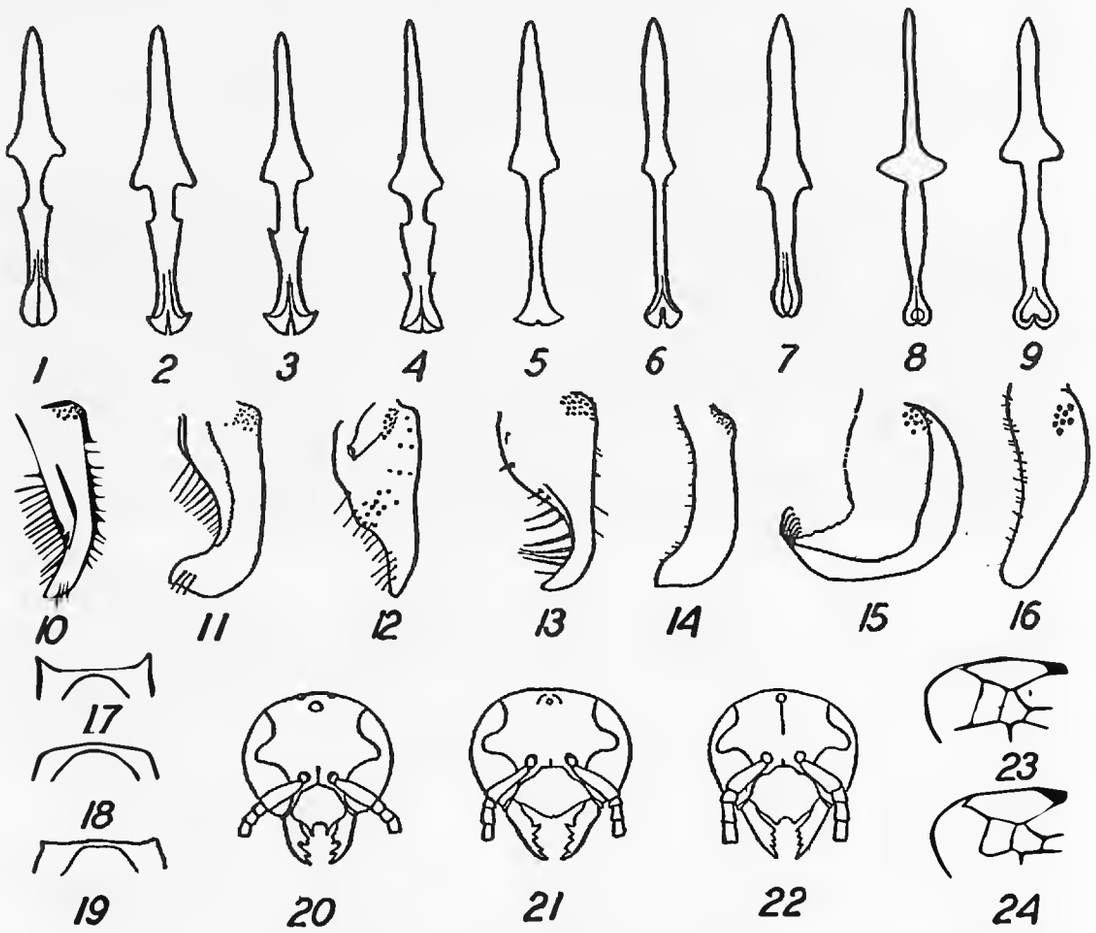
Odynerus rufobasilaris Ashmead

Odynerus rufobasilaris Ashmead, 1896. Psyche, 7:335 (types, U.S.N.M.).

Odynerus bruesi Cameron, 1909. Pom. Jour. Ent., 1:81.

This species is widespread in California where I have seen specimens from Siskiyou, Shasta, Trinity, Tahoe, Tuolumne, Mariposa, Sonoma, Kern, Los Angeles, Riverside, and San Bernardino counties. I also have a record from Grand Coulee, Co-

lumbia River, Washington, July 12, 1902. Northern specimens sometimes have the first tergite black instead of reddish. The projecting pronotal angles are diagnostic. The male parameres are similar to those figured for *republicanus.*



North American species of *Odynerus,* subgenus *Leptochilus.* Top row, dorsal view of ædeagus of: 1, *republicanus*; 2, *rufobasilaris*; 3, *rufinodus*; 4, *trachysomus*; 5, *erubescens*; 6, *rubicundulus*; 7, *lissosomus*; 8, *tylocephalus*; 9, *minutissimus.* Middle row, dorsal view of right paramere of: 10, *republicanus*; 11, *trachysomus*; 12, *erubescens*; 13, *rubicundulus*; 14, *lissosomus*; 15, *tylocephalus*; 16, *minutissimus.* Bottom row, left, front margin of female prothorax from above of: 17, *rufobasilaris;* 18, *erubescens*; 19, *rubicundulus*; center, front view of male head and basal antennal segments of: 20, *lissosomus*; 21, *trachysomus*; 22, *minutissimus*; right, apical portion of female anterior wing of: 23, *erubescens*; and 24, *monotylus.*

Odynerus republicanus Dalla Torre

Leptochilus ornatus Saussure, 1853. Etud. Fam. Vesp., 1:233 (nec Smith).

Odynerus republicanus Dalla Torre, 1889. Wien. Ent. Zeit., 8:125.

Odynerus zendaloides Robertson, 1901. Tr. Amer. Ent. Soc., 27:202.

I have seen specimens from South Carolina, Virginia, New Jersey, New York, Massachusetts, Ohio, Missouri, Texas, Kansas, Colorado, and Nebraska. Southern specimens usually have the first abdominal tergite marked with red. Northern specimens have this tergite either very dark red or black. It is the latter variety that Robertson named *zendaloides*.

Odynerus trachysomus Bohart, new species

Male. Black; clypeus, first antennal segment in front, anterior margin of pronotum except at middle, tegula except central spot, mesopleural spot, two spots on scutellum, front femur and all tibiæ partly, apical margins of first six tergites and second sternite, ivory yellow; mandible apically, tarsi, wing veins and clouded area along front wing margin, brownish. Pubescence of clypeus very short, sparse, and silvery; that of rest of body obscure, dull silvery. Puncturation coarse and moderately dense, punctures of head and thorax mostly less than a puncture diameter apart, front face of pronotum sparsely punctured, first two tergites with smooth apical margins bordered inwardly by a zone of very large punctures. Head cubicle; mandible four-toothed, the basal tooth large and sharp; antennal hook somewhat flattened, reaching to apex of tenth segment; clypeus strongly convex, minutely incised apically; oblique inter-ocellar tubercles prominent. Pronotal angles about 90 degrees, projecting slightly forward and outward; postscutellum sharply carinate, propodeum untoothed above. First two tergites raised apically; second tergite twice as broad as long and with a broad basal concavity; ædeagus abruptly inflated apically and with a sharp pair of subapical hooks visible in dorsal view. Length to apex of second tergite, 9 mm.

Female. Markings, pubescence, and puncturation about as in male with exceptions as follows: Clypeus yellow at base only, first five tergites apically banded. Mandibles stout, short, and four-toothed; clypeus minutely incised apically; third antennal segment one and one-half as long as second; second sternite two and one-half times broader than its median length; length to apex of second tergite, 9 mm.

Holotype, male, Santa Rita Mts., Ariz., July 17, 1932 (R. H. Beamer); allotype, female, Santa Rita Mts., Ariz., June (F. H. Snow). Paratypes, three females, Baboquivari Mts., Ariz., Aug., 1924 (O. C. Poling). Holotype and allotype to be returned to the University of Kansas, paratypes in collections of the California Academy of Sciences and the author.

Readily recognizable by its more extensive and ivory colored markings. From *republicanus*, its nearest ally, *trachysomus* also differs in the structure of the male genitalia.

Tylocephalus Group

The two North American species comprising this group are distinguished by having a single swelling on the vertex between the posterior ocelli. Also, the second sternite has the median basal suture faint or absent, there is a small sharp tubercle between and above the antennal bases, the propodeum is untoothed, the postscutellum is sharply crested, the female mandible is four-toothed, and the middle femur of the male is depressed beneath toward the base. The group is represented in Central and South America by several species among which is *acolhuus* Saussure.

Odynerus tylocephalus Bohart, new species

Black; top of mandible, first two antennal segments, prothorax, tegula, mesopleural spot, scutellum and postscutellum, propodeum mostly, legs, first abdominal segment, apical border of second segment, reddish yellow to reddish; wings dark smoky, hind wing apically spotted. Pubescence pale and short except for a single apical row of long hairs on sternites three to six in male and three to five in female. Body closely and coarsely punctured, less so on abdomen. Third antennal segment shorter than fourth; hook of male antenna small, flattened, reaching about half the length of eleventh segment; mandible four-toothed in both sexes; clypeus of male about as long as broad, angularly incised between apical teeth; clypeus of female broader than long; tubercle of vertex dulled by minute punctures; pronotal angles sharp and slightly obtuse as seen from above; middle femur of male contorted, depressed beneath before the middle; third submarginal cell of fore wing almost as broad as high; first abdominal tergite raised apically; ædeagus as figured; parameres with a row of bristles apically and rows of thick short setæ along inner side basally; length to apex of second tergite, male 6 mm., female 6.5 mm.

Holotype, male, and allotype, female, Palm Beach, Florida (C. F. Baker collection). Seventeen paratypes from the following localities in Florida: Palm Beach, Sanford, Coconut Grove, Fort Mead, Upper Matecumbe Key, Lower Matecumbe Key, Bradentown, Miami, Key Biscayne, Cape Sable road, Key Largo, and Paradise Key; one paratype from Jekyl Island, Georgia. Holotype and allotype to be returned to the U. S. National Museum, paratypes in the collections of the California Academy of Sciences, Museum of Comparative Zoology at Harvard, University of Kansas, Washington State College, J. Bequært, and the author.

In general appearance *tylocephalus* resembles two other species from Florida which belong, however, to the subgenus *Stenodynerus*. These are *histrio* Lepeletier and *anacardivora* Rohwer. The tubercle of the vertex and the lack of pronotal pits easily differentiate *tylocephalus*.

Odynerus monotylus Bohart, new species

Male. Black; clypeus, first antennal segment in front, front margin of prothorax, mesopleural spot, band across scutellum, tibiæ and tarsi partly, apical margins of first tergite and second segment of abdomen, yellow; tegula reddish; wings dark stained, slightly violaceous, hind wing spotted apically, pubescence pale and short except for rows of long hairs on apices of third to sixth sternites. Puncturation coarse and close, becoming finer on abdomen. Third antennal segment shorter than fourth; antennal hook small, flattened, reaching about half the length of eleventh segment which is concave beneath; clypeus almost as long as broad, roundly incised between apical teeth; tubercle of vertex dulled with minute punctures; pronotal angles sharp and slightly obtuse as seen from above; middle femur contorted, depressed beneath before the middle; third submarginal cell of fore wing almost as broad as high; first abdominal tergite raised apically; ædeagus and parameres about as figured for *tylocephalus*, parameres with a row of bristles apically and rows of thick short setæ along inner side basally; length to apex of second tergite, 6.5 mm.

Female. General characters about as in male except as follows: Clypeus black, markings of head and thorax tending toward red, apex of third tergite yellow-banded. Length to apex of second tergite, 6.5 mm.

Holotype, male, Chatsworth, New Jersey, July 6, 1935; allotype, female, South Hill, Virginia, June 2, 1917. Eighteen paratypes from the following localities: Stony Brook reservation, Massachusetts; Fort Lee and Alpine, New Jersey; Long Island and Millwood, New York; South Hill, Virginia; Black Mt., North Carolina; Greenville, South Carolina; Atlanta, Georgia; Mobile, Alabama; Fedor, Mineola, Cameron Co., New Braunfels, and McDade, Texas; Tempe, Arizona; mountains near Claremont, California. Holotype and allotype to be deposited in the California Academy of Sciences, paratypes in the collection of U. S. National Museum, Museum of Comparative Zoology at Harvard, University of Kansas, Pomona College, J. Bequært, and the author.

The entirely different markings of *monotylus* should differentiate it from *tylocephalus*. Structurally the two appear to be practically identical. Some specimens of *monotylus* have more of the abdominal segments banded. Also, the hind margin of the prothorax may be partially yellow-bordered.

Minutissimus Group

So far this group is known only from a single species which contains the smallest specimens of *Odynerus* that I have seen. It is structurally similar to the *tylocephalus* group but lacks the tubercle of the vertex, the sharp tubercle between the antennal bases, and the depressed middle femur of the male, as well as possessing a different type of male genitalia.

Odynerus minutissimus Bohart, new species

Black; clypeus in male and basal spot of clypeus in female, apex of male antenna beneath, prothorax in front, tegula, mesopleural spot, band across scutellum, legs partly, apical bands on first tergite and second segment of abdomen, pale yellow; wings smoky and slightly violaceous, apical cell dark. Pubescence short, sparse, and silvery; apical abdominal segments fringed with moderately long hairs. Puncturation moderate, punctures mostly about one puncture diameter apart, apices of first two tergites smooth. Third and fourth antennal segments subequal; male antennal hook reaching base of eleventh segment; clypeus almost as long as broad, shallowly excavated apically; pronotal angles moderate, obtuse; first tergite, and second sparingly, raised apically; second sternite more than twice as long as broad; genitalia as figured; length to apex of second tergite, male 4 mm., female 5 mm.

Holotype, male, Indio, Riverside Co., Calif., Apr. 7, 1936, at mesquite flowers (P. H. Timberlake); allotype, female, Palm Springs, Riverside Co., Calif., Apr. 15, 1938 (G. E. and R. M. Bohart). Eighteen paratypes from the following localities in California: The Narrows, San Diego Co.; Whitewater, Andreas Canyon, Palm Springs, Indio, Mecca, Dos Palmos, and Shavers Well, Riverside Co.; Furnace Creek (Death Valley), Inyo Co. One female paratype, Glendale, Nevada, June 15, 1930, on *Covillea tridentata* (E. W. Davis). A single specimen in my collection bears the data, Arizona (C. F. Baker). Holotype and allotype to be deposited in the California Academy of Sciences, paratypes in the collections of U. S. National Museum, J. Bequært, P. H. Timberlake, E. G. Linsley, and the author.

Lissosomus Group

The structural characters given for *minutissimus* for the most part apply here also. However, this group has the second tergite broader than long and the puncturation of the body exceedingly fine. In addition to the single species of the group in North America, I have seen two European species, *timidus* Saussure and *nugdunensis* Saussure, which definitely belong to it. The former can hardly be separated specifically from *lissosomus* but is somewhat more heavily punctured.

Odynerus lissosomus Bohart, new species

Male. Black; mandible except for reddish apex, flagellum beneath, prothorax in front, tegula, mesopleural spot, spots on scutellum, legs partly, apical bands on abdominal tergites and second and third sternites, pale whitish yellow; flagellum above, apex of mandible, scutellum mostly, postscutellum, propodeum except superior face, legs partly, first two abdominal segments mostly, other segments partly, reddish; wings slightly smoky. Pubescence short, sparse, and silvery. Body minutely punctured, appearing smooth except under high magnification. Clypeus very deeply and roundly incised apically; mandible deeply notched between second and third teeth, antennal hook minute, reaching half the length of eleventh segment; pronotal angles moderate, obtuse; first abdominal tergite somewhat raised apically; ædeagus short, with a thick neck, cleft apically; parameres paddle-shaped and almost hairless, ending far below apex of ædeagus; length to apex of second tergite, 5 mm.

Female. Markings, pubescence, and puncturation about as in male with the following exceptions: Clypeus black except at base; mandible, antenna beneath, prothorax mostly, mesopleuron partly, reddish; third and following abdominal segments dark brown. Mandibular teeth regular, clypeus with a small apical incision; length to apex of second tergite, 5.5 mm.

Holotype, male, Palm Springs, Riverside Co., Calif., Apr. 24, 1938 (P. H. Timberlake); allotype, female, Riverside, Riverside Co., Calif., Apr. 11, 1934, on *Eriogonum fasciculatum* (P. H. Timberlake). Paratypes, one male and six females, Claremont, Los Angeles Co., Calif. (C. F. Baker); one female, Palm Springs, Riverside, Co., Calif., Apr. 16, 1939 (R. M. Bohart); one male, Mt. Diablo, Contra Costa Co., Calif., Apr. 24, 1937 (G. E. and R. M. Bohart). Holotype and allotype to be deposited in the California Academy of Sciences, paratypes in the collections of Pomona College, P. H. Timberlake, and the author.

ERUBESCENS GROUP

This group may be recognized by the following combination of characters. The second sternite may or may not have a crease-like basal median suture, the postscutellum is sharply crested, no inter-ocellar or vertex tubercles are present, the horizontal portion of the first tergite is sparsely punctured and shining, the second abdominal sternite is broader than long, the female mandible is four-toothed, and the middle femur of the male is normal. Only two species of the group are known at present.

Odynerus erubescens Bohart, new species

Male. Black; clypeus, first antennal segment in front, front margin of prothorax, tegula mostly, legs partly, apices of first tergite and second to sixth abdominal segments, whitish yellow; antenna apically, propodeum, legs partly, first abdominal segment mostly, red; wings brown stained, especially in apical cell. Pubescence short and silvery. Puncturation of head and thorax moderate, punctures separated by about one puncture diameter; clypeus hardly punctured; puncturation of abdomen fine, heaviest toward apex of second tergite. Clypeus much broader than long, roundly incised between the tiny apical teeth, width of emargination less than length of fifth antennal segment; mandible evenly four-toothed; antennal hook slender, sharply pointed, and reaching to base of eleventh segment, second to fourth segments subequal in length; pronotal angles rounded slightly, not projecting forward; middle femur normal; propodeum with an indistinct tubercle near angles of postscutellum; first abdominal tergite slightly raised and smooth apically; second sternite with a distinct crease-like basal median suture; ædeagus as figured; parameres with slender bristles along their inner curved surfaces; sheath of lateral spine elongate, rounded, and bristleless apically; length to apex of second tergite, 5 mm.

Female. Markings, pubescence and puncturation about as in male with following exceptions: Clypeus and third to sixth abdominal segments black; mandible and postscutellum red; legs red and black. Clypeus narrowly and shallowly incised between apical teeth; length to apex of second tergite, 6 mm.

Holotype, male, Riverside, Riverside Co., Calif., Apr. 15, 1932, on *Lotus scoparius* (P. H. Timberlake); allotype, female, Riverside, Calif., May 21, 1925, on *Eriogonum fasciculatum* (P. H. Timberlake). Forty-five paratypes from the following localities in California: Campo, San Diego Co.; Palm Springs

and Riverside, Riverside Co.; Claremont, Whittier, Pasadena, Altadena, Azusa, La Crescenta, Palmdale, and Lancaster, Los Angeles Co.; Crestline, San Bernardino Co.; Argus Mts., Mazurka Canyon, and Lone Pine creek, Inyo Co.; Tallac Lake, Placer Co. Seven paratype females, Buckeye, Arizona, Mar. 28, 1934, on *Lycium torreyi* (P. H. Timberlake). Other recorded host plants are *Lotus glaber*, *Lotus agrophyllus*, and *Baccharis viminea*. Atypical specimens with black instead of red on the first tergite are in my collection from Buckeye, Arizona; Berkeley, Alameda Co. and Mt. Diablo, Contra Costa Co., California; Klamath Falls, Oregon; Pullman and Wawawai, Washington. Pullman specimens bear the additional data "reared from larvæ in stems of *Sambucus glauca*." Holotype and allotype to be deposited in the California Academy of Sciences, paratypes in collections of U. S. National Museum, Pomona College, J. Bequært, P. H. Timberlake, E. G. Linsley, C. D. Michener, and the author.

Odynerus rubicundulus Bohart, new species

Male. Black; clypeus except apically, first antennal segment in front, spot on mandible, pronotum in front, mesopleural spot, lateral spot on scutellum, legs partly, whitish yellow; tegula mostly, apical margins of first tergite and second and third abdominal segments, whitish; antenna beneath and legs partly, brownish red; first abdominal segment red except for apical band; wings nearly clear except in apical cell. Pubescence obscure, silvery. Puncturation moderate; sparse on clypeus, propodeum, and first tergite; elsewhere punctures mostly separated by at least a puncture diameter; first and second tergites apically smooth. Clypeus much broader than long, roundly incised between apical teeth, the width of emargination as great as length of fifth antennal segment; mandible evenly four-toothed; antennal hook moderately slender, pointed apically and reaching to base of eleventh segment, second to fourth segments subequal in length; pronotal angles rounded, slightly but distinctly projecting forward as seen from above; middle femur normal; propodeum with an indistinct tubercle near angles of postscutellum; first and second abdominal tergites slightly raised apically; second sternite without a median basal suture; ædeagus as figured; parameres with long stout bristles along their inner edges; sheath of lateral spine elongate, whip-like, and with a single terminal bristle; length to apex of second tergite, 5.5 mm.

Female. Markings, pubescence, and puncturation about as in

male with following exceptions: Mandible red, clypeus black; propodeum mostly red; third abdominal segment without apical band. Clypeus well punctured and with a small apical incision; length to apex of second tergite, 6.5 mm.

Holotype, male, allotype, female, and three paratype females, Lone Pine creek, Inyo Co., Calif., June 6, 1939 (R. M. Bohart); paratypes, two males, Olancha, Inyo Co., Calif., May 20, 1937 (J. W. Johnson and N. W. Frazier); one male and one female, Altadena, Los Angeles Co., Calif. (C. D. Michener); one female, Mariposa, Mariposa Co., Calif., June 13, 1938 (R. M. Bohart). Holotype and allotype in California Academy of Sciences, paratypes in collections of U. S. National Museum, C. D. Michener, and the author.

This species is easily separated from *erubescens*, which it resembles superficially, by the absence of the median basal suture of the second sternite, the forward projecting pronotal angles, the broader emargination of the male clypeus, and differences in the male genitalia.

A Conopid Fly Parasite of Megachile

(Hymenoptera, Apoidea)

While excavating for *Microbembex* cocoons in the sand dunes near Antioch, California, October 16, 1938, a dead male *Megachile* (*Xanthosaurus*) *perihirta* Cockerell[1] was taken from the end of a short burrow in a hard packed sand cliff. No evidence of megachilid cells was present which indicates that the bee was occupying a "resting burrow" (a common habit of male bees) when killed by the pupation of the conopid fly parasite, *Conops argentifacies* Van Duzee[2] within its abdomen.

The bee was put in a small vial with a cotton plug. The conopid emerged on March 15 but in a very stunted and undeveloped condition.—George E. Bohart and John W. MacSwain, University of California.

[1] *Megachile perihirta* Cockerell, 1898, Ann. Mag. Nat. Hist., (7), 1:126.
[2] *Conops argentifacies* Van Duzee, 1927, Proc. Cal. Acad. Sci., (4), 16:574-575.

NOTES ON TWO CHRYSIDIDS PARASITIC ON WESTERN BEMBICID WASPS

(Hymenoptera)

BY GEORGE E. BOHART AND JOHN W. MacSWAIN

University of California, Berkeley

In the spring and fall of 1938 and 1939 we collected a number of aculeate Hymenoptera from the sandy areas of Emeryville and Antioch, California. From the former locality several cocoons of the sand wasp, *Bembix comata* Parker[1] were obtained while at Antioch several hundred cocoons of *Microbembex aurata* Parker[2] were collected. All of these were brought into the laboratory and opened for examination or placed in bottles for rearing. Of the *Bembix comata* cocoons examined, about thirty per cent contained the brown silken cases of the chrysidid wasp, *Parnopes edwardsii* (Cresson)[3]. Approximately the same ratio of parasitism was obtained from unopened cocoons which later emerged. The pupal cases of *Microbembex aurata* were studied in the same manner and were found to be twenty per cent parasitized by *Parnopes westcotti* Melander and Brues[4].

In the field neither species of parasite appeared for at least two weeks after the emergence of its host but the parasites remained active for as long a period after the bembicids were gone. *Parnopes edwardsii*, which is a large, brilliant green species, was found to frequent the blossoms of two sweet clovers, *Melilotus alba* Desr. and *Melilotus indicus* All. The host wasp also visited these flowers. On cloudy days and at night many of the parasites remained hidden beneath loose objects on the sand where they often fell victims to the black widow spider, *Latrodectus mactans* Fabricius, which made its webs in these situations. *Parnopes westcotti*, a smaller green and bronze wasp, was found most commonly at flowers of the small bush, *Croton californicus* Mull., which also attracted many *Microbembex*.

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[1]*Bembix comata* Parker, 1917, Proc. U. S. Nat. Mus., 52:100.
[2]*Microbembex aurata* Parker, 1917, Proc. U. S. Nat. Mus., 52:121.
[3]*Euchrœus edwardsii* Cresson, 1879, Proc. Amer. Ent. Soc., 7:iv.
[4]*Parnopes westcotti* Melander and Brues, 1902, Biological Bulletin, Lancaster, 3:39.

The habits of both parasites in searching for host cocoons are apparently nearly the same. The activities of *Parnopes westcotti* were more completely studied because of the relatively large population of that species. A greater concentration of host burrows allowed it a large share of time for actually digging into host entrances. In contrast, *Parnopes edwardsii* had to search over large areas of sand in order to discover the scattered burrows of its host. While searching, the wasps made short flights close to the sand, alighting frequently to run over the surface, tap rapidly with the tips of their antennæ, and examine every depression. At frequent intervals the wasps would scratch the surface of the sand with their anterior tarsi and, upon finding what was apparently a host entrance, would tunnel their way beneath the loose top sand. The digging efforts of both species are interesting because of their ineffectiveness. In contrast to other aculeates these wasps have neither well developed mandibles nor tarsal combs and have restricted use of their front legs. When starting to dig, the body is raised to an almost vertical position from which they often lose their balance and fall over backwards.

Our observations indicate a striking host specificity for these parasites in the localities studied. At Antioch *Bembix comata* is scarce whereas *Bembix occidentalis beutenmuelleri* Fox is quite abundant. *Parnopes edwardsii* is even rarer at this locality than *Bembix comata* which is, therefore, apparently its only host. In addition, this parasite has never been found in the many cocoons of other *Bembix* from Antioch which have been examined[5]. *Parnopes edwardsii* has a wider geographical range than *Bembix comata*, however, and has been collected on sweet clover at Walla Walla, Washington, in company with *Bembix amœna* Handlirsch. *Parnopes westcotti* has not been taken from *Bembix* cocoons but will most likely be found as a parasite of the common and wide ranging *Microbembex monodonata* Say, since these two have been collected together in the absence of *Microbembex aurata*. At Emeryville both species of *Microbembex* are present but are not parasitized by chrysidids.

[5]Bohart, G. E., and J. W. MacSwain, 1939. The life history of the sand wasp, *Bembix occidentalis beutenmuelleri* Fox and its parasites. Bull. South. Calif. Acad, Sci., 38:84-98.

Fleas of Eastern United States

Fleas of Eastern United States. Irving Fox. The Iowa State Collegiate Press. 191 pp. 31 plates. 1940. $3.00.

This book is confined to a consideration of the fleas reported from the United States east of the one hundredth meridian exclusive of Texas and is apparently a thesis written in partial fulfillment of the requirements for a doctorate. A good bibliography is given for each species. The specific descriptions are brief but adequate except for the allocation of new species closely related to one or more previously described and for the determination of certain species not earlier reported from the eastern United States. The illustrations are adequate with the exception of the one denoting female structures. Unfortunately no fully labeled drawing of a male is given. The absence of entirely satisfactory illustrations showing morphologic detail is a serious handicap to a beginning student of Siphonaptera.

The locality and host records are as complete as one might reasonably expect in view of the fact that so many of these records have not been published and therefore are not readily available. The author lists these records under both "Records" and "Eastern localities" which is somewhat confusing until one recognizes that the former designation apparently applies only to specimens examined by the author and the latter to records made by other workers.

Subspecies are either ignored or barely mentioned. *Foxella ignotus*, for example, is treated as if it were one of several species in the genus rather than the only species with several subspecies.

The keys are accurate and clear; however, it would have been more desirable if they had been expanded to include species occurring over a wider geographic range. Such an expansion would have done a great deal to eliminate possible confusion arising from the study, with the aid of this book, of new species or species not previously reported from the east.

Tunga penetrans (L.), despite the statement in the book, has been authentically recorded from Florida and Texas. *Opisocrostis hirsutus* (Bak.), *Orchopeas labiatus* (Bak.), and *O. nepos* (Roths.) occur in the area considered by the author.

The allocation of *Monopsyllus vison* (Bak.) and *M. wagneri* subsp. to the genus *Megabothris* is unwarranted. *Corrodopsylla* has been raised to a generic status; therefore, "*Doratopsylla*" *curvata* Roths. is *Corrodopsylla curvata*. *Epitedia testor* (Roths.), although described, is not included in the key to the species of *Epitedia*.

Unfortunately no key is given for the genus *Ceratophyllus*. It is true, as the author indicates, that the characters of species belonging to this genus do not lend themselves as well to a key

as do the species of most other genera, but adequate keys for the species of this genus have been made.

In several instances where only one species of a genus is known to occur in the United States, the author writes as if but one species occurs in the east and other species of the genus occur in the west.

A synonymic list is included at the back of the book but it is arranged alphabetically according to synonyms. This makes it difficult to find all of the synonyms of a given valid species. A very good list of the eastern fleas arranged according to the hosts from which they have been recorded is given.

This book will be very useful in determining described fleas occurring commonly in the eastern United States but its use is very limited as an aid in taxonomic research of this group of insects.—M. A. Stewart.

CARABUS TÆDATUS FABR. AND ITS SUBSPECIES VANCOUVERICUS CSIKI OR BICOLOR WALKER ARE IDENTICAL

(Coleoptera, Carabidæ)

BY ROBERT Y. PRATT

Coupeville, Washington

Carabus (*Archicarabus*) *tædatus* Fabr. is listed in Leng's "Catalogue of North American Coleoptera" as occurring in Alaska. When occurring in the State of Washington it is referred to as the subspecies *vancouvericus* Csiki[1] or *bicolor* Walker[1].

A series of forty-one *Carabus tædatus* that I collected within seven days in a single nineteen-acre field on Whidbey Island, State of Washington, have the color of the elytra ranging from brown to distinct black. Comparison of this series with two specimens of the typical form[2] of *tædatus* from Kodiak Island, Alaska, and other specimens of *Carabus tædatus* in the Hatch collection at the University of Washington, Seattle, conclusively proved that the Kodiak Island and the Washington specimens of *tædatus* described as the subspecies *vancouvericus* Csiki or *bicolor* Walker were identical. Therefore the subspecies *vancouvericus* Csiki and *bicolor* Walker should be relegated to synonymy.

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[1]Leng, Charles W., Catalogue North American Coleoptera, p. 44, Catalogue No. 169 and 169b, 1920. Also Ibidem, Second and Third Supplements, p. 10, section under *Carabus*, 1933.

[2]Rœschke, Dr. H.—Berlin, *Carabus tædatus* F., Entomologische Nachrichten XXVI, 1900. Februar 1900, No. 4, p. 57.

Kodiak Island, Alaska, is about one hundred and seventy-five miles from the beginning of the Aleutian Island peninsula, or Unalaska, where the type specimen of *Carabus tædatus* Fabr. was found. Hence the Kodiak Island specimens of *tædatus* in the Hatch collection are the typical form. Both the brown and the black elytra are found in *Carabus* (*Archicarabus*) *tædatus* Fabr. from the Alaskan region.

HOPLIA MISCELLANY

(Coleoptera, Scarabæidæ)

BY L. B. BOYER

From the descriptions of *Hoplia maculifera* Moser[5] and *H. philippensis* Moser,[6] one could not surely differentiate between the two species. They might be interpreted as being but scale variations within a single protean species. However, the holotype of *maculifera* (number 7225, Philippine Bureau of Science, Entomology) has posterior tarsal claws which are distinctly cleft at the tip while those of *philippensis* (Holotype number 6026, Philippine Bureau of Science, Entomology) are entire. These insects represent different species.

In a recent note[1] the author erred in his interpretation of synonymy in a Central American *Hoplia.* Whereas he accepted the Junk Catalogue listing "*H. argentata* Geoffroy"[3] and thus regarded *argentata* Nonfried[7] a homonym, the Geoffroy insect is *argentea*, having been described as *Scarabœus argenteus*[4]. Therefore, *argentata* Nonfried is the correct name for the species.

In "A Revision of the Species of *Hoplia* Occurring in America North of Mexico"[2], the type locality of *meridionalis* Boyer was omitted. The labels on the holotype read as follows: "Alachua County, Fla., IV-17-1938, F. Young" and "Lake Newman Biol. Station, Gainesville, IV-17-38." On one group of paratypes the labels are: "Sanford, Fla., Mch. 8, 1927, F. M. Uhler," and "L. W. Saylor Collection." The other group of paratypes is labeled: "Meggett, S. C., 26-May-1934, O. L. Cartwright" and "from the O. L. Cartwright Collection."

[1]Boyer, L. B., Pan-Pac. Ent., 16:11, 1940.
[2]Boyer, L. B., Microent., 5 (part 1):14, 1940.
[3]Dalla Torre, K. W, von, Junk Cat. Coleopt., 50:372, 1913.
[4]Geoffroy, E. L. (in Fourcroy, A. F. Entomologia Parisiensis, 1:8, 1785).
[5]Moser, J., Philippine Jour. Sci., 5:185, 1910.
[6]Moser, J., Philippine Jour. Sci., 5:184, 1910.
[7]Nonfried, A. F., Deut. Ent. Ztschr., p. 259, 1891.

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A REVIEW OF THE GENUS ANKOTHRIPS D. L. CRAWFORD (Thysanoptera)

BY STANLEY F. BAILEY

University of California, Davis

The present status of the family Melanthripidæ has recently been reviewed by the writer (Pan-Pacific Ent. 15(4):168-172, 1939). Priesner (1936) has prepared a review of the genus *Melanthrips* Hal., and *Dactuliothrips* Moulton is summarized in the first mentioned paper. *Dorythrips* Hood, and *Cranothrips* Bagn. each contain at present only one species. The remaining known genus in this family, *Ankothrips* D. L. Crawford is here reviewed.

Through the kindness of Hood, Priesner, Moulton, and the Canadian National Museum, it has been possible to study types, paratypes, or homotypes of all the known species of *Ankothrips.* Since D. L. Crawford established this distinctive genus in 1909 for *robustus* (designated the genotype by Bagnall, 1913) eight additional species have been described. A key to the known species, the description of a new form, and such biological information as is known concerning the California representatives are here presented.

Bagnall (1913) placed *Dicranothrips* Trybom and *Prionothrips* Schille in synonymy with *Ankothrips.* Hood (1924) pointed out the very interesting coincidence that, "In 1909 and 1910 three students of the Thysanoptera, situated in widely separated parts of the world, described almost simultaneously three species of Æolothripidæ which were remarkable for certain structural characters previously unknown in the group. Each erected a new genus for the reception of the species known to him; yet, oddly enough, though coming from South Africa, Galicia and California, respectively, these three species were congeneric." Priesner (1926, p. 86) reviewed the status of the genus up to that date. The same author (1939) reëstablished *Prionothrips* as a subgenus for *mavromoustakisi* Pr. and *niezabitowskii* (Shille).

The outstanding generic characters which separate *Ankothrips* from other genera in the Melanthripidæ are as follows: The projection of the second antennal segment, the anterior pro-

jection of the vertex, the lack of tarsal claws and tibial spurs, and the transverse horse-shoe shaped sensory areas on antennal segments III and IV.

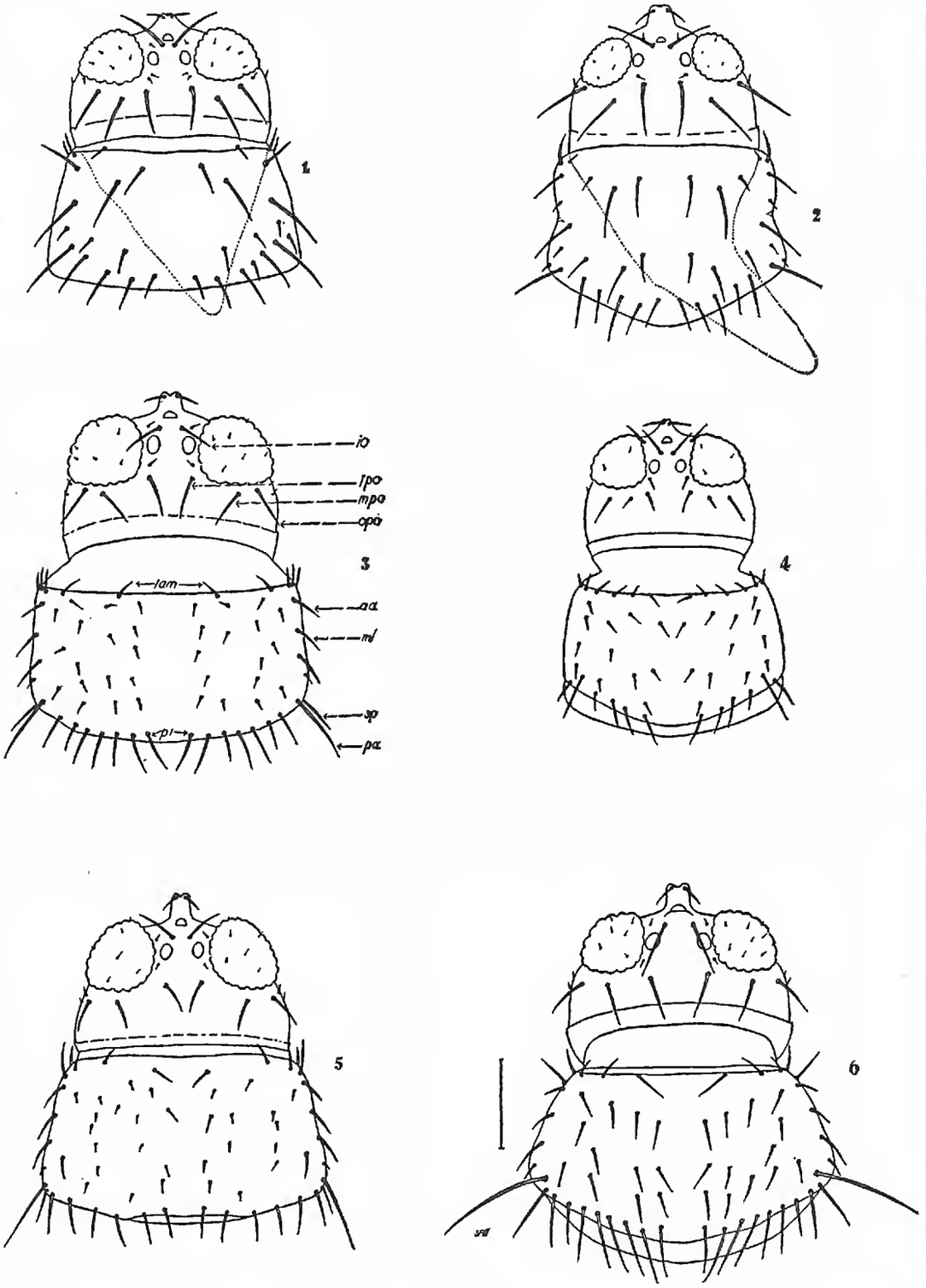

Plate I. *Ankothrips.* Head and pronotum of: 1, *niezabitowskii*; 2, *mavromoustakisi*; 3, *vandykei*; 4, *gracilis;* 5, *æqualis*; 6, *notabilis.* Scales: Plate II, Figure 3, line equals 0.1 mm. All other figures in Plates I, II, and III are to same scale as in Plate I, fig. 6, Plate II, fig. 4, and Plate III, fig. 9, i.e., line equals 0.1 mm.

The diversity in the genus is not great, although the individual species exhibit considerable variability when studied in long series. For example, occasional individuals are seen with the antennal projection missing on one or both antennæ, the notches or serrations on the antennal projections are variable, and the number of bristles on the pronotum sometimes fluctuates.

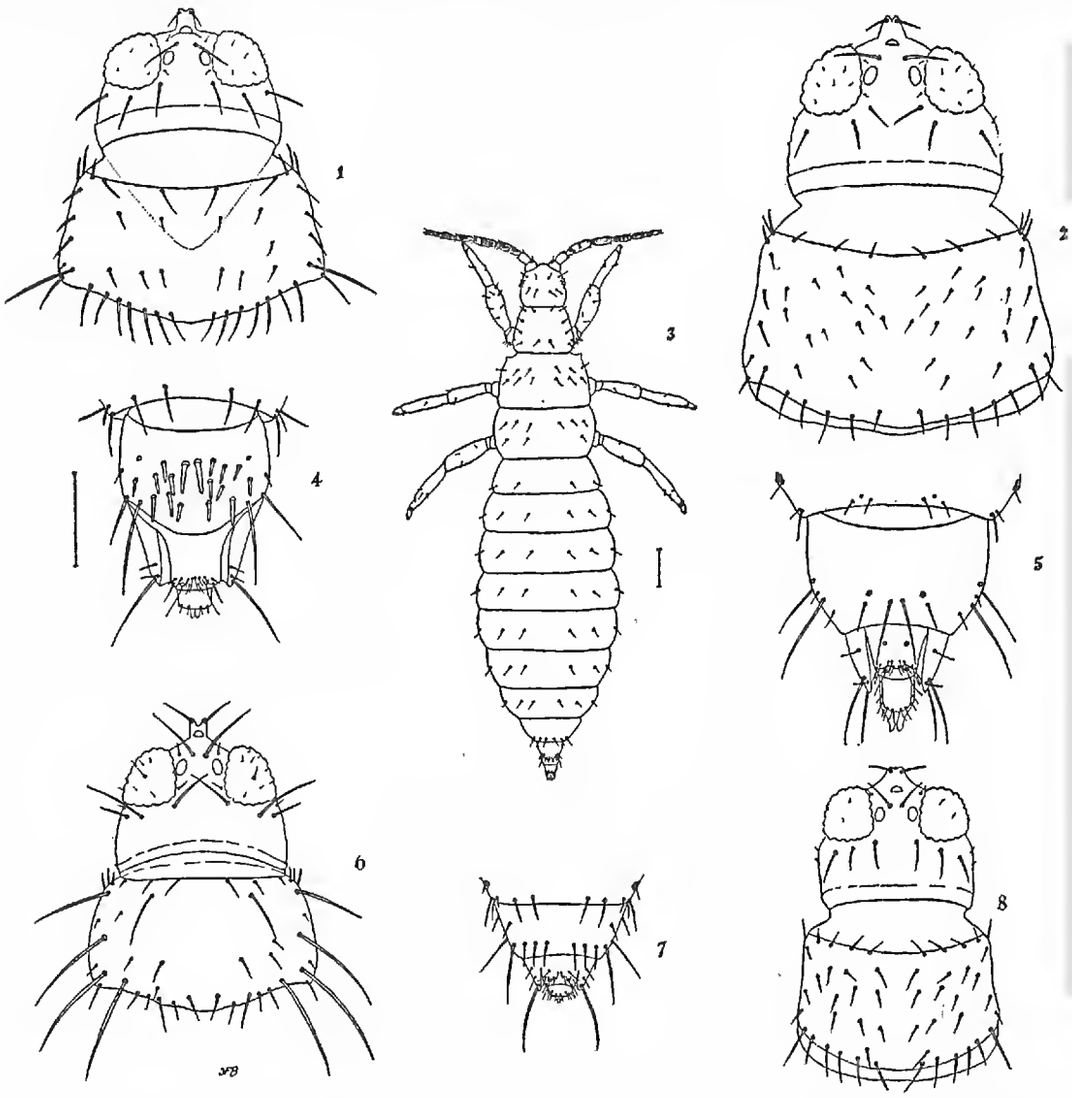

Plate II. *Ankothrips.* Head and pronotum of: 1, *robustus*; 2, *yuccæ*; 6, *fissidens*; and 8, *diffractus.* Genitalia of males of: 4, *robustus*; 5, *yuccæ*; and 7, *gracilis.* Figure 3, mature larva of *yuccæ.*

In the known males of those species having very heavy bristles on the dorsum of the terminal abdominal segments, namely, *æqualis* Moulton, *robustus* D. L. Crawford (Plate II, fig. 4), and *notabilis* Bailey, there is also variability in the number and placement of these bristles. As the males of more species become known the genitalia (Plate II, figs. 5 and 7) will be used more successfully than is now possible. Good specific char-

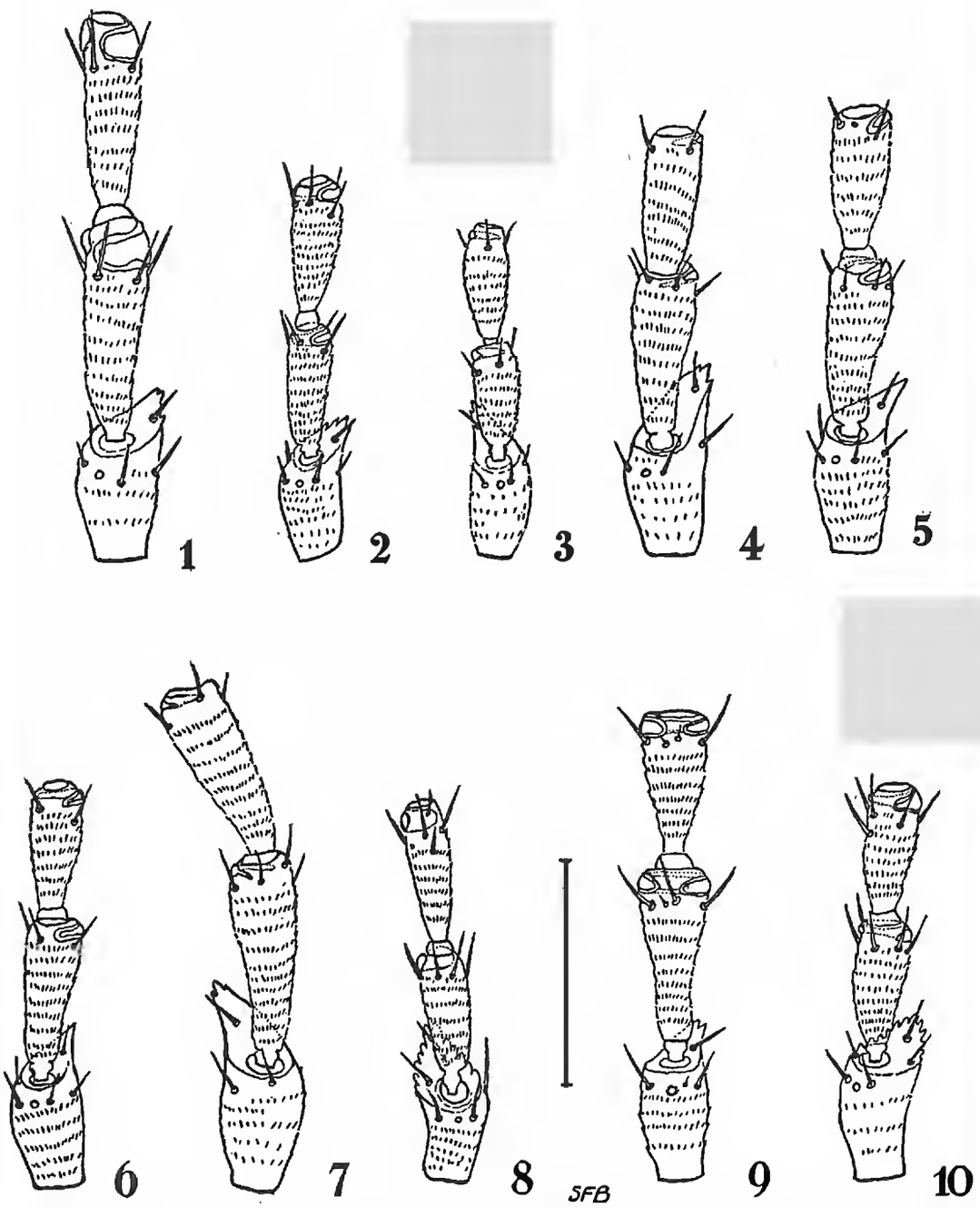

Plate III. *Ankothrips.* Second, third, and fourth antennal segments of: 1, *yuccæ*; 2, *gracilis*; 3, *diffractus*; 4, *vandykei*; 5, *notabilis*; 6, *robustus*; 7, *æqualis*; 8, *mavromoustakisi*; 9, *fissidens*; and 10, *niezabitowskii.*

acters are also to be found in the chætotaxy of the pronotum and dorsum of the head. It should be noted that the antennal sensory areas on the third and fourth segments do not offer such distinct specific characters as in *Melanthrips* although there are marked differences (Plate III, fig. 1-10). The nomenclature of the bristles of the pronotum as here used is adapted from Priesner (1936) (Plate I, fig. 3).

KEY TO THE SPECIES OF ANKOTHRIPS

1. (10) Mouth cone very long and pointed, extending considerably beyond posterior margin of pronotum (Plate I, figs. 1 and 2). Ovipositor very long.....Subgenus *Prionothrips* Pr. 10
—. Mouth cone short and blunt, not extending beyond posterior margin of prothorax (Plate II, fig. 1).....2
2. (1) Projection on vertex over-hanging base of antennæ wider at base than at tip (Plate II, fig 2).....3
—. Projection of vertex over-hanging base of antennæ with sides parallel[1] (Plate II, fig. 6).....6
3. (2) Sensory areas on antennal segments III and IV very broad, about one-fifth the length of the segment and extending almost entirely around the segment (Plate III, fig. 1). Projection on antennal segment II toothed or serrate on outer margin only. .....*yuccæ* Moulton
—. Sensory areas on antennal segments III and IV narrow and extending little more than half way around segment at tip....4
4. (3) Median post-ocular bristles very short (0.016 mm.) and with micro-setæ between inner margin of eye and anterior ocellus strongly developed (Plate I, fig. 4).....*gracilis* Moulton
—. Three post-ocular bristles well-developed.....5
5. (4) Posterior-angular bristles (pa) on pronotum 0.075 mm. long; sp bristles 0.052 mm.; with three strong lateral bristles on pronotum (Plate I, fig. 3).....*vandykei* Moulton
—. Pa bristles 0.052 mm.; sp bristles absent; lateral bristles on pronotum weak or absent (Plate II, fig. 8)....*diffractus* Hood
6. (2) Projection of vertex with a deep U-shaped notch at tip (Plate II, fig. 6). Median post-ocular bristles longer (0.072 mm.) than the inner or outer ones. Mid-lateral bristle (ml) very long (0.089 mm.).....*fissidens* (Trybom)
—. Projection of vertex with shallow V-shaped notch.....7
7. (6) Projection on second antennal segment simple—without notches or serrations on margin.....8
—. Projection on second antennal segment notched on one or both sides near tip 9
8. (7) All bristles on head and pronotum strongly developed; inter-ocular bristles 0.069 mm., pa bristles very long (0.115 mm.) (Plate I, fig. 6). Pronotum and portions of head, legs, and thorax golden yellow.....*notabilis* Bailey
—. Bristles on head and pronotum moderately well developed; interocular bristles 0.049 mm.; pa bristles 0.085 mm. (Plate II, fig. 1). Body uniform dark brown.....*robustus* Crawford
9. (7) Projection on vertex slightly wider at base than at tip. Pronotal bristles iam 0.023 mm. Interocellar bristles 0.046 mm. (Plate I, fig. 3). Color yellow to orange brown.....*vandykei* Moulton

[1]Measurement of the one paratype of *vandykei* in the writer's collection shows the projection to be slightly wider at the base than at tip; width at tip 0.022 mm., width at base 0.028 mm.

—. Projection on vertex more slender with sides straight. Pronotal bristles iam 0.029 mm. Interocellar bristles 0.039 mm. (Plate I, fig. 5). Color yellow to orange-yellow with bristles dark brown; abdominal segments 2–7 each with dark brown transverse line on anterior margin of sternum..... ..... *æqualis* Moulton

10. (1) Ovipositor 0.637 mm. long. Head produced in front of eyes and projection with sides nearly parallel (Plate 1, fig. 2). Antennal segments I and II light brown, remainder dark brown ..... *mavromoustakisi* Pr.

—. Ovipositor 0.455 mm. long. Head scarcely produced in front of eyes and projection with base much wider than tip (Plate I, fig. 1). Antennal segment I light brown, remainder dark brown..... *niezabitowskii* (Shille)

Ankothrips notabilis Bailey, new species

Plate I, fig. 6. Plate III, fig. 5.

Female: Basal portion of head with dark brown collar, remainder light brown to golden brown. Prothorax yellow to golden brown; remainder of body uniform dark brown. Eyes dark brown to black, marginal ocellar pigment crimson. Antennæ dark brown, base of segment III light brown to gold, segments I and II somewhat lighter than anterior segments. Femora dark brown, yellowish-brown at tip. Tibiæ light golden brown, middle and hind tibiæ darker in center. Wings fuscous, hind wing lighter than fore wing. Bristles moderately strong, dark brown to black at tip of abdomen, light brown to gold on remainder of body.

Head about one-third wider than long, cheeks pronouncedly arched behind eyes, with a collar-like ridge at posterior, microsetæ on compound eyes between facets. Three ocelli, anterior ocellus at base of projection and directed forward. Head transversely reticulate behind eyes. Mouth cone short and rounded. Antennæ moderately slender, nine-segmented. Segment II projected on under side in the manner typical of the genus. Rings or annulations on all segments but indistinct on segment I. Segments III and IV with narrow sensory band at tip extending two-thirds of distance around segment. *Prothorax* about one-third wider than long, bristles long and well-developed. Fore and middle tibiæ with two short spines at tip. Hind femora thickened. Wings broad and rounded at tip, entire surface of both wings covered with micro-setæ. Fore wing with two longitudinal veins and three distinct cross-veins; fore longitudinal vein with 25-30 bristles, posterior longitudinal vein with 22-26 bristles. Hind wing with a thickening near base on costal margin and a central vein or darkened area extending a short distance from base. *Abdomen* broadly ovate, bluntly rounded at tip. Transverse striations weak on dorsum of all segments except first.

Measurements of type: Total body length (exclusive of antennæ): 1.89 mm.; head, length (including projection) 0.15 mm.; width, 0.19 mm.; prothorax, length 0.15 mm., width 0.27 mm.; mesothorax, width, 0.37 mm.; abdomen, greatest width (at 4th segment), 0.40 mm. Length of antennal segments in mm.: I, 0.029; II, 0.052; III, 0.079; IV, 0.066; V, 0.049; VI, 0.052; VII, 0.029; VIII, 0.019; IX, 0.033; total length (including intersegmental membranes), 0.455. Length of spines in mm.: io, 0.056; ipo, 0.049; mpo, 0.042; opo, 0.049; iam, 0.036; aa, 0.046; ml, 0.033; pl, 0.049; sp, 0.062; pa, 0.095.

Male: Smaller and more slender than female. Tip of abdomen spatulate and turned upward. Total body length (including projection on vertex) of allotype 1.65 mm.

Described from nineteen females and ten males collected by the author in California laurel flowers in Mix Canyon, Solano County, California, on February 1 and 14, 1939. Additional specimens of the type series are in alcohol, as well as a long series of slides from the same locality from manzanita and plum blossoms, February and March, 1935 and 1936. This species has also been collected by the writer from Arroyo Seco, Los Angeles County; on Ceanothus, near Wilbur Springs, Colusa County; on manzanita, at McDonnell Creek, Sonoma County, California. Additional specimens have been collected by R. M. Bohart at Cajon Pass on Ceanothus and by W. A. Brereton in San Gabriel Canyon from "flowers of a woody shrub."

Type locality, Mix Canyon, Solano County, California. Holotype slide (T16) and allotype (T17) in writer's collection.

The complete life history of none of the species of this genus of thrips has been worked out in detail. However, during the past eight years, the writer has collected and observed *robustus*, *gracilis*, *yuccæ*, and *notabilis* in California and a few generalizations can be made regarding their biology. These species have only one generation a year which is correlated with the blooming of their native hosts. The earliest species to appear, following the rains of the winter season (in January) is *notabilis*. Later *robustus* appears and it may be found up to May at altitudes of about 3,000-4,000 feet. In April, May, and June, *yuccæ* may be found in yucca flowers, particularly in southern California. The preferred host of *gracilis* appears to be *Adenostoma fasciculatum* and this thrips is to be found commonly in its flowers in May and June. Judging from these four species, these thrips are plant feeders only. The larvæ are

found in the late blooms of the host plants and disappear rapidly as the blooming period passes. The larval period lasts about two weeks.

In the laboratory the larvæ of *yuccæ* and *gracilis* have been found to spin cocoons in the soil. Therefore, it is safe to say that in the field pupation occurs in the soil beneath the hosts. The life history of these species may be compared with that of the pear thrips, *Tæniothrips inconsequens* (Uzel).

As in the case of the above-mentioned crop pest, these *Ankothrips* species fluctuate greatly in numbers from year to year. When conditions are favorable the larvæ of *yuccæ* (Plate II, fig. 3) may be found by the thousands in yucca flowers. The most widespread species in California appears to be *robustus*; *gracilis* and *yuccæ* can be considered common, *notabilis* common in certain definite, widely-separated localities, and *æqualis* is rare. The latter species is apparently known only from the original collection; it may be found to be a coastal species only. Concerning the other two North American species, *diffractus* and *vandykei,* nothing is known except the data of the original collections.

The exotic species, *fissidens*, *neizabitowskii* and *mavromoustakisi,* appear to be common and also occur in numbers in the spring only.

Insufficient data are at hand to formulate any general conclusions relative to the world distribution of this genus. Nevertheless, it should be pointed out that in North America this group of thrips is known only from the arid, semi-desert regions. Further and more thorough early spring collecting in other regions having a similar climate in western North America, as well as in South America and Africa, will undoubtedly disclose additional undescribed forms.

Catalog of the Species of Ankothrips

1. *A. robustus* D. L. Crawford. 1909. Genotype. North America (California—widely distributed). Common in flowers of *Ceanothus* and manzanita; also found in prune blossoms and by sweeping.
2. *A.* (*Prionothrips*) *niezabitowskii* (Shille). 1910. Poland and Hungary. February to May on *Juniperus communis.*

3. *A. fissidens* (Trybom). 1910. (*Dicranothrips*). South Africa (Klein-Namaland). August, from leaves of "Pferdebusches." Form *major* taken in July on leaves of "Zuur-Klee."
4. *A. diffractus* Hood. 1924. North America (New Mexico). In May in flowers of *Cercocarpus montanus* Raf. (7600 feet).
5. *A. yuccæ* Moulton. 1926. North America (California). Common in spring in flowers of native yucca, chiefly in southern California (also Kern County).
6. *A. gracilis* Moulton. 1926. North America (California). Common in late spring and early summer in flowers of *Adenostoma fasciculatum.*
7. *A. æqualis* Moulton. 1926. North America (California and Washington). April and June. Recorded hosts are *Prunus*, *Spiræa corymbosa*, *Schizonotus discolor*, and *Sambucus glauca.*
8. *A. vandykei* Moulton. 1928. North America (Colorado). In June from unknown plant.
9. *A.* (*Prionothrips*) *mavromoustakisi* Pr. 1939. Cyprus. February, in turf with juniper trees nearby.
10. *A. notabilis* Bailey. North America (California). January to March in flowers of *Umbellularia californica* and *Ceanothus.*

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ORNITHODOROS TURICATA IN CALIFORNIA

(Arachnida, Acarina)

BY THOMAS F. KELLEY

University of California, Berkeley

While working last summer for the George Williams Hooper Foundation for Medical Research, University of California, the writer collected a specimen of a tick which has since been identified as *Ornithodoros turicata* (Duges, 1876). This is the first time since 1908 that this species has been definitely found in California.

The tick was originally described by Duges from Mexico in the newspaper le Repertorio de Guanajuato. Banks in 1908 reported it from Florida, New Mexico, Arizona, and San Diego, California. In the last two instances it was taken from cattle. Several workers including Brumpt (1936), Neveu-Lemaire (1938), and Bishopp (1933) have suggested the presence of this tick in considerable numbers in California, particularly in the southern portion of the state, but as far as can be determined they were evidently making use of Banks' early publication. At the present time it is also reported to occur in Kansas as well as in the states previously mentioned.

The specimen in question, an early nymphal form, was collected from the ground squirrel, *Citellus beecheyi fisheri* Merriam,

at the San Joaquin Experimental Range 20 miles northeast of Madera, Madera County, August 20, 1939. The nymphal tick was brought to the laboratory and reared to the last nymphal stage at which time it was identified by Dr. R. A. Cooley of the Rocky Mountain Laboratory, Hamilton, Montana.

This species has been incriminated as a vector of the Texas strain of relapsing fever and has been shown to transmit this hereditarily (Kemp, Moursund, and Wright, 1934). Wheeler (1938) has been successful in experimentally transmitting *Trypanosoma cruzi* Chagas, the causative organism of Chagas disease, by means of this tick.

The presence of this tick so far north in the San Joaquin Valley presupposes a wider distribution in California than has previously been reported. Dr. C. M. Wheeler, of The George Williams Hooper Foundation for Medical Research, has informed the writer that he has some specimens of an *Ornithodoros* tick from ground squirrels in the same locality and from Raymond in Madera County. All are in an early nymphal stage and have yet to be identified. If these ticks prove to be *Ornithodoros turicata*, it would suggest a wide area of infestation in that region.

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TWO NEW CALIFORNIA DOLICHOPODIDÆ[1]

(Diptera)

F. C. HARMSTON AND G. F. KNOWLTON[2]

The following report deals with two species of apparently undescribed long-headed flies collected in California during 1939.

Thinophilus scopiventris Harmston and Knowlton, new species

Male. *Length*, 5.8 mm.; of wing, 6 mm. *Face* moderately wide, narrowest just below antennæ, greenish, with coarse brownish pollen which is thicker below longitudinal facial ridge; palpi (fig. 2) large, brownish-yellow, each about one and one-half times as large as face and covered with short, stiff, black hairs; front about twice the width of face, coppery-green, except a metallic violet, triangular-shaped, central area immediately below occellar tubercle: the portion of front immediately above antennæ and along orbits as far as occiput, lightly dusted with brownish-yellow pollen; antennæ black on upper half, yellow below, the third joint short, rounded at tip, the arista inserted near base above; lower orbital cilia and beard composed of stiff, yellowish-white hairs, among which are situated two short, black bristles; upper orbital cilia black. *Dorsum of thorax* and scutellum dusted with dark brown pollen which hides the greenish ground color except a central greenish vitta and posterior margin of mesonotum; lateral margins of scutellum shining greenish; one pair of large scutellar bristles outside of which is located a pair of small, hair-like bristles; pleuræ green, the anterior region dulled with brownish pollen, the posterior surface more greyish; calypters and halteres yellow, the former with delicate, whitish cilia. *Abdomen* metallic green with bronze reflections, dusted with grey pollen, the incisures blackish; bristles of thorax and abdomen entirely black; hypopygium (fig. 1) black, dulled with greyish pollen, rounded behind, with a pair of large, black, fleshy lamellæ, fringed with black delicate hairs which are long and curled at their tips; lamellæ reaching ventral hind margin of fourth abdominal segment, this margin not projecting below, but with a cluster of short, stiff bristles. *Coxæ* blackish green, dulled with greyish pollen; fore and middle pairs with coarse black hairs on anterior surfaces, the middle and hind pairs each with a long bristle on outside surface; femora and tibiæ brownish, nearly concolorous, yet the former nearly black on upper surfaces; all femora with strong bristles below, the posterior pair with six short bristles along apical half

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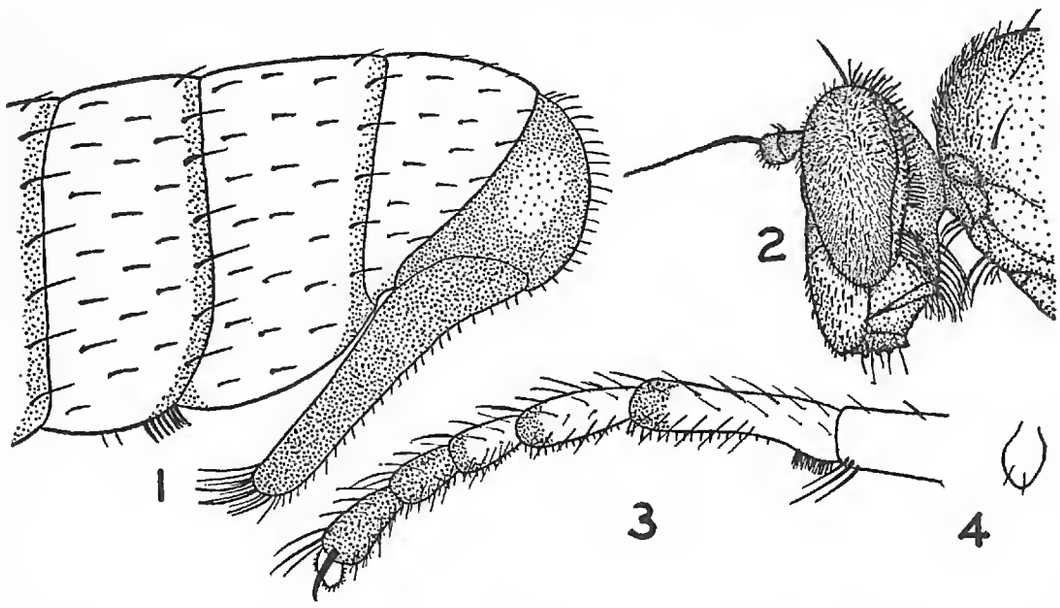
[1]Contribution from the Department of Entomology, Utah Agricultural Experiment Station.

[2]Research assistant and research associate professor of entomology, respectively.

of upper, outer surface; fore tarsi (fig. 3) with last two joints and tips of first three joints, black, their basitarsi somewhat hollowed below, with a cluster of stiff bristles at base below and longer hair-like bristles along outer, lower surface; middle tarsi with fifth segment and tips of other segments black; hind tarsi wholly black. (Femora of female lighter than in male.) *Wings* greyish hyaline, without spots or infuscations; third and fourth veins nearly parallel beyond cross vein, the fourth vein ending in apex of wing.



Figures 1-3. *Thinophilus scopiventris*, n. sp., male. Figure 4. *Chrysotus xanthocal*, n. sp.

Described from one male and one female taken at Newark, California, June 27, 1939, by G. F. Knowlton, along the margin of a small stream running through alkaline land. The type is deposited in the collection of the California Academy of Sciences.

Taxonomy. In general outward appearance *Thinophilus scopiventris*, n. sp., resembles *T. frontalis* V. D., described from Florida; it differs, however, in having a brush of short, coarse bristles on the ventral, posterior margin of the fourth abdominal segment, strong bristles along the lower edge of the posterior femora and in having the legs of much darker color. An interesting feature of *scopiventris* is the striking similarity of structure and color in the fore and middle tarsi with those of *T. spinipes* V. D., a common Utah species; the latter species

differs, however, in possessing a spot on the last portion of fourth vein and another on the cross vein, also in possessing wholly black femora.

Chrysotus xanthocal Harmston and Knowlton, new species

Male. *Length*, 2 mm.; of wing, 2 mm. *Face* narrow, showing greenish ground color lightly dusted with golden-yellow pollen between approximated eyes; front and occiput green, the former more bronze near middle and above base of antennæ; second and third antennal joints black, the latter small, somewhat triangular but with rounded tip, densely pubescent; first joint entirely yellow; arista about two and one-half times length of antenna; palpi (fig. 4) yellow, leaf-like, with two small blackish bristles near their tips; orbital cilia white, about five of the upper ones appearing brownish in certain lights, especially when viewed from behind. *Dorsum of thorax* shining metallic green, lightly dusted with yellow pollen along anterior and lateral margins; pleuræ of similar color to dorsum except that pollen is more dense and whitish. *Abdomen shining*, metallic green with bronze reflections; hypopygium more blackish, sub-shining, its appendages entirely imbedded; bristles of thorax and hairs of abdomen wholly black. *Fore coxæ* yellow, darkened at base, especially on outer face, their anterior surfaces with whitish hairs which are as long as the thickness of coxæ; middle and hind coxæ wholly dark, of greenish-black color; femora yellow; fore pair darkened along entire upper edge; middle pair entirely yellow; hind pair yellow with apical fifth blackened; fore and middle tibiæ yellow, hind pair brown; all tarsi blackish, without ornamentations; calypters yellow with black cilia; knobs of halteres lemon-yellow, their stems more brownish.

Described from one male, taken at Tracy, California, November 15, 1939, by F. C. Harmston and V. H. Harmston and deposited in the collection of the California Academy of Sciences.

Taxonomy. This species resembles both *Chrysotus terminalis* V. D. and *C. picticornis* Loew. From the former it is readily separated by the yellow palpi and the white hairs of the fore coxæ; both palpi and hairs of fore coxæ are black in *terminalis*. From *C. picticornis* it differs in having large, pendant palpi of a bright yellow color; the palpi of *picticornis* are small, whitish and lack the two bristles at their tips. *Chrysotus xanthocal*, n. sp., possesses apical fifth of posterior femora black, posterior tibiæ brown, whereas the corresponding structures in *picticornis* are wholly yellow.

A PRELIMINARY SYNOPSIS OF THE DRAGONFLIES OF NEVADA

BY IRA LA RIVERS

Reno, Nevada

Although Nevada is an area of almost extreme semi-aridity, still the as yet insignificant number of dragonfly captures within its boundaries have, to the best of my knowledge, yielded the rather substantial number of 63 species. This number is considered substantial because dragonflies are, as a group, restricted in their distribution in direct proportion to the available water supply, and Nevada's water supply probably averages less per unit mile than any other region of equal size in the United States. Only a very small portion of the vast reaches of the state has been collected over, much still remaining to be done along the Nevada-California border, where the western edge of the state meets the tall, humid Sierra, and where, no doubt, many species hitherto accredited only to the coast region will eventually be found crossing the line. A similar situation exists along the Nevada-Idaho and Nevada-Oregon borders, where numerous swift streams head on one of the Great Basin's northern divides, and flow north and west to the Pacific Ocean via the Snake and Columbia rivers. There is less to be expected along the Nevada-Utah line, since the boundary here is man-made, and stretches across salt flats, playas, and typical desert topographies which present much the same aspect, and contain much the same ecologic environments, in one state as in the other. The third portion of the state with considerable promise for future collecting is the southern tip, bordered on the south and east by the turbulent Rio Colorado, up whose broad waters many subtropical dragonflies have worked their way northward from Arizona, California, and Mexico. And last, but not least, is the fourth region of promise, the interior, higher Great Basin ranges such as those in central Nevada bearing the Nevada National Forest.

It is the purpose of the author to enlarge upon this list from time to time, as future collecting turns up additional species, until such a time as the accumulation of seasonal and biologic data is sufficient to warrant a more comprehensive synopsis of the state's dragonflies.

Order ODONATA "Recent Dragonflies"

Superfamily LIBELLULOIDEA "Dragonflies proper"

Family ÆSHNIDÆ "Darners"

Subfamily PETALURINÆ "Grays"

1. Tanypteryx hageni (Selys), "Western Grayling"—*Washoe County* (Cody Basin). Previous records: Muttkowski, 1910 ("*Nevada*"); Kennedy, 1917 ("*Nev., Reno*").

Subfamily GOMPHINÆ "Clubtails"

2. Ophiogomphus occidentis Hagen, "Western Grayclub"—*Washoe County* (Cody Basin). Previous records: No specific designations; Muttkowski, 1910 ("*Canadian: British Columbia, Washington, Utah*"); Essig, 1926 ("*British Columbia, Washington, Oregon, California, Utah*").
3. Ophiogomphus montanus (Selys), "Montana Grayclub"—*Elko County* (Gold Creek, Mountain City, Owyhee, Wild Horse Reservoir). Previous records: None.
4. Ophiogomphus morrisoni Selys, "Morrison Grayclub"—*Elko County* (Carlin, Elko); *Eureka County* (Beowawe, Palisade); *Humboldt County* (Winnemucca); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Wadsworth). Previous records: Muttkowski, 1910 ("*Nevada, California*"); Kennedy, 1917 ("*Reno, Lower Truckee River, Carlin, Golconda*"); Essig, 1926 ("*Washington, Oregon, California, Nevada*").
5. Ophiogomphus bison Selys, "Bison Grayclub"—not seen. Previous records: No specific designations; Muttkowski, 1910 ("*Lower Sonoran: California, Nevada*").
6. Herpetogomphus designatus Hagen, "Common Redclub"—*Lincoln County* (Pahranagat Valley). Previous records: None.
7. Herpetogomphus compositus Hagen, "Western Redclub"—not seen. Previous records: Muttkowski, 1910 ("*Oregon and Wyoming to Arizona and Texas, California*"); Kennedy, 1917 ("*Lower Truckee River, Carlin, Lovelock*"); Essig, 1926 ("*Oregon, California, Nevada, Wyoming, Arizona*").

8. Gomphus intricatus Hagen, "Intricate Clubtail"—*Pershing County* (Rye Patch Reservoir). Previous records: Kennedy, 1917 ("*Golconda, Lovelock*").

9. Gomphus olivaceus Selys, "Olivaceous Clubtail"—*Pershing County* (Lovelock). Previous records: Kennedy, 1917 ("*Golconda, Winnemucca, Lovelock*").

Subfamily ÆSHNINÆ "Darners proper"

10. Anax junius (Drury), "Common Zilia"—*Churchill County* (Carson Sink); *Clark County* (Boulder Lake, Rio Colorado); *Elko County* (Carlin, Elko); *Eureka County* (Beowawe, Palisade); *Humboldt County* (Golconda, Paradise, Winnemucca); *Lander County* (Battle Mountain); *Lincoln County* (Caliente, Pahranagat Valley, Panaca, Pony Spring); *Lyon County* (Smith Valley, Yerington); *Mineral County* (Schurz); *Pershing County* (Imlay, Lovelock, Mill City, Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Wadsworth, Washoe Lake). Previous records: Muttkowski, 1910 ("*Entire North America*"); Kennedy, 1917 ("*Golconda*").

11. Æshna californica (Calvert), The "California Blue"—*Washoe County* (Cody Basin, Truckee Meadows). Previous records: Muttkowski, 1910 ("*Upper and Lower Sonoran: British Columbia and California to Utah and Arizona*").

12. Æshna multicolor Hagen, the "Desert Blue"—*Clark County* (Boulder Lake, Corn Creek, Harris Spring, Las Vegas, Rio Colorado); *Elko County* (Carlin); *Eureka County* (Palisade); *Pershing County* (Rye Patch Reservoir); *Humboldt County* (Paradise); *Lincoln County* (Caliente, Pahranagat Valley, Panaca); *Washoe County* (Truckee Meadows); *White Pine County* (Lehman Caves). Previous records: Muttkowski, 1910 ("*Upper and Lower Sonoran: British Columbia to Texas, Colorado and Panama*"); Kennedy, 1917 ("*Lower Truckee River, Golconda, Winnemucca*").

13. Æshna umbrosa Walker, the "Woodland Blue"—*Elko County* (Gold Creek, Jarbridge, Mountain City, Owyhee, Whiterock). Previous records: Muttkowski, 1910 ("*Canadian to Upper Austral: Atlantic to Pacific Coast*").

14. Æshna palmata Hagen, the "Palma Blue"—none seen. Previous records: Muttkowski, 1910 ("*Boreal: Pacific Coast, Kamchatka, Alaska to Colorado, Utah, B. Cal.*"); Kennedy, 1917 ("*Reno, Carlin, Golconda*").
15. Æshna constricta Say, the "Common Blue"—*Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Wadsworth). Previous records: Kennedy, 1917 ("*Golconda*").
16. Æshna interrupta Walker, the "Elusive Blue"—not seen. Previous records: Kennedy, 1917 ("*Golconda*").

Subfamily CORDULEGASTERINÆ "Biddies"

17. Cordulegaster dorsalis Hagen, "Western Biddy"—*Washoe County* (Cody Basin, Peavine, Verdi). Previous records: None.

Family LIBELLULIDÆ "Skimmers"

Subfamily MACROMIINÆ "Belted Skimmers"

18. Macromia pacifica Hagen, "Western Waba"—*Washoe County* (Cody Basin). Previous records: No specific designations; Muttkowski, 1910 ("*Upper Austral: Wisconsin to Indiana, Texas, California*").
19. Macromia magnifica McLachlan, "Desert Waba"—*Elko County* (Carlin); *Eureka County* (Dunphy); *Humboldt County* (Mouth of Little Humboldt River); *Lincoln County* (Pahranagat Valley); *Pershing County* (Lovelock, Mill City, Rye Patch Reservoir); *Washoe County* (Wadsworth). Previous records: Kennedy, 1917 ("*Lower Truckee River, Golconda, Winnemucca*").

Subfamily LIBELLULINÆ "Skimmers Proper"

20. Libellula saturata Uhler, "Red Skimmer"—*Clark County* (Boulder Lake, Corn Creek, Harris Spring, Las Vegas, Rio Colorado, Stump Springs); *Elko County* (Gold Creek); *Eureka County* (Beowawe); *Lincoln County* (Caliente, Pahranagat Valley, Pony Springs). Previous records: No specific designations; Muttkowski, 1910 ("*Upper and Lower Sonoran: Montana and New Mexico to Baja California and Mexico*") Essig, 1926 ("*Montana, Colorado, Utah, California, Arizona, New Mexico*").

21. Libellula forensis Hagen, the "Eight Spot"—*Elko County* (Carlin, Elko, Deeth); *Eureka County* (Beowawe, Dunphy, Palisade); *Humboldt County* (Golconda, Mouth of Little Humboldt River, Paradise, Valmy, Winnemucca); *Lander County* (Battle Mountain); *Pershing County* (Lovelock, Humboldt, Imlay, Mill City, Oreana, Rye Patch Reservoir); *Lincoln County* (Pahranagat Valley); *Washoe County* (Truckee Meadows, Washoe Valley). Previous records: Muttkowski, 1910 ("*Upper Sonoran: British Columbia to California, Montana to Arizona*"); Kennedy, 1917 ("*Reno, Carlin, Golconda*").
22. Libellula quadrimaculata Linné, "Cosmopolite Skimmer"—*Washoe County* (Cody Basin, Verdi). Previous records: No specific designations; Essig, 1926 ("*Northern Hemisphere, excepting the tropics. Throughout our western area*").
23. Libellula nodisticta Hagen, the "Four Spot"—*Elko County* (Elko); *Lincoln County* (Pahranagat Valley); *Pershing County* (Rye Patch Reservoir). Previous records: Muttkowski, 1910 ("*Upper Sonoran: Montana and Washington to California and Nevada; Mexico to Venez.*"); Kennedy, 1917 ("*Golconda*").
24. Libellula composita Hagen, "White Eyes"—*Churchill County* (Carson Sink, Stillwater); *Lincoln County* (Pahranagat Valley); *Pershing County* (Rye Patch Reservoir). Previous records: Kennedy, 1917 ("*Lovelock*").
25. Plathemis subornata Hagen, "Desert Whitetail"—*Churchill County* (Carson Sink); *Elko County* (Carlin); *Lincoln County* (Pahranagat Valley); *Pershing County* (Rye Patch Reservoir). Previous records: Kennedy, 1917 ("*Golconda*").
26. Sympetrum corruptum (Hagen), "Common Toper"—*Churchill County* (Carson Sink, Fallon); *Clark County* (Boulder Lake, Corn Creek, Harris Springs, Hidden Canon, Las Vegas, Lee Canon, Overton, Rio Colorado, Stump Springs); *Douglas County* (Gardnerville, Topaz Lake); *Elko County* (Carlin, Deep Creek, Elko, Gold Creek, Jarbridge, Midas, Mountain City, North Fork, Owyhee); *Esmeralda County* (Fish Lake Valley); *Eureka County* (Beowawe, Dunphy, Palisade); *Humboldt County* (Golconda, Paradise, Winnemucca); *Lander County* (Battle

Mountain); *Lincoln County* (Caliente, Pahranagat Valley, Panaca, Pony Springs, Quartz Spring); *Lyon County* (Fernley, Smith Valley, Yerington); *Mineral County* (Schurz); *Nye County* (Beatty); *Ormsby County* (Carson City); *Pershing County* (Lovelock, Humboldt, Imlay, Mill City, Oreana, Rye Patch Reservoir); *Storey County* (Virginia City); *Washoe County* (Dry Lake, Peavine, Pyramid Lake, Truckee Meadows, Verdi, Wadsworth, Washoe Lake); *White Pine County* (Duck Creek, Ely, Timber Creek). Previous records: Muttkowski, 1910 ("*Transition and Upper Austral*: *New York to Tennessee and Louisiana*; *Texas to Honduras, north to British Columbia*; *Asia*; *Sea of Ocholsk*"); Kennedy, 1917 ("*Reno, Lower Truckee River, Pyramid Lake, Carlin, Golconda*").

27. Sympetrum illotum (Hagen), "Pacific Toper"—*Washoe County* (Truckee Meadows). Previous records: No specific designations; Muttkowski, 1910 ("*Transition and Upper Sonoran*: *Pacific Coast, British Columbia to California, Nevada*").

28. Sympetrum madidum (Hagen), "Western Toper"—not seen. Previous records: Muttkowski, 1910 ("*Upper Sonoran*: *British Columbia to California*; *Montana, Wyoming, Colorado*"); Kennedy, 1917 ("*Carlin*").

29. Sympetrum pallipes (Hagen), the "Palip Toper"—*Churchill County* (Carson Sink); *Elko County* (Carlin, Elko, Mountain City); *Humboldt County* (Mouth of Little Humboldt River, Valmy, Winnemucca); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows). Previous records: Kennedy, 1917 ("*Reno, Lower Truckee River, Carlin, Golconda*").

30. Sympetrum rubicundulum (Say), "Rubic Toper"—*Elko County* (Carlin, Mountain City, North Fork); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Dry Lake, Truckee Meadows). Previous records: Kennedy, 1917 ("*Reno, Carlin*").

31. Sympetrum semicinctum (Say), the "Red Toper"—*Churchill County* (Carson Sink); *Elko County* (Carlin, Elko); *Humboldt County* (Winnemucca); *Pershing County* (Lovelock);

Washoe County (Wadsworth, Derby). Previous records: Kennedy, 1917 ("*Lower Truckee River, Golconda*").

32. Sympetrum costiferum (Hagen), "Blacktail"—*Elko County* (Carlin); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Wadsworth). Previous records: Kennedy, 1917 ("*Reno, Golconda, Lovelock*").
33. Sympetrum danæ (Sulzer), the "Dana Toper"—*Elko County* (Mountain City); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows). Previous records: Kennedy, 1917, as *S. scoticum* (Donovan) ("*Reno*").
34. Sympetrum atripes (Hagen), the "Elusive Toper"—*Washoe County* (Truckee Meadows). Previous records: None.
35. Leucorrhinia glacialis Hagen, "Jimmy Whiteface"—not seen. Previous records: Hagen, 1890 ("*Reno*").
36. Leucorrhinia intacta (Hagen), "Johnny Whiteface"—not seen. Previous records: No specific designations; Essig, 1926 ("*British Columbia, Washington, Oregon, Nevada*").
37. Pachydiplax longipennis (Burmeister), the "Blue Pirate"—*Clark County* (Las Vegas); *Lincoln County* (Pahranagat Valley); *Washoe County* (Truckee Meadows, Washoe Lake). Previous records: Muttkowski, 1910 ("*Austral to Gulf Strip: entire United States*").
38. Erythemis simplicicollis (Say), "Green Jacket"—*Clark County* (Las Vegas); *Lincoln County* (Pahranagat Valley); *Pershing County* (Mill City, Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Washoe Valley). Previous records: Muttkowski, 1910 ("*United States; Ontario to British Columbia to California; Montana to Texas, Mexico*"); Kennedy, 1917 ("*Golconda, Lovelock*").
39. Pantala hymenea (Say), the "Two Spot"—*Clark County* (Boulder Lake, Las Vegas, Rio Colorado, Stump Springs); *Lincoln County* (Caliente, Pahranagat Valley, Quartz Spring). Previous records: None.
40. Pantala flavescens (Fabricius), the "Globe Skimmer"—*Washoe County* (Cody Basin). Previous records: No specific designations; Muttkowski, 1910 ("*Cosmopolitan (circumequatorial); all continents, except Europe (Italy); North America: Alleghanian to Tropic; Maine and North Dakota to California and Florida*").

41. Trapezostigma lacerata Hagen, the "Common Master"—*Clark County* (Las Vegas, Searchlight); *Lincoln County* (Caliente, Pahranagat Valley, Panaca). Previous records: No specific designations; Muttkowski, 1910 ("*Carolinian to Austroriparian: New York to South Dakota to California and Florida*").

42. Trapezostigma onusta Hagen, the "Brown Master"—*Washoe County* (Pyramid Lake). Previous records: No specific designations; Muttkowski, 1910 ("*Carolinian to Tropic: Ohio and Illinois to California and Florida*").

Superfamily AGRIONOIDEA "Damselflies"

Family AGRIONIDÆ "Janies"

Subfamily AGRIONINÆ "Janies proper"

43. Agrion æquabile (Say), "Western Blackwing"—*Elko County* (Mountain City). Previous records: None.

44. Hetærina americana (Fabricius), "Common Rubywings"—*Clark County* (Boulder Lake, Rio Colorado); *Lincoln County* (Caliente, Pahranagat Valley). Previous records: No specific designations; Muttkowski, 1910 ("*Canadian to Lower Austral: Canada to Guatemala*").

Family CŒNAGRIONIDÆ "Brocatels"

Subfamily LESTINÆ "Gimps"

45. Lestes congener Hagen, "Common Gimp"—*Churchill County* (Carson Sink); *Elko County* (Carlin, Elko); *Eureka County* (Beowawe, Palisade); *Humboldt County* (Mouth of Little Humboldt River, Winnemucca); *Pershing County* (Lovelock, Mill City, Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Wadsworth). Previous records: Kennedy, 1917 ("*Reno, Lower Truckee River, Carlin, Golconda, Winnemucca*"); Essig, 1926 ("*A common species throughout the United States, and widely distributed in the west*").

46. Lestes unguiculatus Hagen, "Pond Gimp"—*Pershing County* (Lovelock, Oreana, Rye Patch Reservoir); *Washoe County* (Dry Lake, Truckee Meadows, Wadsworth). Previous records: Kennedy, 1917 ("*Golconda*").

47. Lestes uncatus Kirby, "American Gimp"—*Churchill County* (Rye Patch Reservoir); *Lyon County* (Fernley); *Washoe County* (Dry Lake, Truckee Meadows, Wadsworth). Previous records: Muttkowski, 1910 ("*Canadian and Transition into Upper Austral: Nova Scotia and Panama to California and British Columbia*"); Kennedy, 1917 ("*Reno*).

Subfamily CŒNAGRIONIDÆ "Willowisps"

48. Argia agrioides Calvert, "Desert Wamble"—*Clark County* (Las Vegas, Stump Springs). Previous records: None.
49. Argia alberta Kennedy, "Alba Wamble"—*Elko County* (Peck Hot Springs, near Mountain City); *Washoe County* (Steamboat Hot Springs). Previous records: No specific designations; Needham and Heywood, 1929 ("*California, Colorado and Utah*").
50. Argia rita Kennedy, "Rita Wamble"—*Clark County* (Las Vegas, Stump Springs). Previous records: None.
51. Argia emma Kennedy, "Emma Wamble"—*Churchill County* (Carson Sink); *Elko County* (Carlin, Elko, Mountain City, Owyhee); *Humboldt County* (Winnemucca); *Lander County* (Battle Mountain); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Wadsworth, Washoe Lake). Previous records: Kennedy, 1917 ("*Reno, Lower Truckee River, Carlin, Golconda, Winnemucca*").
52. Argia vivida Hagen, "Western Wamble"—*Clark County* (Las Vegas); *Elko County* (Peck Hot Spring near Mountain City). Previous records: No specific designations; Essig, 1926 ("*Common about perennial streams throughout the entire western area, the United States and Canada*"); Needham and Heywood, 1929 ("*British Columbia and Montana to Texas and California*").
53. Amphiagrion saucium (Burmeister), "Common Whiffet"—*Elko County* (Elko, Mountain City); *Humboldt County* (Mouth of Little Humboldt River); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows). Previous records: Muttkowski, 1910 ("*Austral, into Transition: Washington and California to Massachusetts and South Carolina, Cuba?*"); Kennedy, 1917 ("*Reno*").
54. Telebasis salva (Hagen), "Desert Alva"—*Clark County* (Stump Springs). Previous records: No specific designations; Essig, 1926 ("*California, Nevada, Arizona*").

55. Enallagma boreale Selys, the "Boreal Bluet"—*Clark County* (Harris Springs, Kyle Canon); *Elko County* (Mountain City); *Washoe County* (Truckee Meadows). Previous records: Muttkowski, 1910 ("*Hudsonian, Boreal and Transition*: *Alaska and Washington to Nevada to Maine*"); Kennedy, 1917 ("*Golconda*") as *E. calverti* Morse.
56. Enallagma clausum Morse, "Mountain Bluet"—Not seen. Previous records: Morse, 1895 ("*Franktown*"); Kennedy, 1917 ("*Pyramid Lake, Golconda*").
57. Enallagma carunculatum Morse, "Lake Bluet"—*Churchill County* (Carson Sink); *Elko County* (Carlin, Elko); *Humboldt County* (Golconda, Winnemucca); *Pershing County* (Imlay, Lovelock, Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Derby). Previous records: Muttkowski, 1910 ("*Canadian and Alleghanian*: *British Columbia and Nevada to New York and Pennsylvania*"); Kennedy, 1917 ("*Lower Truckee River, Pyramid Lake, Carlin, Golconda, Winnemucca, Lovelock*").
58. Enallagma civile (Hagen), "Common Bluet"—*Clark County* (Corn Creek, Las Vegas, Stump Springs.) Previous records: No specific designations; Muttkowski, 1910 ("*Transition to Tropics*: *North America, south of* 45° *latitude, West Indies*").
59. Enallagma prævarum (Hagen), "Western Bluet"—*Clark County* (Rio Colorado, Stump Springs). Previous records: No specific designations; Muttkowski, 1910 ("*Lower Austral*: *Kansas and Louisiana, west to California, Mexico*"); Essig, 1926 ("*California, Nevada, Arizona, New Mexico*").
60. Enallagma anna Williamson, "Ana Bluet"—*Elko County* (Elko, Mountain City); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Sparks Canon). Previous records: Kennedy, 1917 ("*Reno, Golconda*").
61. Ischnura denticollis (Burmeister), the "Little Forktail"—*Elko County* (Carlin, Elko); *Humboldt County* (Mouth of Little Humboldt River, Winnemucca); *Lander County* (Battle Mountain); *Washoe County* (Truckee Meadows, Wadsworth). Previous records: Kennedy, 1917 ("*Golconda, Lovelock*").
62. Ischnura perparva Selys, the "Arva Forktail"—*Churchill County* (Carson Sink); *Elko County* (Deep Creek, Gold

Creek, Mountain City, North Fork, Owyhee, Whiterock); *Humboldt County* (Golconda, Valmy, Winnemucca); *Pershing County* (Rye Patch Reservoir); *Washoe County* (Truckee Meadows, Verdi, Wadsworth). Previous records: Muttkowski, 1910 ("*Upper and Lower Sonoran: Rockies, British Columbia and Montana to California and Texas*"); Kennedy, 1917 ("*Reno, Carlin, Golconda*").

63. Ischnura cervula Selys, the "Ula Forktail"—*Eureka County* (Beowawe); *Humboldt County* (Mouth of Little Humboldt River, Winnemucca); *Pershing County* (Lovelock, Oreana, Rye Patch Reservoir); *Washoe County* (Truckee Meadows). Previous records: Kennedy, 1917 ("*Reno, Lower Truckee River, Pyramid Lake, Carlin, Golconda*").

The following species have not yet been found within the borders of the state but will doubtless be found in the future because they occur in similar adjacent areas: *Gomphoides obscura* (Rambur), *Cordulegaster diadema* Selys, *Somatochlora semicircularis* (Selys), *Pseudoleon superbus* (Hagen), *Libellula luctuosa* Burmeister, *Libellula comanche* Calvert, *Plathemis lydia* (Drury), *Sympetrum obtrusum* (Hagen), *Dythemis velox* Hagen, *Brechmorhoga mendax* (Hagen), *Agrion maculatum* Beauvais, *Lestes disjunctus* Selys, *Hyponeura lugens* (Hagen), *Argia mœsta* (Hagen), and *Enallagma cyathigerum* Charpentier.

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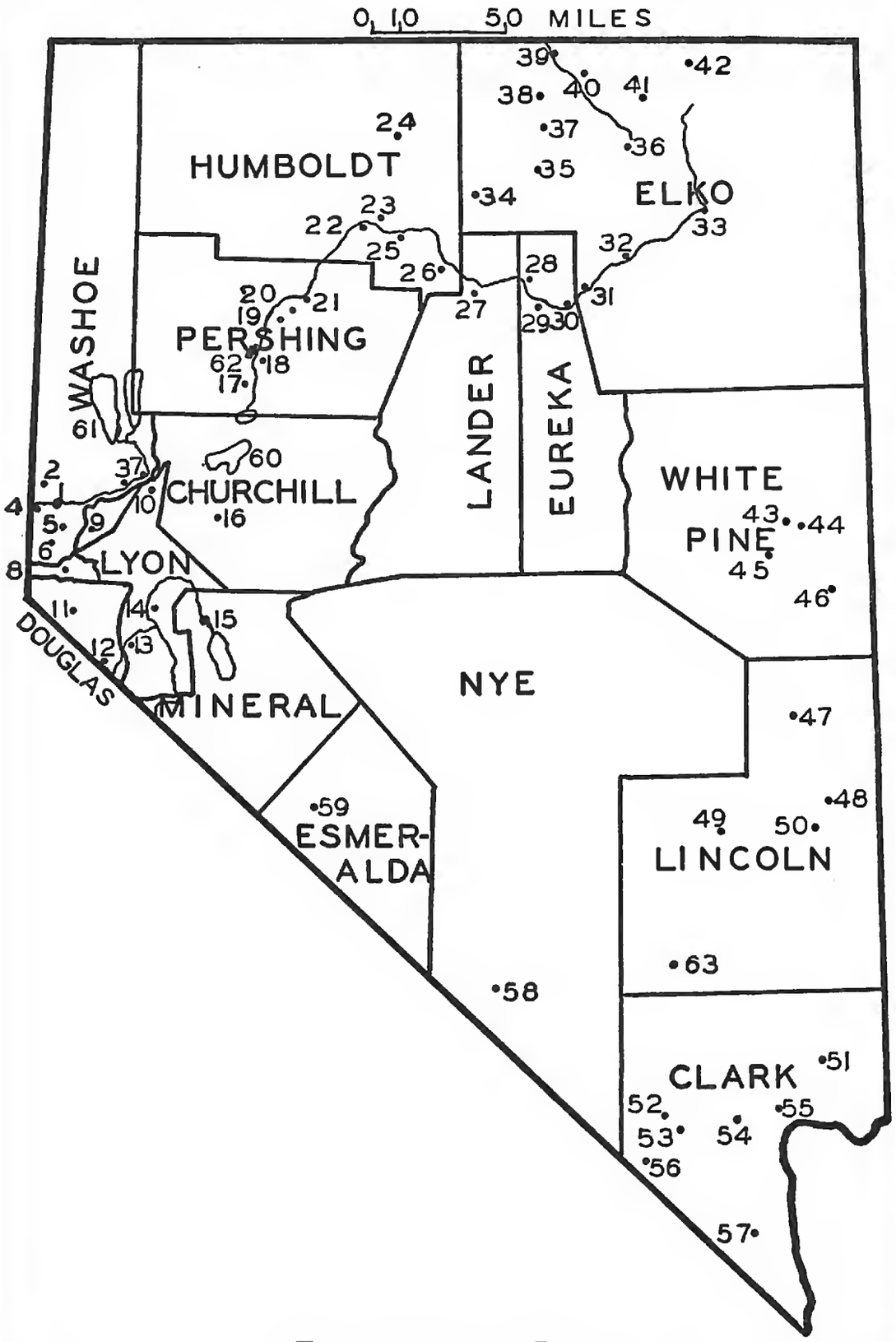

Explanation of Plate

Showing the points at which the author has made collections of dragonflies. The unnamed counties are Ormsby, in which Locality 8 lies, and Storey, designated by Locality 9. The long stream heading in Elko County and winding westward across the state to the Pershing-Churchill boundary is Humboldt River,

the longest stream in Nevada. The Owyhee River, whose source is near that of the Humboldt, flows northwest into Puget Sound. Two other large streams are the Truckee, entering Nevada from the west and depositing its waters in Pyramid and adjacent Winnemucca lakes (Washoe County), and the Walker emptying into Walker Lake in Mineral County. Forming the state's extreme southeast boundary, is the great Rio Colorado, the largest stream touching Nevada. Following is an explanatory list of the collecting localities: (1) Reno (Truckee Meadows), (2) Peavine (Cody Basin, Dry Lake), (3) Derby, (4) Verdi, (5) Steamboat Springs, (6) Franktown (Washoe Valley, Washoe Lake), (7) Wadsworth, (8) Carson City, (9) Virginia City, (10) Fernley, (11) Gardnerville, (12) Topaz Lake, (13) Smith Valley, (14) Yerington, (15) Schurz, (16) Fallon, (17) Lovelock, (18) Oreana, (19) Humboldt, (20) Imlay, (21) Mill City, (22) Winnemucca, (23) Mouth of Little Humboldt River, (24) Paradise, (25) Golconda, (26) Valmy, (27) Battle Mountain, (28) Dunphy, (29) Beowawe, (30) Palisade, (31) Carlin, (32) Elko, (33) Deeth, (34) Midas, (35) Tuscarora, (36) North Fork, (37) Deep Creek, (38) Whiterock, (39) Owyhee, (40) Mountain City, (41) Gold Creek, (42) Jarbridge, (43) Duck Creek, (44) Timber Creek, (45) Ely, (46) Lehman Caves, (47) Pony Spring, (48) Panaca, (49) Pahranagat Valley (Hiko), (50) Caliente, (51) Overton, (52) Lee Canon, (53) Harris Spring, (54) Las Vegas, (55) Boulder City (Boulder Lake), (56) Stump Springs, (57) Searchlight, (58) Beatty, (59) Fish Lake Valley, (60) Carson Sink, (61) Pyramid Lake, (62) Rye Patch Reservoir, (63) Quartz Spring.

Edward Payson Van Duzee

It is with deepest regret that we announce the death of Mr. Edward Payson Van Duzee at the age of 79 years. Born in New York City on April 6, 1861, he died on June 2, 1940, at Alameda, California, after a brief illness.

As a fitting memorial to one who served so long and so faithfully, the Publication Committee of the Pan-Pacific Entomologist dedicates the October number of the journal to Mr. Van Duzee, one of the founders and editor during the first fourteen years of its existence. The October number will contain a full account of the life and work of Mr. Van Duzee.—R. L. Usinger.

A NEW SPECIES OF CALLIGASTER FROM THE PHILIPPINE ISLANDS

(Hymenoptera, Vespidæ, Subfam. Zethinæ)

BY J. BEQUAERT

Museum of Comparative Zoölogy, Cambridge, Massachusetts

I have known for some time that the large Zethine wasp from the Philippines, listed thus far as *Calligaster cyanopterus*, is structurally distinct from the true Javanese *cyanopterus*. I intended to describe it in a revision of Philippine Diploptera. As this revision may be indefinitely postponed, the *Calligaster* is now described by itself.

Calligaster williamsi Bequaert, new species

Zethus (*Calligaster*) *cyanopterus* F. X. Williams, 1919, Rept. Expt. Sta. Hawaiian Sugar Planters' Assoc., Ent. Ser., Bull. 14, p. 157, figs. 88 (male), 89-94 (nest, egg, pupa). Not of de Saussure, 1852.

Length (h. + th. + t.1 + 2): female, 21 to 26 mm.; male, 20 to 22 mm.; of fore wing: female, 20 to 21 mm.; male, 20 mm.

Female. Head in front view (Fig. 1A) more nearly circular than in *cyanopterus*, conspicuously swollen at vertex and in upper outer orbits. First abdominal segment shaped much as in *cyanopterus*, but the ribbon-like portion of tergite (Fig. 1B) relatively wider and less parallel-sided, more flattened above and somewhat concave basally; first sternite also relatively wider. Puncturation much finer and very sparse on frons, vertex and outer orbits (in *cyanopterus* the punctures of these areas are larger than their intervals); also smaller and farther apart along hind margin of pronotum, over mesonotum and scutellum and in lower part of mesopleura. Longitudinal striation of median area of first tergite sharper and more regular than in *cyanopterus*, spreading fan-like; at base there are seven to ten fine ridges on either side of a conspicuous median ridge; as some of the ridges stop at the margin, new ones appear in the intervals of the remaining; grooves between ridges smooth (punctate in *cyanopterus*). Mid tibiæ with two apical spurs (as in *cyanopterus*). Color of body and wings as in *cyanopterus*, but the clypeus and mandibles entirely black (in the two females of *cyanopterus* seen, the apical area of the clypeus and portions of the mandibles are ferruginous).

Male. Differs from *cyanopterus* in the same details of structure and sculpture as the female. Head (Fig. 1C) not conspicuously swollen; apical margin of clypeus more deeply emarginate than in *cyanopterus*. Thirteenth antennal segment (Fig. 1D)

shorter and more broadly rounded off. Clypeus and frons entirely black (in the two males of *cyanopterus* seen the clypeus bears a small dirty-yellow spot below the middle and there are two dirty-yellow dots on the inter-antennal transverse ridge).

C. williamsi seems to average larger than *C. cyanopterus*.

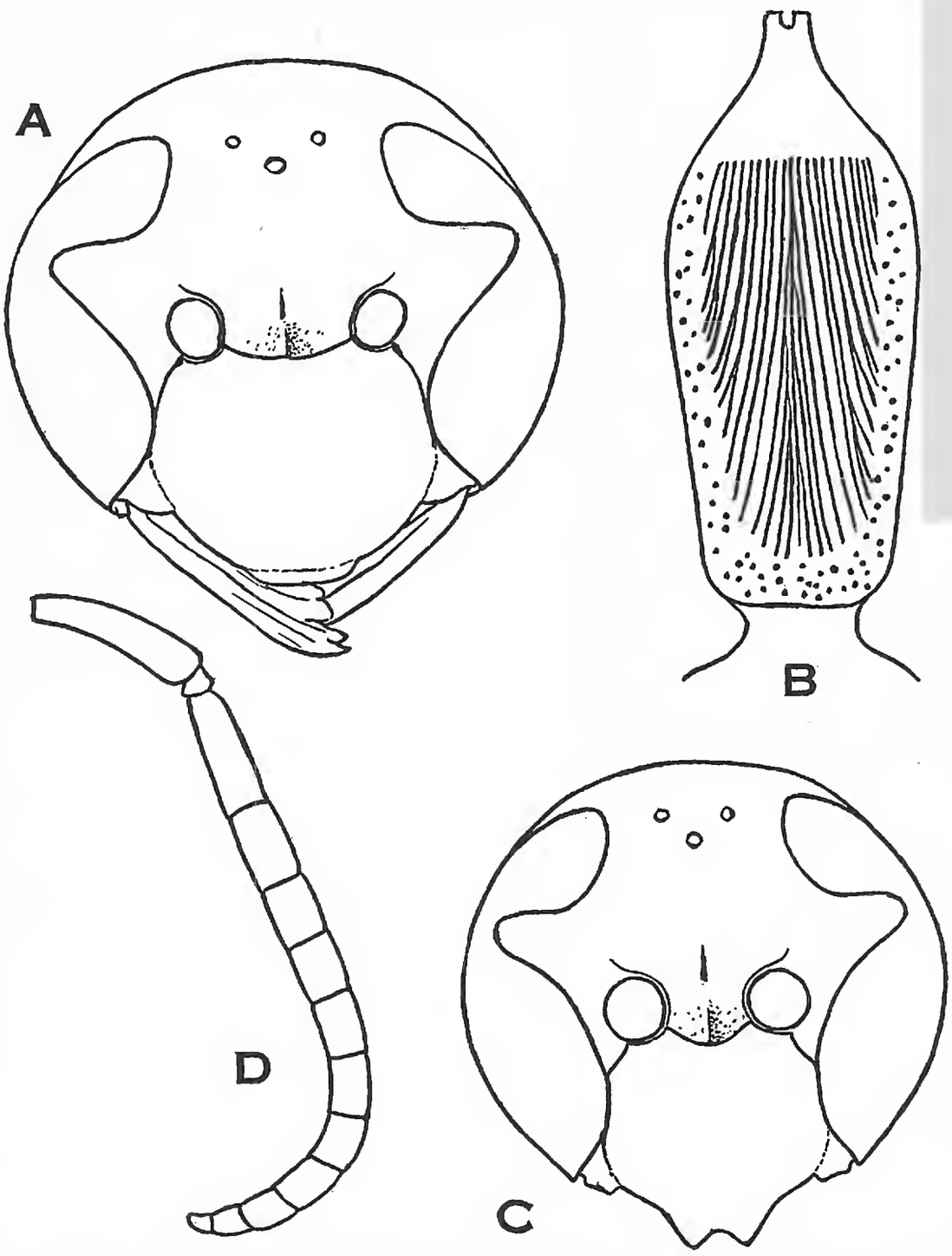

Fig. 1. *Calligaster williamsi* J. Bequaert: A, head of female; B, first abdominal tergite of female; C, head of male; D, antenna of male.

Holotype, female, and *allotype*, male, Los Baños, Luzon, Philippine Is. (F. X. Williams), Mus. Comp. Zoöl., Cambridge, Mass.

Numerous *paratypes* of both sexes at the Philippine Bureau of Science, the Dept. of Entomology of the College of Agriculture at Laguna, P. I., the American Museum of Natural History, the U. S. National Museum, the Academy of Natural Sciences, Philadelphia, and in Mr. J. van der Vecht's collection, from Los Baños, Luzon (D. Maulit; P. Bautista; M. M. Manis; A. Coronel; Pedroso; D. Feria, etc.); Zambales, Amuling, Luzon (R. C. McGregor); Mt. Maquiling, Luzon (A. Durano); Bayombong, Luzon; Lamao, Bataan, Luzon (H. M. Curran); Montalban Gorge, Rizal, Luzon (W. Schulze); and Puerta Galera, Mindoro (R. P. Cowles).

C. williamsi should not be confused with a species of *Pareumenes,* of the Philippines (apparently undescribed), of the same color and much the same shape, having even the median longitudinal striation of the first tergite. The *Pareumenes,* however, has long, knife-like mandibles and a quadridentate propodeum.

Calligaster de Saussure differs from *Zethus* in the shape of the first abdominal segment, the tergite of which bears a median dorsal area covered with longitudinal striæ. The mid tibiæ have two apical spurs in all species I have seen. In the male the antennæ have thirteen segments, but the thirteenth is normal, straight, not bent back as a hook nor curled up. The genus is strictly Indo-Malayan. *C. cyanopterus* de Saussure (1852) is probably restricted to Java, *Zethus erythrostomus* "Cameron" Meade Waldo (1914) and *Calligaster javanus* Gribodo (1891) being synonyms; its nest and habits were described by H. O. Forbes (1885, A Naturalist's Wanderings in the Eastern Archipelago, pp. 72-73), G. E. Frisby (1919) and J. van der Vecht (1934). The supposed *cyanopterus* recorded from Celebes, by F. Smith (1858), and from Sumatra, by Gribodo (1891), were certainly different and probably undescribed species. *C. williamsi* is restricted to the Philippines, where its habits were investigated by F. X. Williams (1919). *Zethus himalayensis* Cameron (1904), of Sikkim, and *Zethus etchellsii* Cameron (1909), of Borneo, the types of which I have seen at the British Museum, appear to be true *Calligaster.* Both are specifically distinct from either *cyanopterus* or *williamsi.* None of the other described Indo-Malayan Zethinæ belong in *Calligaster.*

The type of *Calligaster* is *Calligaster cyanopterus* de Saussure, by designation of Ashmead (1902, Can. Ent., 24:205).

TWO NEW SPECIES OF LOMACHÆTA, WITH A KEY TO DESCRIBED SPECIES*

(Hymenoptera, Mutillidæ)

BY CLARENCE E. MICKEL
University of Minnesota

Mr. George E. Bohart, Davis, California, has sent me three specimens, representing both sexes, of a small Mutillid which he states were reared from Larrid cocoons. They proved to be an undescribed species of the genus *Lomachæta*. Mr. Rollin H. Baker, Austin, Texas, has sent me an additional male specimen of the same genus collected in northern Mexico. It represents a second undescribed species.

The genus *Lomachæta* was proposed by the author (Ann. Ent. Soc. Amer., vol. 29, pp. 289-295, 1936). The two new species bring the total number of known species to six. A key to the species is herewith presented to facilitate their identification. The few observations regarding biology which are available indicate that the species of this genus are parasites of small aculeate Hymenoptera which nest in the twigs of plants.

KEY TO THE SPECIES OF LOMACHÆTA

Males

1. Body almost entirely, or entirely black.....2
–. At least the abdomen in part ferruginous.....3
2. Pronotum with moderate, close punctures throughout; distal margin of second abdominal tergite obscurely testaceous..... .....*punctinota* Mickel
–. Pronotum with moderately small punctures, the latter sparse medially, close at the lateral margins; abdomen entirely black. .....*coloradensis* Mickel
3. Abdomen almost entirely ferruginous; abdominal tergites three to six each with an anterior, median, black spot; most of the area of each black spot on that part of the tergite telescoped within the preceding segment; trochanters and femora of middle and posterior legs ferruginous, except the tips of the femora blackish.....*hicksi* Mickel
–. Only the first and second abdominal segments marked with ferruginous; legs entirely black.....4
4. First tergite, and second abdominal segment entirely ferruginous; head and thorax entirely, and abdomen, except marginal bristles on tergites two to four, and sparse, dark hairs medially on tergites five to seven, clothed with sparse, pale hairs.....*formosula* n. sp.

*Paper No. 1794 of the Scientific Journal Series of the Minnesota Agricultural Experiment Station.

–. First and second abdominal segments ferruginous only in part; the median, longitudinal third of the second tergite black, the black area dilated toward the posterior margin, and slightly constricted at the anterior margin; first sternite mostly black, ferruginous only at the sides; second sternite with a median, anterior, cuneiform, infuscated spot; front, vertex, mesonotum, scutellum, black area of second tergite and tergites three to seven with sparse black pubescence ..... *variegata* n. sp.

Females

1. Entirely pale ferruginous, except the antennæ, tibiæ and tarsi infuscated; dorsum of thorax very broadly reticulate throughout ..... *hicksi* Mickel
–. At least the second abdominal tergite largely black, and the ferruginous of the head and dorsum of thorax infuscated; at least the anterior third to half of dorsum of thorax narrowly reticulate, the remainder broadly reticulate 2
2. All of the abdominal segments, except the first, piceous to black, the posterior margin of each tergite and sternite ferruginous; tibiæ and tarsi piceous ..... *variegata* n. sp.
–. Abdomen entirely ferruginous, except the second black with the broad, posterior margin ferruginous; legs entirely ferruginous ..... *minutula* Mickel

Lomachæta variegata Mickel, new species

Male. Black, except the first and second abdominal segments in part ferruginous as described below, clothed with sparse, pale, glittering pubescence, except the front, vertex, mesonotum, scutellum, median black area of second tergite, and tergites three to seven with sparse, black pubescence, the abdominal tergites also with a few, pale, erect hairs at each lateral margin; pronotum with moderate, close punctures throughout; first segment of flagellum shorter than pedicel, about half the length of second flagellar segment. Length, 5.5 mm.

Head entirely black, clothed with sparse, pale, glittering pubscence, except front and vertex with sparse, black pubescence, and clypeus with long, thick pubescence pale in certain lights, fuscous in others; mandibles tridentate at tip and broadly emarginate beneath; clypeus convex medially, the sculpture obscured by thick pubescence; antennal tubercles separated by a space equal to length of second flagellar segment; scape densely punctate, clothed with black pubescence; first segment of flagellum as described above; front subreticulate, the punctures large and crowded, but becoming slightly smaller and less crowded toward vertex, the latter with moderate, slightly separated punctures; ocelli very small; relative widths of head and thorax at tegulæ, 2.0–2.2. *Thorax* entirely black, clothed with sparse, pale, glittering pubescence, except mesonotum and scutellum with sparse,

black pubescence; pronotum and mesonotum with moderate, distinct, close punctures throughout; scutellum with moderate, distinct punctures anteriorly, small, distinct punctures at posterior margin; dorsum of propodeum without an enclosed space, both dorsum and posterior face of propodeum reticulate throughout; propleura closely punctate; mesopleura with large, contiguous punctures medially, the anterior and posterior fourths glabrous, almost impunctate; metapleura and sides of propodeum glabrous, unsculptured, except reticulation of dorsum and posterior face of propodeum extending slightly on to sides of propodeum; tegulæ convex, glabrous, impunctate, except entire, narrow margin punctate and pubescent. *Abdomen* black, except as follows: first tergite ferruginous, except anterior margin black; second tergite with lateral thirds ferruginous, median third black, the lateral margins of black area slightly sinuate, dilated toward posterior margin and slightly constricted at anterior margin; lateral margins of first sternite ferruginous; second sternite ferruginous, except a large anterior, cunieform spot blackish; abdomen clothed with sparse, pale, glittering pubescence, except median black area of second tergite and tergites three to seven with sparse, black pubescence; bristles at posterior margin of second, third and fourth segments black; first tergite mostly impunctate, with a submarinal row of large, contiguous punctures near posterior margin; second tergite with moderate, well separated punctures; tergites three to seven with fine, separated punctures; first sternite with a median, longitudinal carina; second sternite with moderately large, distinct, close punctures; sternites three to six finely punctate at posterior margin; hypopygium with very small, distinct punctures. *Wings* subhyaline; venation typical, as figured previously for *hicksi*. *Legs* black, clothed with sparse, pale, glittering pubescence; tibiæ externally with very sparse, erect, black bristles; calcaria pale.

Female. Ferruginous, except front, vertex and dorsum of thorax infuscated; abdomen, except first segment and posterior margin of remaining segments, piceous; and femora, tibiæ and tarsi, infuscated to black; front, vertex and anterior half of dorsum of thorax narrowly reticulate, the posterior half broadly reticulate; abdominal tergites shagreened, and with small, scattered punctures, the second tergite with a thick, posterior fringe of pale pubescence, third tergite with a similar, thinner fringe; pygidial area obsolete. Length, 3 mm.

Head ferruginous, except front and vertex infuscated and flagellum black, clothed with very sparse, erect, black hairs, except the genæ and clypeus with pale pubescence; mandibles edentate, not emarginate nor toothed beneath; antennal tubercles slightly separated; pedicel and first flagellar segment equal in length, the latter longer than second, but shorter than second and third united; antennal scrobes not carinate above; front, vertex and genæ reticulate, the posterior margin of genæ defined by a

carina. *Thorax* ferruginous, infuscated like head, the dorsum clothed with scattered, recumbent, pale hairs, and very sparse, erect, fuscous hairs; pleural areas bare, except a few, scattered, pale hairs on propleura and mesopleura; anterior half of dorsum of thorax narrowly reticulate, the posterior half broadly reticulate; dorsum of propodeum and lateral margins of posterior face of propodeum also broadly reticulate, but median, posterior area of posterior face of propodeum unsculptured, glabrous; relative widths of thorax at humeral angles, anterior spiracular tubercles, propodeal spiracles and posterior margin of propodeum, 1.2 — 1.4 — 1.3 — 0.3; propodeal spiracular tubercles prominent; scutellar scale entirely absent; propleura and posterior half of mesopleura reticulate; anterior half of mesopleura, metapleura entirely, and sides of propodeum glabrous, unsculptured. *Abdomen* piceous, except first segment ferruginous, and posterior margins of tergites and sternites two to five, ferruginous, clothed with sparse, pale hairs beneath and on first tergite above, the remaining tergites with scattered, erect, fuscous hairs, second tergite also with a thick, posterior marginal fringe of pale pubescence, and third tergite with a similar fringe, but pubescence thin; first tergite with a few, scattered punctures, and a posterior, submarginal row of moderate, distinct punctures; second and following tergites shagreened, and with scattered, small punctures; pygidial area obsolete; first sternite with a median, longitudinal carina; second sternite with moderate, distinct punctures; sternites three to five indistinctly, finely punctate at posterior margin. *Legs* ferruginous, the tibiæ and tarsi piceous, clothed with sparse, pale, glittering pubescence; calcaria pale.

Holotype, allotype and paratype, a male and two females, Riverside County, California, May 2, 1939, reared from Larrid cocoon in twig (R. M. Bohart). Holotype and allotype in the California Academy of Sciences collection; paratype in University of Minnesota collection.

The three type specimens each bear a label reading "ex Crabronid," but Mr. George E. Bohart has stated in a letter to me that the cocoons from which the specimens were reared are actually Larrid cocoons.

Lomachæta formosula Mickel, new species

Male. Black, except first abdominal tergite, second abdominal segment entirely, and tips of mandibles, ferruginous, clothed throughout with sparse, erect, pale hairs, except tergites five to seven medially with sparse, erect, dark hairs, and bristles at posterior margin of tergites two to four, black; pronotum with moderately large, irregularly spaced punctures, some well separated, some confluent; first segment of flagellum shorter than

pedicel, about half the length of second flagellar segment. Length, 5 mm.

Head entirely black, except tips of mandibles ferruginous, clothed throughout with sparse, long, erect, pale hairs, except a few fuscous hairs at inner eye margins; mandibles tridentate at tip, distinctly emarginate beneath, and with a distinct tooth beneath, half the distance from base to apex; median area of clypeus triangular, slightly elevated, densely, finely punctate throughout; antennal tubercles separated by a space equal to length of second flagellar segment; scape clothed with pale hairs throughout; front subreticulate, the punctures large and crowded; vertex with moderately large, distinct, separated punctures; ocelli very small; relative widths of head and thorax at tegulæ, 1.3 — 1.6. *Thorax* entirely black, clothed throughout with sparse, long, erect, pale hairs; pronotum with moderately large, irregularly spaced punctures, some well separated, some confluent; mesonotum with moderately large, close punctures throughout; scutellum almost flat, only very slightly convex, with punctures similar to mesonotum but more crowded; dorsum of propodeum without an enclosed space; both dorsum and posterior face of propodeum broadly reticulate throughout; propleura mostly smooth, glabrous, very few punctures; anterior and posterior fourths of mesopleura glabrous, impunctate, the median half with large, contiguous punctures, subreticulate; metapleura and sides of propodeum glabrous, impunctate, the dorsal margin of metapleura finely rugose, and reticulations of dorsum and posterior face of propodeum extending slightly on to sides of propodeum; tegulæ large, strongly convex, glabrous, impunctate, except entire margin punctate and with long, pale, erect hairs. *Abdomen* black, except first tergite, and second segment entirely, ferruginous, clothed throughout with sparse, long, erect, pale hairs, except tergites five to seven medially with hairs dark, and bristles at posterior margin of tergites two to four, black; first tergite almost impunctate, but posterior margin with a row of very large, contiguous punctures; second tergite with moderately large, distinct, slightly separated punctures; tergites three to seven with progressively small to fine, separated punctures; second sternite with large, close punctures throughout. *Wings* subhyaline; venation typical, as previously figured for *hicksi*. *Legs* black, clothed with sparse, long, erect, pale hairs; tibiæ without black bristles; calcaria pale.

Holotype, male, Puerta de la Goriona, elevation 4900 feet, Sierra del Carmen, Coahuila, Mexico, July 13, 1938 (Rollin H. Baker), in University of Minnesota collection. (Mr. Baker writes that "Sierra del Carmen" on the label should read "Sierra de la Encantada.")

Similar to *variegata* but with the second abdominal segment entirely ferruginous and clothed almost entirely with long, erect, pale hairs.

THE IDENTIFICATION OF THE FEMALE OF THE MYRMOSID SUBGENUS MYRMOSULA*

(Hymenoptera, Tiphiidæ)

BY CLARENCE E. MICKEL

University of Minnesota

A revision of the Myrmosinæ of the New World by Dr. Karl V. Krombein has recently appeared (Trans. Amer. Ent. Soc., vol. 65, pp. 415-465, January 23, 1940). It includes a key to the males and females of the subgenus *Myrmosula* and a description of the new species *Myrmosa* (*Myrmosula*) *exaggerata.* Since the appearance of this revision, two female specimens of *Myrmosula* have come to my notice by being included with Mutillid material sent me for identification. The first specimen was sent me for identification by the Division of Entomology, University of California, Berkeley, California. An attempt was made to identify the specimen by means of Krombein's key but due to the use of an unfortunate descriptive term and the absence of any mention of certain structures on the head, authentic identification could not be made. The specimen had been collected at Pasadena, California, and since the only other species recorded from that vicinity was the unique type of *exaggerata* from Riverside, California, it seemed probable that the specimen was one of that species. The description of *exaggerata* states: "Frontal processes joined basally to form a weak median biramose process overhanging the bases of the antennæ." The front of the specimen in question was strongly elevated between the insertion of the antennæ and the elevation bore a pair of parallel ridges separated by a distance much less than the length of the ridges. It did not seem possible to imagine this elevated prominence as being a biramose process. The same phrase, biramose process, was used in Krombein's key to describe the interantennal elevation in the species *rutilans*, except that in that species the biramose process was said to be strong. An examination of *rutilans* specimens determined by Krombein showed that the interantennal elevation bore a pair of strong oblique ridges, converging but not meeting posteriorly. There was almost no resemblance between the interantennal elevations of the two species, except that both had a pair of ridges, and it did not seem possible to use such a descriptive term as "biramose" in describing either one.

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The Pasadena specimen also had a pair of processes on the under side of the head near the insertion of the mandibles. Nothing whatever was said in the original description of *exaggerata* regarding such processes.

The specimen was sent to Professor P. H. Timberlake, University of California Citrus Experiment Station, Riverside, California, for comparison with the type. Special attention was called to the form of the interantennal elevation and the processes on the under side of the head. Professor Timberlake replied that the type and the Pasadena specimen were exactly alike in all respects, except for a slight difference in color, which he did not regard as significant.

A second specimen came in material from the California Academy of Sciences. It was collected at Antioch in Contra Costa County, California. While it is closely related to *exaggerata* it is obviously not the same and is described hereafter.

All of the species of *Myrmosula* have a well developed hypostomal carina. This carina is more or less elevated into a tubercle or a strong process slightly mesad of the insertion of the mandible in all the females of this subgenus so far described. This modification of the hypostomal carina has not been mentioned with reference to any species in any of the previous papers on this group. The following key is offered with the hope that it may aid in the easier and more certain identification of the known females:

1. Front not elevated between the insertions of the antennæ, the antennal tubercles large and prominent; hypostomal carina elevated slightly mesad of insertion of mandibles into a distinct tooth, the latter almost concealed by the mandibular lamella; inferior margin of mandibular lamella emarginate ..... *parvula* Fox

–. Front very strongly elevated between the antennæ, the antennal tubercles much less prominent than the interantennal elevation; hypostomal carina very slightly tuberculate slightly mesad of the insertion of mandibles, or with a process not concealed by the mandibular lamella; inferior margin of mandibular lamella emarginate or not 2

2. Interantennal elevation with a pair of weak parallel ridges; hypostomal carina elevated into a distinct, dentate process slightly mesad of the insertion of mandibles, the tip of the process blunt and slightly recurved anteriorly 3

–. Intertennal elevation with a pair of oblique, prominent ridges converging posteriorly; hypostomal carina with only a very

small tubercle slightly mesad of the insertion of the mandibles ..... *rutilans* (Blake)

3. Parallel ridges on interantennal elevation approximate, the distance between them equal to half their length; front without a depression immediately behind the interantennal elevation; inferior edge of mandibular lamella broadly, shallowly emarginate ..... *exaggerata* Krombein

–. Parallel ridges on interantennal elevation widely separated, the distance between them almost equal to their length; front with a distinct depression immediately behind the interantennal elevation; mandibular lamella short, its inferior edge not emarginate ..... *pacifica* n. sp.

Myrmosa (Myrmosula) pacifica Mickel, new species

Female. Pale, ferruginous, almost testaceous throughout, except for darkened tips of mandibles; second tergite with a pair of small, creamy white, antero-lateral spots; and median third of telescoped part of last tergite, creamy white. *Head* distinctly broader than thorax; the front and vertex with small, close, distinct punctures, the genæ with fine, close punctures; mandibles bidentate at tip, the mandibular lamella on inferior margin short, present only on proximal third of mandible, and not emarginate; hypostomal carina produced slightly mesad of insertion of mandibles forming a blunt process distinctly recurved anteriorly at tip, and distinctly visible below mandibular lamella; anterior margin of clypeus broadly, shallowly emarginate; front strongly elevated between insertions of antennæ, the elevation bearing a pair of widely separated, parallel ridges, the distance between the ridges almost, but not quite, equal to their length; a very shallow, broad depression immediately posterior to interantennal elevation; head clothed throughout with very short, pale, glittering hairs, and scattered, long, erect hairs. *Dorsum of thorax* finely, very closely punctate, the pleural areas weakly striolate-punctate; thorax clothed throughout with very short, pale, glittering hairs and numerous, long, erect, pale hairs. *Abdomen* weakly, finely punctate, clothed with very short, pale, glittering hairs and scattered, long, erect hairs, except exposed portion of last tergite with thick, long, very pale ferruginous hairs. *Legs* finely, closely punctate, clothed throughout with thick, short, appressed, pale, glittering hairs and a few scattered long, erect pale hairs. Length, 4.5 mm.

Holotype, female, Antioch, California, September 4, 1938 (E. C. Van Dyke), in the California Academy of Sciences.

Myrmosa (Myrmosula) exaggerata Krombein

A single female has been examined from Pasadena, California, May 22, 1925; compared with the type by P. H. Timberlake.

THE CALIFORNIA SPECIES OF THE GENUS TRAGIDION
(Coleoptera, Cerambycidæ)

BY E. GORTON LINSLEY

University of California

The genus *Tragidion* is composed of large, striking, handsome longicorns, most of the species of which are rare in collections. Three species and one subspecies are known to occur in California, but apparently all but one of these have been misidentified. The following key is offered in an attempt to straighten out these forms.

KEY TO THE SPECIES AND SUBSPECIES OF TRAGIDION OCCURING IN CALIFORNIA

1. Elytra smooth, not corrugated, costæ indicated by vague, thread-like, unraised lines; posterior tibiæ slender, sparsely pubescent; dark pubescence without bluish reflections.....2
–. Elytra corrugated, costæ strongly elevated; posterior tibiæ robust, densely pubescent; dark pubescence with a distinct bluish reflection.....(*peninsulare*).....3
2. Posterior tarsi densely pubescent beneath, segments broad, first shorter than two following together, second wider than long, distinctly shorter than third segment; antennæ distinctly less than twice as long as body in male. 17–20 mm. Mojave Desert. Host: *Yucca*.....*armatum*
–. Posterior tarsi sparsely pubescent beneath, segments narrow, first longer than two following together, second longer than wide, distinctly longer than third segment; antennæ twice as long as body in male. 20–22 mm. Central and northern California. Host: *Rhamnus*.....*gracilipes*
3. Posterior tarsi broad, first segment gradually expanded to apex, about twice as long as apical width; larger: 28–34 mm. Southern and Lower California. Host: *Prosopis*.....*peninsulare peninsulare*
–. Posterior tarsi narrow, first segment parallel-sided, nearly three times as long as apical width; smaller: 17–21 mm. Central and northern California. Host: *Quercus*.....*peninsulare californicum*

(1) TRAGIDION ARMATUM LeConte

Tragidion armatum LeConte, 1858, Jour. Acad. Nat. Sci. Phila., (2) 4:25; Lacordaire, 1869, Genera Coleopt., 9:174, f.n.3; LeConte, 1873, Smithson. Misc. Coll., XI, 265:314; LeConte and Horn, 1883, Smithson. Misc. Coll., XXVI, 507:299; Leng, 1886, Entom. Amer., 2:81; Casey, 1893, Ann. N. Y. Acad. Sci., 7:586; Hamilton, 1896, Trans. Amer. Ent. Soc., 23:169; Casey, 1912,

Mem. Coleopt., 3:324; Craighead, 1923, Can. Dept. Agr., Bull. 27:79, pl. 27, f.3 (larva).

In this species the antennæ are usually but little longer than the body in the male and about three-fourths as long as the body in the female but a small percentage of individuals in any moderate series show variation in this character. The most constant structures appear to be the smooth elytra and the form of the posterior tarsi.

Type locality: Upper Rio Grande Valley, New Mexico.

Distribution: Western Texas to Mojave Desert, California.

Host: *Yucca.*

(2) **Tragidion gracilipes** Linsley, new species

Form elongate, subcylindrical; color black, elytra reddish orange, antennal segments three to six reddish in both sexes, pubescence black. *Head* opaque, finely, closely punctured, the punctures perceptibly larger on vertex; vertical carina distinct, shining; vertical horns of male prominent; pubescence short, erect, moderately dense; antennæ twice as long as body in male, attaining apical one-fourth of elytra in female. *Pronotum* of male opaque, densely pubescent, with anterior disk very coarsely, more or less contiguously punctured, discal tubercles shining, finely, sparsely punctured, punctures of posterior disk fine, close; pronotum of female very finely, closely but not contiguously punctured, median callous large, polished, with a few fine punctures around margin, discal tubercles polished, with a few coarse punctures; prosternum coarsely, subcontiguously punctured in male, finely, closely in female; metasternum and metepisterna finely punctured and pubescent in both sexes; scutellum clothed with black pubescence. *Elytra* about one and eight-tenths times as long as broad; smooth, costæ thread-like, not elevated; surface finely, closely punctured, densely clothed with short, depressed, golden reddish hairs intermixed with fine black hairs on basal margin; apices narrowly, conjointly rounded. *Legs* elongate; posterior tibiæ slender; posterior tarsi sparsely pubescent beneath, segments narrow, first segment longer than following two together, second segment longer than broad, distinctly longer than third segment. *Abdomen* without an apical golden fringe in either sex; sternites opaque, finely, closely punctured and pubescent. Length 20 mm.; breadth, 5.5 mm.

Holotype, male (No. 4603, Calif. Acad. Sci., Ent.), and allotype, female (No. 4604), from Napa County, California, June 18, 1922, on *Rhamnus californica*, collected by Mr. E. R. Leach. Numerous paratypes with the same data are in the collections of Mr. E. R. Leach and the writer. Additional paratypes are as follows: One female, Havilah, California, June 19, 1905, F.

Grinnell (Van Dyke collection, C. A. S.), and one male, Willow Spring, Kern County, California, June 30, 1905, F. Grinnell (Van Dyke collection, C. A. S.).

This fine species is related to *T. armatum* LeConte but differs in the very long antennæ of the male (twice as long as the body) and the form of the tarsi in both sexes (sparsely padded beneath with narrow segments, the first longer than the following two together, the second longer than broad and distinctly longer than third). In addition it has an entirely different distribution (foothills rather than desert) and host (*Rhamnus* rather than *Yucca*).

(3) Tragidion peninsulare Schæffer

Tragidion annulatum, Casey, 1893, Ann. N. Y. Acad. Sci., 7:856; Hamilton, 1896, Trans. Amer. Ent. Soc. 23:169.

Tragidion annulatum var. *peninsulare* Schæffer, 1908, Bull. Brooklyn Inst. Arts Sci., 1:339.

Tragidion peninsulare, Casey, 1912, Mem. Coleopt., 3:321.

This species differs from *T. annulatum* LeConte (type locality: Sonora, Mexico) by having a narrow dark band at the base of the elytra. The male further differs in having segments eight to eleven of the antennæ black, the head, thorax, and legs black rather than reddish brown, and the elytra reddish orange rather than fulvous. A few specimens of what appears to be typical *peninsulare* have been seen from the deserts of southern California, on *Prosopis.*

The majority of the California forms are smaller, differ in general as indicated in the key, and although occurring from San Diego to Shasta County, are primarily found in the foothills and mountains of the northern part of the state on *Quercus.* These may be regarded as a subspecies, **Tragidion peninsulare californicum** Linsley, new subspecies. Holotype, female (No. 4605, Calif. Acad. Sci., Ent.), and allotype, male (No. 4606). Additional material has been seen from the following localities: Upper Soda Springs, Shasta County (Van Dyke), Mokelumne Hill, Calaveras County (Blaisdell), Yosemite Valley (Linsley), Sequoia National Park, Tulare County (F. T. Scott), San Bernardino Mountains (Linsley), Pasadena (Fenyes), Los Angeles (Linsley), and Poway, San Diego County (Blaisdell). The dates are from June to September. Apparently this is the form which appears in the California lists under the name of "*annulatum* LeConte."

THE GENUS CENTRIS IN CALIFORNIA
(Hymenoptera, Apoidea)

BY P. H. TIMBERLAKE

University of California Citrus Experiment Station, Riverside

The Californian species of *Centris* are *C. rhodopus* Ckll., *C. rhodoleuca* Ckll., *C. pallida* Fox, *C. hoffmanseggiæ* Ckll., *C. tiburonensis* Ckll., *C. cockerelli* Fox, and the two new species described below. *Centris rhodopus* is common during the summer on the deserts of southern California, and I have collected a few in Bear Valley (7000 feet), San Bernardino Mountains. One female has been taken at Riverside, but it must have been a stray or wind-blown specimen, as the species almost surely does not nest in the cismontane area. Of *Centris rhodoleuca* I took three males in Morongo Valley, on *Croton californica*, August 4, 1933. *Centris pallida* is common in the spring and early summer on the Colorado desert and near Needles, at flowers of *Cercidium*, *Olneya* and *Dalea*. It has also been taken by C. M. Dammers in the upper portion of Cajon Canyon. *Centris hoffmanseggiæ* occurs on the western part of the Mohave desert and locally in different parts of the cismontane area of southern California. I have taken it at flowers of *Lotus scoparius*, collecting pollen, near Perris. The male has been taken at The Gavilan, Lytle Creek wash and on the Mohave desert near Victorville, on flowers of *Pentstemon antirrhinoides*, *Dicentra chrysantha* and *Larrea divaricata*. Cockerell based his *C. hoffmanseggiæ davidsoni* on a male from Banning, which is like the males recorded above, but it seems to me that the subspecies is based on too feeble characters. *Centris tiburonensis* is very similar to *C. pallida*, but smaller. I took both sexes flying with *pallida* at flowers of *Dalea spinosa* near Needles, on June 5, 1938. *Centris cockerelli* occurs rather commonly on the Colorado desert in the spring and early summer at flowers of *Cercidium*, *Krameria* and of several species of *Dalea*. It is certainly the same species as the *C. lanosa* of New Mexico and southern California (Fox and Cockerell records), but the male does not quite agree with Cresson's description of the male from Texas. It is, however, probably not more than subspecifically different from *C. lanosa* Cress.

The types of the following two species are in the collection of the Citrus Experiment Station, Riverside.

Centris californica Timberlake, new species

Nearest *C. hoffmanseggiæ* Ckll., but differs in the dentition of mandibles, lack of a yellow spot on clypeus and labrum, and in having the pubescence of abdomen shorter and much appressed, as well as partially dark on the second tergite.

Female. Black. Mandibles red at middle. Legs rufescent, sometimes weakly so, except small joints of tarsi. First two segments of abdomen sometimes rufescent. Antennæ at most slightly rufescent. Tegulæ testaceous. Wings dusky hyaline, the nervures blackish. Pygidium rather dark red. Pubescence of head and thorax pale ochraceous, becoming fuscous on the sternum, and of the usual density and texture. Hair of legs black, or blackish, the scopa of hind tibiæ and basitarsi dense as usual. Hair on under side of front basitarsi dark reddish. Pubescence of abdomen short, closely appressed, especially on tergites 2 and 3, longer and erect at base of tergite 1, and with longer erect hairs interspersed on 4 and 5. Hair of tergite 1 entirely pale ochraceous. That of tergite 2 more or less dusky or black on disk, but pale at base and sides and pale for a short distance at apex except more or less broadly in middle. Hair of abdomen, including venter, otherwise black. Head broader than long, the face nearly as wide as length of eyes. Mandibles somewhat broadened toward apex. The inner margin crenulate subapically, thus faintly marking off two short, bluntly rounded, teeth. (In *C. hoffmanseggiæ* the inner margin of mandible similar except that just basad is a third well-developed subacute tooth). Third antennal joint subequal to four following joints combined. Head shining. Clypeus weakly convex, finely and rather closely punctured at sides, broadly impunctate in middle. Frons and vertex finely, closely puctured, except a small area in front of ocelli and area between ocelli and eyes, impunctate. Thorax, especially mesonotum, more coarsely punctured than frons and dullish, except scutum posteriorly and disk of scutellum. Basal area of propodeum not enclosed, slightly dullish, minutely punctured and thinly hairy. Abdomen above shining, with fine, almost dense, setigerous punctures. Length, 14-15 mm.; anterior wing, 10-11 mm.

Holotype, female, collected at Kerman, Fresno County, California, on mustard, September 24, 1933 (P. A. Harvey). One female (paratype) at flowers of *Cleomella obtusifolia*, Barstow, San Bernardino County, September 12, 1924 (Timberlake).

Centris rhodomelas Timberlake, new species

Differs from all other species in the color of the hair, which is dark red on the notum, otherwise almost entirely black in the female. There seems to be no similar species with which it could be confused.

Female. Shining black. Mandibles with a red blotch on apical tooth. Flagellum rufescent beneath. Tegulæ dark ferruginous. Apical joint of tarsi dark red. Wings pale fuliginous, subhyaline, the nervures black. Pubescence dark fox-red on mesoscutum, scutellum and metanotum, and black on head, under parts of thorax, including pleura and propodeum, and on legs and abdomen. Hair of tubercles reddish, tipped with black. Hair on under side of front tarsi and on anterior edge of under side of middle tarsi dark red. Hair of first tergite dusky reddish, appearing either dark or rather light at different angles of vision. Pubescence of the usual density and texture on head, thorax and legs. Pubescence of abdomen thin and appressed, the surface of tergites being well exposed. Hair on tergite 2 shortest, that on following segments longer and less appressed. Hair at base of tergite 1 rather long and erect, but that on the disk appressed. Head wider than long, the width of face subequal to length of eyes. Inner margin of mandibles with three large subacute teeth, the apical tooth much longer and also subacute. On outer surface of mandibles opposite the basal inner tooth is a pencil of dark reddish hair, and the inferior margin has a thin fringe of long hairs of similar color. Third antennal joint subequal to four following joints combined. Clypeus strongly convex, finely and sparsely punctured, with a broad impunctate area in the middle. Frons and vertex more finely and closely punctured. Thorax closely and finely punctured, the notum shining, the pleura tessellate and dull. Basal area of propodeum, except apex, tessellate, slightly dullish, finely punctured and thinly hairy. Tergites shining, with minute setigerous punctures. Length, 14.5 mm.; anterior wing, 11.6 mm.

Male. Black. Apical joints of tarsi and under side of flagellum ferruginous. Stripe on inner margin at base of mandibles, labrum, clypeus, transverse supraclypeal mark and under side of scape, pale yellow. Pubescence of notum as in female, but hair of head and remainder of thorax dull ochraceous, slightly tinged with brown, becoming fuscous on upper part of frons and tinged with reddish on vertex behind ocelli. Hair of abdomen black, that of first two tergites ochraceous, tinged with brown, and tergites 2 to 4 with a paler, more whitish, apical fringe on each side. Hair of legs mainly light, like that of under parts of thorax, but becoming black on the middle and hind tibiæ and basitarsi, except the long fringe on dorsal margin which is poorly developed on hind legs (about as in *C. hoffmanseggiæ* Ckll.). Hair on anterior side of front tibiæ and tarsi also darkened. Head shaped as in female, but eyes larger, the face moderately narrow or about equal in width to two-thirds the length of eyes. Eyes not diverging except below the widest part of clypeus. Clypeus more finely punctured than in female. Sculpture of head and thorax otherwise similar. Abdomen less shiny, the punctures of tergites stronger and much closer, the surface also more hairy, with the hairs longer than in the female and suberect. Mandibles shorter, the inner margin with

only two teeth, the apical tooth less elongate. Third antennal joint somewhat shorter than four following joints combined. Length, 14 mm.; anterior wing, 4 mm.

The hair on the notum of male paratypes varies to fulvous, but is still redder than in other Californian species, except in one much faded specimen.

Holotype, female, collected at Mariposa, California, June 18, 1938 (R. M. Bohart), the allotype at same place, June 13, 1938 (J. M. Ferguson). Also the following paratypes: One female, one male, Mariposa, June 13 (Ferguson and Bohart), and ten males, June 18 (R. M. Bohart); one male, Santa Paula, June 5, 1927 (collector unknown); and three males, Sespe Canyon, Ventura County, June 9, 1926 (collector unknown). The Sespe Canyon paratypes, except one, returned to Mr. Mont A. Cazier, and the remainder of the paratypes, except one, are in the Bohart collection.

DRYOTRIBUS AND MACRANCYLUS ARE NOT AMERICAN COSSONINE GENERA

(Coleoptera, Curculionidæ)

BY ELWOOD C. ZIMMERMAN

Bernice P. Bishop Museum, Honolulu, T. H.

To one working with American literature, it appears that the genera *Dryotribus* and *Macrancylus* of the Cossoninæ are American. The purpose of this paper is to call attention to the fact that they are not. In my recently completed report[1], I had occasion to inquire into the status of these genera, and it is worth while to present my findings to continental students in this more available journal.

Genus Dryotribus Horn

Dryotribus Horn, 1873, Proc. Amer. Philos. Soc. 13:433.

Thalattodora Perkins, 1900, Fauna Haw. 2:146. Synonymy by Champion, 1909, Ent. Mo. Mag. (2) 20:123.

This genus was erected by Dr. Horn for the reception of a species (*D. mimeticus*) found in Florida. In 1900 Dr. Perkins named the same insect *Thalattodora insignis* and based his description upon a single specimen found under a log on the coast of the Hawaiian island of Lanai. In more recent years the species has been found to have a wide distribution and has now been recorded from many places including Florida, West Indies, the main and outlying Hawaiian Islands, Wake Island, Australia, and the Ryukyu Islands, between Japan and Formosa.

[1] Zimmerman, E. C. Synopsis of the Genera of Hawaiian Cossoninæ with notes on their Origin and Distribution. Occas. Papers, B. P. Bishop Museum, Vol. XV, No. 25, pp. 271-293, 1940.

It is found in numbers breeding in driftwood thrown up on beaches and is evidently confined to such materials.

The species *D. mimeticus* has been considered American and to have been introduced from America to Hawaii. However, enough new data have now been accumulated to refute this theory. In 1916 Dr. Perkins described a second species of the genus from Midway, one of the outlying Hawaiian Islands. In 1925 Sir Guy Marshall described a species from the Sunda Islands, and in 1926 Dr. Perkins described the fourth species from another of the outlying Hawaiian Islands, Pearl and Hermes Reef. These data, I believe, prove beyond a doubt that the genus *Dryotribus* is a native of the Pacific and that the one species now found in America has been carried there from some part of the Pacific, perhaps Hawaii, through the agencies of man.

Both generic and specific synonyms should be added to the Leng Catalogue, and the species should be followed by the sign indicating an introduced species.

Genus MACRANCYLUS LeConte

Macrancylus Le Conte, 1876, Proc. Amer. Philos. Soc. 14:338.
Haloxenus Perkins, 1900, Fauna Haw. 2:148. Synonymy by Champion, 1909, Ent. Mo. Mag. (2) 20:123.

LeConte described this genus from specimens taken in Florida by Hubbard and Schwarz. In 1900 Perkins described his *Haloxenus*, which Champion showed was really *Macrancylus*, to receive a common insect found under logs and in driftwood on the coasts of the Hawaiian islands of Molokai and Lanai. It is evident that this situation is quite like that of *Dryotribus*. In my paper on the Guam weevils I described a new species, and when I compared the two previously described members of the genus, *M. linearis* LeConte and *M. immigrans* (Perkins) Champion, I found that there were not two species involved but only one with two names. A case of great discontinuity in the natural distribution of the genus was, therefore, eliminated by showing that *M. immigrans* was a synonym of *M. linearis*. Furthermore the discovery of a new species on Guam showed that *Macrancylus*, like *Dryotribus*, is a Pacific genus and not American. I now have a new species from Samoa and one from the Cook Islands.

This generic and specific synonymy should be added to the Leng Catalogue, and *M. linearis* should be marked as an introduced species.

STUDIES ON THE SPECIES OF OMUS, NO. 1

(Coleoptera, Cicindelidæ)

BY F. W. NUNENMACHER

Piedmont, California

Among my captures for the present year, 1939, I recognize what appear to be two new and interesting species of *Omus*, and take this opportunity to make them known.

Omus subcylindricus Nunenmacher, new species

Form elongate, parallel and slightly ventricose. Head a little narrower than the widest part of the pronotum, rather coarsely and densely rugulose. Antennæ long and slender, a little shorter in the female than in the male.

Pronotum as wide as long, widest at apical fourth (5 mm.); sides arcuate, straighter posteriorly and moderately convergent toward base, the latter 4 mm. in width; disk rather finely, densely and moderately deeply vermiculate-rugose, the vermiculations very fragmentary and short, in this quite different from all the other species that I have seen or studied.

Elytra in the male type 12 mm. long and 6 mm. in width behind the middle at posterior third. Sides arcuate from the base, parallel in middle two-thirds, thence arcuately converging to apex, the tip evenly rounded; disk coarsely and moderately, deeply punctured, the punctures becoming more crowded toward and along the sides, without granules, but with a minute short and smooth line at the bottom of each coarse puncture. The only evidence of foveæ are a few scattered extra large punctures. Legs rather long.

Female. The elytra are 14 mm. in length and 7 mm. in width.

Measurements of types. Male: length, 18 mm.; width, 6 mm. Female: length, 20 mm.; width, 7 mm.

Type locality: Santa Clara County, California. Variation in the length is from 17 mm. to 22 mm., and the width, 5 to 7 mm.

Holotype, male; allotype, female, and twenty-six paratypes in my collection. Nineteen specimens were collected on April 16, 1939; nine others on April 23, 1939.

So far I have found this species only in a locality about 400 feet long and 20 feet wide. It has the appearance of an *Amblycheila* at first glance, the elongate and parallel form being notable. The species belongs to the Lecontei group. Compared with its close allies, *lecontei* and *intermedius*, it is more parallel with the vermiculate-rugose sculpturing twice as fine and more crowded than in *lecontei*. The pronotum of *intermedius* has

only traces of such sculpturing. The distribution of this species appears to be very local and it will, in all probability, prove to be a scarce insect in collections.

Omus vanlooi Nunenmacher, new species

Apparently belonging to the Edwardsi group. The large females look somewhat like that species, but in general the black color is dull or flat and the vermiculate-rugose sculpturing will separate the two species.

Head a little smaller than the widest part of the pronotum; not so coarsely rugulose as in *californicus*, but more like that in *lecontei*. Antennæ long and slender, slightly different in the two sexes.

Pronotum with the sides evenly arcuate to the middle, thence almost straight to the base; surface thickly vermiculate-rugose, but not as deeply so as in *californicus*, more like that in *lecontei*. Measurements: Length 3.5 mm.; width 4 mm. at the widest point before the middle and 3 mm. at base.

Elytra coarsely and densely punctate, with no granules. At the humeri and towards the sides the punctures become deeper and closer. There are no indications of foveæ, only here and there a large shallow puncture. Legs rather long.

Male. Narrower and less ventricose with the antennæ slightly longer and the sides of the elytra less arcuate than in the female. The elytra measure 9 mm. in length and 5 mm. in width.

Female. Body broader and more dilated, a little ventricose; elytral apex a little more pointed than in the male and the sides more strongly arcuate. The elytra measure 10 mm. in length and 6 mm. in width.

Measurements of types. Male: 15 mm. in length and 5 mm. in width. Female: 16 mm. in length and 6 mm. in width. The paratypes vary as follows: Length 13 to 17 mm., width 5 to 7 mm.

Type locality. Butte County, California.

Holotype, male, allotype, female, and fifty-six paratypes in the author's collection.

The species is dedicated to W. C. Van Loo.

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THE PAN-PACIFIC ENTOMOLOGIST

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IN MEMORIAM

EDWARD PAYSON VAN DUZEE

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San Francisco, California
1940

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E. P. VanDusee

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THE LIFE AND WORKS OF EDWARD PAYSON VAN DUZEE[1]

BY E. O. ESSIG and R. L. USINGER

University of California

Edward Payson Van Duzee was born at Number 36, East 22nd Street, New York City on April 6, 1861. Perhaps his greatest inspiration during his early years came from his father, William Sanford Van Duzee, a man of remarkable and varied talents and ability, who was a missionary to the Hawaiian Islands with one of the first expeditions in 1837. W. S. Van Duzee was later a dentist, a teacher and a builder and evidently maintained an active interest in scientific work throughout his life. Of his large family, only two sons, Millard C. (Pan-Pac. Ent., 10:90-96, portrait) and Edward P., followed scientific work. In 1861 the elder Van Duzee, whose home was in Buffalo, New York, was engaged as a building contractor in New York City. Within a week after the birth of Edward, the firing on Fort Sumpter initiated the Civil War and necessitated the closing out of building operations and the return of the Van Duzee family to their Buffalo home. Concerning this period, E. P. Van Duzee has written as follows[2]:

"My father as soon as he could close up his business in New York returned with his family to his home in Buffalo, and that city and its suburbs was my home for more than fifty years. Before transferring his business activities from Buffalo to New York father had purchased from James Fitz of Brooklyn a large acromatic refracting telescope, having an eighteen inch objective, that Mr. Fitz had constructed for the University of Virginia and which had been left on his hands through the stress of war conditions then prevailing in Virginia. This instrument is listed in the 8th edition of the Encyclopedia Britannica as one of the three largest refracting telescopes then made. On securing this large instrument father sold his smaller one to Hobart College and erected a three-story addition to his home, with the necessary equipment for the equatorial mounting of his large instrument. On the floor below the observatory he had five large rooms in which he installed the really extensive natural history collections he had accumulated

[1] Read before the 162nd meeting of the Pacific Coast Entomological Society on September 21, 1940.

[2] From a short autobiographical sketch of Edward Payson Van Duzee, typed in January, 1940.

through many years of active scientific work. The largest room was devoted to father's special interest, the birds, of which a representative of each species was mounted in a box having a background finished somewhat after the fashion of the habitat groups now so popular in museums. Other rooms contained collections in mineralogy, conchology and miscellaneous subjects. Some of this material he had accumulated while a missionary in the Hawaiian Islands and in travels about the country, and some he had obtained by purchase.

These collections and the observatory were open to the public free on certain days each month and father's place became the rendezvous for those in Buffalo who were interested in Natural History, and it was in these rooms that a few of the more earnest workers in natural science met together and decided to organize the Buffalo Society of Natural Science.

Such was the environment in which my boyhood days were spent and it formed, not only in me but also in my older brother, Millard C. Van Duzee, a deep-seated love of nature and a strong collecting diathesis which neither of us ever outgrew. This love of nature was still further strengthened by an intimate association with nature on father's farm at Lancaster, ten miles east of Buffalo where our summers were spent. There we ran wild in the fields and woods, often accompanying father on his hunting trips for birds and for other objects for his collection. Our education was largely obtained at private schools or under private tutors, but our real scientific training came from actual contact with nature under able guidance, and from the study of nature in father's large collections. Much of my early work was done in botany and geology and a little later in astronomy. In the latter study I devoted myself largely to work in the observatory, making nightly observations with the telescope, recording sun spots and keeping meteorological records. It was also during this period my duty to preside at the telescope when classes in astronomy were visiting the observatory, and to explain to the students the objects at which they were looking. During all this time, however, my real interest was gradually turning toward entomology under the guidance of Mr. Augustus R. Grote, then the director of the Buffalo Society of Natural Science, and the leading authority on American moths. Mr. Grote encouraged my brother and me to sugar for moths, taught us how to prepare and spread our specimens and helped us by making the determinations of our captures. Millard and I spent many happy days with him. He would exhibit with enthusiasm some of the new or rare Noctuids he had just received from Belfrage, Behrens, or others of his numerous correspondents, and explain to us the characters distinguishing the new species from allied forms. On one of these visits Mr. Grote advised me to take up the study of some group of insects, and recommended the Hemiptera."

In 1883 William Sanford Van Duzee died and his two entomologically inclined sons set out on the course of their life work. Millard carried on as a building contractor while Edward took some special laboratory work from March to July at Yale University under Prof. A. E. Verrill. Here he met and worked with S. W. Williston, one of the leading dipterists of the country. In March of 1885, through Henry A. Ward, an old friend of his father, E. P. Van Duzee became assistant librarian of the Grosvenor Library of Buffalo. This was exclusively a research library and hence provided ideal surroundings for the scientific work which was to occupy most of his waking hours during the next half century. With a medium power monocular microscope and his collection within reach, much of his early work on the Homoptera was done while not actually cataloguing and dispensing books at his desk. Other work was done evenings and Sundays in the house which he built at 17 Putnam Street. Here, by his first wife, Julia, were born his son, Edward Heath, who still resides in Buffalo, and his daughter, Mabel, now assistant professor of English at the University of Colorado. During these years, in addition to his work on the Hemiptera, Mr. Van Duzee collected generally, publishing lists of the Lepidoptera and of the dragonflies of Buffalo and vicinity. After ten years he was advanced to head librarian, which position he held for an additional 18 years. During these 28 years he acquired a knowledge of books and bibliographical methods which made him one of the foremost Hemiptera bibliographers of his time. Moreover, on yearly trips to library conventions and while purchasing books for the Grosvenor Library, he was able to visit the entomologists at the U. S National Museum and, on at least two occasions in 1885 and 1888, a fellow librarian and the foremost hemipterologist of America, Philip Reese Uhler of Baltimore. Dr. Uhler was a constant source of inspiration through correspondence and must have welcomed such able assistance because of his own failing eyesight.

The first twenty-five years of Mr. Van Duzee's work covered one of the most productive periods in the history of hemipterology. Following upon the foundations laid by the greatest hemipterist of all time, Carolus Stål, came such men as E. Bergroth, G. C. Champion, W. L. Distant, O. H. Heidemann, Geza Horvath, G. W. Kirkaldy, A. L. Montandon, L. Lethierry, B. R. Poppius, and O. M. Reuter. All of these men are now

dead, but Mr. Van Duzee actually belonged to their era and his copious letter files, now a part of the historical files of the California Academy of Sciences, contain his regular correspondence with these men.

Although pursuing a full time librarian's job Mr. Van Duzee kept constant contact with the field through week-end trips, even during the winter when he often went out in search of hibernating forms around Buffalo or at his father's farm at Lancaster. This was a fortunate pastime for one confined so largely to clerical work and no doubt contributed to his long life of vigorous activity which never flagged to the very end. Several longer trips were taken during these years of residence in the East and have since become well-known as the type localities of many of his new species. The more important of these trips were to Muskoka Lake, Ontario, Canada, in 1888; Michigan in 1891; Georgia in 1899; Colorado in 1900 and in 1903; the Adirondack Mountains, New York, and to New Jersey in 1902; Ohio in 1905; the Island of Jamaica in 1906; Florida in 1908; the White Mountains of New Hampshire and to Massachusetts in 1909; and to Ottawa and Quebec, Canada, in 1912.

Soon after the turn of the century the long and arduous task of writing his catalogue of the Hemiptera was begun. This work went on for about ten years, occupying an increasing amount of his time. The excellent library facilities of the Eastern United States were all available to supplement his own very complete library so the resulting catalogue proved to be an exhaustive treatise and a model or standard of excellence for such bibliographical work. While still collecting information, verifying citations (he personally checked each separate reference in the final manuscript), and untangling the perplexing problems of synonymy, the Grosvenor Library had been moved to larger quarters and increased to a staff of about fourteen. It is small wonder, under the circumstances, that a nervous condition developed in 1912 which threatened his health and caused him to sever his connections in Buffalo and move West. After a brief visit with his old friend, E. D. Ball in Colorado, he continued on to San Diego where he visited with Mr. J. L. Rose of Alpine. Here he soon recuperated and spent six months collecting Hemiptera in this very nearly virgin field. The results of this work were published in the Transactions of the San Diego Society of Natural History. In 1913 he obtained a position in the library of the

Scripps Institution of Oceanography at La Jolla, which position he held through 1914. During this period he was able to resume work on his catalogue and completed a rough draft of the final work. With no apparent prospect of its immediate publication he drew up a check list containing only the names, original references, and distribution. This was published by the New York Entomological Society and served to validate the many higher group names proposed for the first time.

Through Prof. W. E. Ritter, then director of Scripps Institution, Prof. C. W. Woodworth, head of the division of entomologoy of the University of California, offered Mr. Van Duzee a position as instructor in entomology at the University of California. The position was accepted in August, 1914, and Mr. Van Duzee immediately applied himself to two tasks, the completion of his catalogue and the building up of the collection of insects at the University. The material which he collected still forms the basis of the University's insect collection, while his catalogue of 916 pages was accepted by the University of California Press. This monumental work appeared not only as Volume 2 of the University of California Publications in Entomology but also as one of the Semicentennial Publications of the University, with a few copies specially bound in this latter series. Teaching never appealed to Mr. Van Duzee and his activities along this line were limited to field instruction, particularly with the entomological field class of the University of California Summer School which was held at Fallen Leaf Lake in the high Sierra from June 21 to July 31, 1915, under the direction of Dr. E. C. Van Dyke. A report of the many new species collected on this trip and several other important studies on the Hemiptera were published at this time in Volume 1 of the University of California publications in entomology. Mr. Van Duzee lived on Woolsey Street during his early days at the University. After his second marriage he remained for a time in Berkeley and then moved to San Francisco.

In the decade since the great fire and earthquake of 1906, the California Academy of Sciences had been gradually rebuilding its collections and library. The large insect collections of former years, built up by curators Herman Behr (1862-1867 and 1881-1904), Richard H. Stretch (1868-1880), and E. C. Van Dyke (1904-1916), were completely destroyed but for 300 specimens of type material saved by the courageous action of Miss Alice East-

wood, curator in botany. This material included the types of the Coleoptera, Hymenoptera, and Hemiptera from the early expeditions to Lower California. With this upon which to build, Dr. Van Dyke carried on for the next ten years in conjunction with his medical practice. Material accumulated during this time included the Grundell collection of about 3,000 specimens, the W. S. Wright collection of about 2,000 specimens, the fine series of insects taken by F. X. Williams on the Academy's expedition to the Galapagos Islands, numbering about 4,000 specimens, the material taken by Mr. Joseph Slevin, mostly in Arizona, by Dr. Thompson in the Orient, and by Dr. Van Dyke from extensive field work throughout the west coast. In all, this material was estimated by Mr. Van Duzee at about 30,000 specimens, a very substantial start toward rebuilding what had been the finest collection of insects in the West.

On June 1, 1916, Mr. Van Duzee accepted the positions of librarian and curator of entomology at the California Academy of Sciences. The latter position was open because Dr. Van Dyke had just taken up teaching and systematic work at the University of California. Mr. Van Duzee held the position of assistant librarian of the Academy for eleven years until a full time librarian was employed. For the first seven years he resided on Ninth Avenue in San Francisco near the Academy. Here it was possible to work evenings and in this he was helped by his wife, Mrs. Helen Van Duzee, who assisted him in the library and made a collection of spiders while he was devoting his energies to the Hemiptera. Later they moved to Mill Valley where they built a cabin and lived for one year and then moved to 1212 Fountain Street, Alameda, where the family home is still located.

During Mr. Van Duzee's twenty-four years at the Academy, starting at the age of 55 years, he built another monument to his lifetime of industry and entomological zeal. With the hearty cooperation of the entomologists of the west, the collections grew from 30,000 specimens to well over one million mounted specimens. Five thousand holotypes and allotypes of new species were accumulated and, of even greater importance, this vast amount of material was prepared beautifully and with meticulous care. The best modern technique for handling pinned material was employed with an improved type of unit tray system, glass tops and bottoms on the Lepidoptera cases, and endless details

which make the Academy collection one of the neatest and best cared for collections in the world today. It should be emphasized that all of this was accomplished with relatively limited funds and assistance, so that much of the routine fell upon Mr. Van Duzee and the volunteer help of such faithful friends of the Academy as F. E. Blaisdell and E. C. Van Dyke. The favorable conditions at the Academy attracted many large collections which were obtained either by gift or purchase. The largest of these are listed below in the order in which they were received.

	Specimens
E. J. Newcomer collection of Lepidoptera, 1917	1,737
R. H. Stretch collection of moths (Loan from the University of California) 1923	3,146
E. C. Van Dyke collection of Coleoptera, 1924	200,000
H. M. Holbrook collection of butterflies, 1924	500
E. P. Van Duzee collection of Hemiptera, 1924	35,184
F. E. Blaisdell collection of Coleoptera, 1925	125,000
J. C. Huguein collection of Lepidoptera, 1925	1,870
Albert Koebele collection of insects (purchase), 1925	100,000
L. S. Slevin collection of Coleoptera, 1927	30,300
C. L. Fox collection of Hymenoptera, 1928	16,700
J. O. Martin collection of Coleoptera, 1928	12,000
Norman R. Gunn collection of Lepidoptera, 1932	3,300
M. C. Van Duzee collection of Diptera, 1934	29,500
Adalbert Fenyes collection of Coleoptera, 1937 (purchase)	100,000
William Hovanitz collection of Lepidoptera, 1939	3,000
Graham Heid collection of butterflies, 1939	4,000
E. G. Linsley collection of Cerambycidæ, 1939	50,000
F. C. Hadden collection of Philippine Coleoptera, 1939	200,000

In addition to these large collections which were received as units, a vast amount of material was collected by Mr. Van Duzee and members of his staff while Dr. Van Dyke and Dr. Blaisdell continued to add to their already large collections, contributing fifteen thousand or more insects each year. During these years Mr. Van Duzee made extensive trips to the San Jacinto Mountains in 1917; Siskiyou County in 1918; Huntington Lake in 1919; Washington State and Vancouver Island in 1920; the Gulf of California in 1921; Utah in 1922; Southern California in 1923; Arizona in 1924; Truckee, California, and Nevada in 1927; Fort Collins, Chicago, Buffalo, Ithaca, New York City,

Boston, Philadelphia, Washington, D. C., Pittsburg, Urbana, Decatur, and Ames, on a trip to attend the Fourth International Congress of Entomology at Ithaca in 1928; and the Owens Valley in 1929. Only shorter trips were taken during the next decade because of the failing health of Mrs. Van Duzee's mother, who required constant attention and care. These short trips took him again to many of his former collecting places in California but much of this travel was incidental to the business of administering the large collections in his care and soliciting new material.

Other material accumulated at the academy includes a fine entomological library, obtained by judicious purchases and recently augmented by the donation of Dr. Van Dyke's excellent library consisting of 1,000 volumes and 1,000 separates, bulletins, etc., on the Coleoptera and general entomology and Dr. Isabel McCracken's library, which is particularly strong in the Hymenoptera.

Members of the Pacific Coast Entomological Society had long felt the need for a special entomological journal devoted to western entomology and had actually planned such a journal to be called the "Pacific Coast Entomologist." However, the uncertainty of conditions during the first World War made the venture inadvisable at that time. In 1924 the project was carried through, due to the vision and faith of E. P. Van Duzee, E. C. Van Dyke, F. E. Blaisdell, E. O. Essig, G. F. Ferris, R. A. Doane, Grant Wallace, W. W. Henderson and J. C. Chamberlin. The bulk of the work fell upon the shoulders of Mr. Van Duzee as editor, and Dr. Blaisdell as treasurer, but the entire Publication Committee contributed in no small measure to finance the new venture. To Mr. Van Duzee goes a large part of the credit for the style and standard of excellence which he built up while acting as editor during the first fourteen years of existence of the Pan-Pacific Entomologist. Few people realize the sacrifices of his own research which Mr. Van Duzee made while building this journal up to its present respected position among the entomological journals of the world. Continuing through the year 1938, he never relaxed his editorial vigilance and only turned the work over to others when the pressure of routine duties and failing health forced him to do so.

In the latter part of May, 1940, Mr. Van Duzee, accompanied by his wife, drove to Los Angeles where he was occupied with

Academy business. While enroute to a collecting place in the Coachella Valley, he was suddenly taken ill and decided to return to his home in Alameda. A trained nurse was employed to accompany them as far as Fresno. Here, after a night's rest, Mr. Van Duzee's condition was considerably improved so the nurse was permitted to return to Los Angeles while Mrs. Van Duzee drove her husband home. The following day he entered the Alameda Hospital for observation and rest. Having been informed by his physician that he would be unable to return to his work and being so concerned about the future of the Academy, he called his assistant, E. S. Ross, to his bedside and discussed with him at length the problems having to do with the care of the insect collections. Although appearing to respond immediately with hospital care, he died suddenly on the next day, June 2. Funeral services were held Wednesday, June 5, 1940, at 3:00 o'clock p. m. at the Mausoleum Chapel at Mountain View Cemetery, Oakland, in which cemetery he was buried. His funeral was attended by a large group of his entomological friends from all parts of the state.

The regular July meeting of the California Academy of Sciences was devoted to a commemoration of the life and work of Mr. Van Duzee. The meeting was held in the entomological laboratories of the Academy on Wednesday afternoon, July 10, at 4:00 p. m. Short commemorative and appreciative addresses were delivered by E. C. Van Dyke, E. O. Essig, W. B. Herms, R. C. Miller, and F. M. MacFarland.

Mr. Van Duzee will long be remembered for his industry and devotion to the causes for which he worked. Throughout his life are scattered landmarks which will stand as his everlasting monuments. He was a link between the older generation of nineteenth century hemipterists and our present-day workers. At the time of his death he was dean of the hemipterists of the world, succeeding to that exalted place upon the death of his friend and correspondent, the eminent Hungarian hemipterist, Dr. Geza Horvath.

Prominent as a member and loyal in his support of scientific societies and journals, Mr. Van Duzee was or had been a member of the following societies: American Entomological Society, American Association of Economic Entomolgists, American Museum of Natural History, Brooklyn Entomological Society, Buffalo Historical Society, Buffalo Society of Natural Sciences,

Cambridge Entomological Club, Ecological Society of America, Entomological Society of Ontario, Kansas Entomological Society, National Geographic Society, Philadelphia Academy of Natural Sciences, Southern California Academy of Sciences, and Western Society of Naturalists. He was a fellow of the American Association for the Advancement of Science, a patron of the California Academy of Sciences, a fellow and charter member of the Entomological Society of America and vice-president in 1934, an honored member of the Pacific Coast Entomological Society and a fellow of the San Diego Society of Natural History.

During his lifetime Mr. Van Duzee accumulated several separate collections. His Lepidoptera, mostly from Buffalo and vicinity, are now part of the collection of the Buffalo Society of Natural History. The Coleoptera collected in Florida and Jamaica went to his friend H. F. Wickham and thence to the United States National Museum. An extensive collection of Hemiptera, 'including a full series of his types up to that time,"[3] was sold to Iowa State College in 1897. A large general collection was accumulated for the University of California during the years 1914-1915. Finally his collection of Hemiptera in 1925, including about 30,000 specimens, was given to the California Academy of Sciences and was augmented by approximately 100,000 insects of all orders collected subsequently in general field work by him for that institution. A considerable collection of land shells was likewise accumulated, including some interesting species collected by his father in Hawaii in 1837. This collection is a part of the undistributed estate at present.

In recognition of his extensive field work while pioneering in little explored territory, a large number of species and two genera have been named in honor of Mr. Van Duzee. Seventy-seven of these are listed at the end of this paper.

Mr. Van Duzee published a total of 250 papers, comprising 2821 pages, in the fifty-five years between 1885 and 1940. During this period there were only four years at scattered intervals when no papers appeared from his pen. In general, these papers are descriptions of new species, extensive faunal lists, and short notes. A few are monographic treatments of particular groups for North America whereas the check list and catalogue are monumental bibliographical works. In these works he described a total of 895 new species, subspecies, or varieties, 47 new

[3] Osborn, Herbert. 1937. Fragments of Entomological History, p. 297.

genera or subgenera, 12 new names for species, subspecies or varieties, 5 new names for genera, and 33 higher group names, these last consisting largely of new names for old subfamily or tribal concepts in order to bring the nomenclature of the higher groups of Hemiptera into conformity with that of other orders.

A list of all of the names proposed by E. P. Van Duzee is given at the end of this work. The names have been arranged systematically according to the arrangement in his catalogue (1917) for higher groups and alphabetically for genera and species. All names are given in their original form and combination. The number immediately following the name and preceding the colon refers to the bibliographical reference in the complete Van Duzee bibliography at the end of this work, while the number following the colon refers to the page on which the name was proposed. A valuable list of the "Types of genera established by the author" up to 1909 is given in the Canadian Entomologist, 41:380-384.

Biographical notes, pictures, and death notices of E. P. Van Duzee have appeared in several places as listed below.

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Some Genera and Species Named in Honor of E. P. Van Duzee

GENERA

Vanduzea Goding.

Vanduzeeina Schouteden.

SPECIES

Arachnida

Sassacus vanduzeei Chamberlin.

Chelanops vanduzeei J. C. Chamberlin.

Orthoptera

Glematodes vanduzeei Hebard

Esselenia vanduzeei Hebard.

Hemiptera

Acalypta vanduzeei Drake.
Aradus duzeei Bergroth.
Aradus vanduzei Heidemann.
Chlorotettix vanduzei Baker.
Cinara vanduzei (Swain).
Cyclokara vanduzei (Ball).
Cyrtolobus vanduzei (Goding).
Deræocoris vanduzeei Knight.
Deltocephalus vanduzei Gillette and Ball.
Dorycephalus vanduzei Osborn and Ball.
Eutettix vanduzei Gillette and Baker.
Gargaphia vanduzeei Gibson.
Geocoris duzeei Montandon.
Idiocerus duzeei Provancher.
Lamproscytus vanduzeei Reuter.
Liburnia vanduzeei (Crawford).
Lygus vanduzeei Knight.
Macrotylus vanduzeei Knight.
Melanostictus vanduzeei Reuter.
Mezira vanduzeei Usinger.
Micronecta vanduzeei Kirkaldy.
Nabis vanduzeei (Kirkaldy).
Okanagana vanduzeei Distant.
Phlepsius vanduzei Ball.
Phytocoris vanduzei Reuter.
Pilophorus vanduzeei Knight.
Platylygus vanduzeei Usinger.
Platypedia vanduzeei Davis.
Pycnoderes vanduzeei Reuter.
Rhinocapsus vanduzeii Uhler.
Scolops vanduzei Ball.
Typhlocyba vanduzei (Gillette).
Xerophlœa vanduzeei Lawson.

Coleoptera

Acmæodera vanduzeei Van Dyke
Adetus vanduzeei Linsley.
Cylindrocopturus vanduzeei Van Dyke.
Dasytastes vanduzeei Blaisdell.
Eleodes vanduzeei Blaisdell.
Eusaltus vanduzeei Blaisdell.
Listrus vanduzeei Blaisdell.
Neoclytus vanduzeei Van Dyke.
Stenopodinus vanduzeei Blaisdell.
Stenoptochus vanduzeei Van Dyke.
Trichochrous vanduzeei Blaisdell.

Lepidoptera

Gelechia vanduzeei Keifer.
Graptolitha vanduzeei Barnes.
Lycæna editha ab. *vanduzeei* Gunder.
Melitæa palla whitneyi ab. *vanduzeei* Gunder.
Pero vanduzeeata Wright.
Xylomyges vanduzeei Barnes and Benjamin.

Hymenoptera

Andrena vanduzeei Linsley.
Anthidium p. vanduzeei Cockerell.
Centris vanduzeei Cockerell.
Ceratina arizonensis vanduzeei Cockerell.
Halictus vanduzeei Sandhouse and Cockerell.
Megachile vanduzeei Cockerell.
Melissodes catalinensis vanduzeei Cockerell.
Nomia howardi vanduzeei Cockerell.
Oreopasites vanduzeei Cockerell.
Osmia vanduzeei Sandhouse.
Perdita vanduzeei Cockerell.

Diptera

Ablautus vanduzeei Wilcox.
Amphicosmus vanduzeei Cole.
Cyrtopogon vanduzeei Wilcox and Martin.
Euparyphus vanduzeei James.
Lissoteles vanduzeei Cole.
Nannocyrtopogon vanduzeei Wilcox and Martin.
Pegomyia vanduzeei Malloch.
Pipiza vanduzeei Curran.
Sapromyza vanduzeei Cresson.
Thereva vanduzeei Cole.
Ulomorpha vanduzeei Alexander.
Villa vanduzeei Cole.

Species, Genera and Higher Group Names Proposed by E. P. Van Duzee[3]

HETEROPTERA

Plataspidæ

Brachyplatys **nitidiceps**, 250:178.

Scutelleridæ

Coleotichus **adamsoni**, 199:177.
Eurygaster **carinatus**, 45:18.
Homæmus **variegatus**, 72:3.
Odontoscelis **balli**, 45:19.
producta, 45:20.
Phimodera **corrugata**, 45:16.
Vanduzeeina **californica**, 108:391.
borealis, 108:392.

Cydnidæ

Corimelæna **californica**, 160:10.
gillettii, 45:8.
sayi, n. n., 45:10.
Cydnoides **arizonensis**, 101:304.
Euryscytus **diminutus**, 101:305.
Thyreocorinæ, n. subfam., 51:5.
Thyreocoris **cognatus**, 51:6.
montanus, 57:231.
Geotomus **murinus**, 202:26.
noctivagus, 97:125.
Psectrocephalus, n. g., 95:270.
cæcus, 95:271.

Pentatomidæ

Acanthosoma cruciata var. **cooleyi**, 45:74.
atricornis, 45:75.
Andriscus **cinctus**, 46:213.
terminalis, 46:213.
Antestia **oliva**, 46:206.
Apateticus **anatarius**, 225:27.
Menida **cockerelli**, 166:93.
Mormidea (Melanochila) **purpurescens**, 196:93.
Neopharnus, n. g., 62:73.
fimbriatus, 62:73.
Œchalia **virgula**, 232:220.
hirtipes, 232:221.

[3] Prepared by R. L. Usinger.

Coreidæ

Aradidæ

Neididæ

Lygæidæ

Pyrrhocoridæ

Tingididæ

Phymatidæ

Reduviidæ

Nabidæ

Cimicidæ

Anthocoridæ

Miridæ

Schizopteridæ

Cicadellidæ

Fulgoridæ

Chermidæ

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NEW SPECIES OF HEMIPTERA COLLECTED BY THE TEMPLETON CROCKER EXPEDITION TO THE SOLOMON ISLANDS IN 1933

BY EDWARD P. VAN DUZEE[1]

PLATASPIDÆ

Brachyplatys nitidiceps Van Duzee, new species

Closely related to *obscurus* Montd. from New Guinea; deep polished black; head smooth, polished, eyes bright vermillion red; a submarginal line on the sides of the pronotum anteriorly, base of costa and abdominal margins yellowish; antennæ, rostrum, tibiæ and tarsi ochraceous. Length 6 mm.

Head short, almost truncate before, one-half as long as wide betwen the eyes, five-eighths as wide as pronotum across the humeri, its surface smooth and polished, without visible punctures or rugæ; cheeks valvate, disk depressed; ocelli small, red, distance between them one-half greater than that to the eye. Pronotum short, its length three-eighths its humeral width, sides but moderately arcuate the humeri but little prominent; punctures obsolete or nearly so. Scutellum transverse, the ratio of length to width as 11::18, one-sixth wider posteriorly; punctures very small, distant, subobsolete, becoming quite so on base and on the lateral areas, especially posteriorly; apex deeply excavated as usual in the males of this genus. Antennal segments as 9:3:10:10:11. Rostrum attaining apex of hind coxæ. Ostiolar orifices small, their distance from coxæ twice that from sides of the metapleuræ, canal narrow, polished, black, flat, with carinate margins, slightly widened and curved anteriorly at apex which attains margin of the opaque area. Venter polished, impunctate, with very feeble transverse rugæ; segment VI produced anteriorly in a sharp triangle to apical margin of IV, V being cut through at center. Genital segment truncate at apex, when extended nearly quadrangular if viewed from below, the side margins but little thickened apically; fringe of pale hair on the basal fova forming two hooks, their common median stalk slender, not thickened as in *subæneus*.

Color deep polished black, eyes vermillion red; a submarginal line on pronotum before the humeri, reproduced below, a short vitta on base of elytra, a suggestion of a submarginal line about the apex of the scutellum, an eroded vitta on abdominal margin, a nearly obsolete point behind the stigmata on segments II, III, and IV, and rostrum, pale yellowish; antennæ dusky yellow,

[1] This posthumous article has been prepared by the editor from the unpublished manuscripts of the late E. P. Van Duzee. At the time of his death Mr. Van Duzee was in the midst of a general study of the entire Hemipterous fauna of the Solomon Islands.

segment I piceous, pale at extreme apex; femora piceous black; tibiæ and tarsi dusky ochraceous; tip of claws black; whole sternal and pectoral region opaque plumbeous-gray, the outer angle of metapleura only polished black, the acetabula piceous to pale; base of head beneath with a yellowish spot either side the rostral canal; a very faint castaneous mark discernible on base of scutellum above elytral sinus.

Holotype, male, No. 5125, Calif. Acad. Sci., Ent., and one male paratype, taken by Maurice Willows at Uras Cove, Malaita Island, Solomon Islands, May 28, 1933. This species pertains to section "a" in Stål's synopsis (Enum. Hemipt., V, p. 7, 1876), which includes *deplanatus* Erich. from the Philippine Islands and *obscurus* Montandon from New Guinea. It can be distinguished from *deplanatus* at once by its nearly impunctate surface. It is much nearer *obscurus* but the puncturation of the scutellum is different, the head wants the feeble rugæ, the color markings are much reduced, a character undoubtedly subject to variation, and there are other differences as indicated in the above description. With our present limited knowledge of this group I believe it best to consider it as a distinct species but the study of material from other islands may lead us to place it as a subspecies of *obscurus*.

PENTATOMIDÆ

Vitellus ensifer Van Duzee, new species

Apparently closely allied to *pungens* Montr. from the island of Woodlark but differing distinctly in the form of the metasternal carina; pale greenish olivaceous, humeral spines rather short, obtuse, slightly recurved. Length 11 mm.

Head as long before the eyes as wide between them, broadly sinuate either side, subangularly narrowed anteriorly; tylus scarcely exceeding the cheeks, surface impunctate, transversely wrinkled. Pronotum more than three times as wide across the humeri as long; anterior submargin sulcate, carrying a single row of large confluent punctures that become irregular at the anterior angle; callosities impunctate, the rest of the surface coarsely, sparsely punctate; sides straight, calloused, humeri forming a short nearly terete blunt spine; hind margin deeply sinuate, the posterior angles prominent, rounded. Scutellum as long as broad at base, apex sharply angled above the depressed surface which forms a broadly rounded plate beneath the inner angle of the elytra, disk sparsely, coarsely punctate, the sides

more finely so, frenum occupying five-sevenths the length of the scutellum. Elytral punctures coarse and discolored on claval region, fine and closer on corium; membrane hyaline. Rostrum long, segment I slightly surpassing the bucculæ, II a little longer than III (25::30), IV equal to III. Bucculæ widest and obtusely angled anteriorly, their margins sinuate. Prosternal lamina attaining apex of first rostral segment, its apex obtusely triangular; its margin broadly sinuate, distally cleft for the reception of the ventral tubercle. Segments I to V of connexivum each armed with a small tooth, VI with an acutely triangular black-tipped spine. Genital segment sinuate next the prominent lateral angles, with a small median notch; styles linear with an almost knob-like apex that very nearly attains the outer angle of the segment; venter and margin of pleural pieces impunctate, polished. Ostiolar canal long.

Color greenish testaceous; antennæ apically, and tip of humeral spines and the genital segment slightly infuscated; apex of rostrum and tips of the claws black; ocelli red.

Holotype, a unique male, No. 5126, Calif. Acad. Sci., Ent., taken by Maurice Willows at the northwest end of Bellona Island, June 22, 1933. This insect comes nearest to *pungens* but the shape of the mesosternal lamina will at once distinguish it.

COREIDÆ

Amblypelta costalis Van Duzee, new species

Pale testaceous-yellow, pronotum posteriorly, scutellum and elytra pale castaneous brown, costa lineate with whitish and black. Length 14 mm.

Head shorter than pronotum as 36::50, nearly horizontal, ocelli placed midway between median line of vertex and eyes, bucculæ as long as dorsal width of head between antennal sockets, highest anteriorly. Rostrum attaining middle of ventral II, segment I attaining margin of prosternum, II as long as I, III shortest, IV longest. Anterior margin of prosternum feebly sinuate, mesosternum feebly sulcate. Antennæ a little longer than the entire body, the segments as 65:80:55:68, I slightly thicker apically, feebly triquetrous. Pronotum wider across the humeri than long, 8::5; humeri short-spinose; posterior submargin with an abbreviated transverse ruga. Scutellum as long as wide, truncate at extreme apex. Venter feebly sulcate at base. Legs slender, unarmed. Pronotum, scutellum, elytra and pectus closely, coarsely punctate, head obsoletely punctate, venter shagreened.

Color pale testaceous-yellow, ocelli and eyes reddish; antennal I with tip and an obscure line above blackish, II and III narrowly black at apex, IV blackish with nearly its basal half croceous, the incisure black; basal two-thirds of costa narrowly whitish, limited within by a broader black vitta; membrane fuliginous; extreme tip of scutellum and of the rostrum and tarsal claws black; tibiæ and tarsi clothed with pale hairs; minute plates at apex of femora black.

Genital segment of male with a broad, shallow sinus; plici of sixth ventral of female broadly arcuate, the fissure behind this plica subacute, attaining the plica.

Holotype, male, No. 5127, and allotype, female, No. 5128, Calif. Acad. Sci., Ent., and five male paratypes taken by Maurice Willows, Jr., June 22, 1933, at the northwest end of Bellona Island, Solomon Islands. Larger than either *bilineata* Stål or *nitida* Stål[2].

LYGÆIDÆ

Scopiastes lepidus ventralis Van Duzee, new subspecies

Agrees with Horvath's description (Ann. Mus. Nat. Hung., 12:631, 1914) in all structural details. Color rufofulvous, eyes black, antennals II and III, posterior lobe of pronotum, elytra, hind margins of propleura, and the meso and metapleura and usually the scutellum infuscated or piceous; antennals IV fulvous or more or less infuscated, scutellum rufous in one specimen, apical two segments of rostrum black; tibiæ and tarsi sometimes tinged with fuscous. Length 8 mm.

Holotype, female, No. 5129, Calif. Acad. Sci., Ent., and two female paratypes taken June 23, 1933, at the northwest end of Bellona Island, Solomon Islands.

This can hardly be considered specifically distinct from *lepidus*, from the same island group, but here the venter is entirely rufo-fulvous, the ostiolar orifices are reddish and the apex of the clypeus is not black. The depth of infuscation on the pronotum, scutellum, elytra, etc. varies from fulvous to piceous but is scarcely blue-black. It is conceivable that this is merely a color form that might be found in a single brood but the chances are that it is a local variation developed on a different island. Dr. Horvath does not state on which island his material was taken.

[2] *Amblypelta gallegonis* Lever (Ann. Mag. Nat. Hist., (10) 17:324, 1936) is not available for comparison but was described from the Solomon Islands and may be identical with the above. Editor.

Nysius villicus Van Duzee, new species

Allied to *ericæ* but with the sides of the pronotum straight and the antennæ more slender. Length, 4 mm.

Head strongly punctured, produced between the eyes about as in *ericæ;* black, the pale vittæ on clypeus and on each side of it much obscured, especially in male; basal spot small but obvious; cheeks with a pale mark below eyes; bucculæ shorter than in *ericæ*, not attaining base of head, their margins feebly arcuate. Antennæ thinner than in *ericæ;* segments in the male as 6:15:13:15; pale tinged with fulvous; IV slightly infuscated, I black above, II blackish at base and apex, III very narrowly so. Pronotum black or blackish, anterior margin obscurely and six longitudinal vittæ on posterior lobe more or less distinctly fulvous, the hind margin with a median pale mark as in *ericæ*. Scutellum polished, black, its extreme tip only pale. Base of elytra parallel for about basal fourth, then moderately expanded, nearly parallel beyond the middle; whitish hyaline, the nervures more or less infuscated, the apical margin with three blackish marks that rarely become connected. Legs pale yellowish with numerous black points that are larger beneath, tips of tarsi infuscated. Body beneath black, the bucculæ and acetabula whitish; metapleura moderately excavated; expanded dorsal and ventral flaps whitish; margins of the pro- and mesopleuræ obscurely fulvous. Rostrum attaining hind coxæ, segment I barely exceeding bucculæ in male, a little larger in female. Venter black, the sides and a subapical discal spot yellowish fulvous, more extended in the female.

Holotype, male, No. 5130, allotype, female, No. 5131, Calif. Acad. Sci., Ent., and three male and three female paratypes taken at the Tal Lagoon on Malaita Island, Solomon Islands, May 30, 1933. One male and three females taken at Mohawk Bay, Matema Island, in the Santa Cruz group have the sides of the scutellum paler and the membrane longitudinally vittate with fuscous but with so little material I would not feel justified in assigning them even subspecific rank. More material from adjacent islands should be studied.

Nysius femoratus Van Duzee, new species

Aspect of *villicus* but differing in the black polished femora and first antennal segment. Length, 3 mm.

Eyes large; head across eyes nearly as wide as basal width of pronotum, 18::22; dull fulvous brown, median line anteriorly and a broad lateral vitta next the eyes and beneath black; bucculæ low, not quite reaching to base of head, slightly lower posteriorly, narrowly pale. Rostrum attaining hind coxæ, segment I hardly surpassing bucculæ. Antennæ rather short, segment I strongly incrassate for this genus; relative lengths of segments as 6:13:10:12; sides rectilinear, about one-fifth wider at humeri than anteriorly, 22::15; brownish fulvous, black anteriorly with median vitta and a mark behind each eye pale; posteriorly black sending a median vitta and another either side to connect with anterior black area; humeri polished black; scutellum black, the extreme tip of smooth median line pale. Elytra whitish hyaline, a spot on inner angle of clavus connecting with the commissure and about three vittæ on the corium and radial vein in part fuscous; membrane hyaline, a median vitta widened behind fuscous. Beneath black with anterior margin and a lateral spot on propleura, ostiolar orifice, and some marks exterior to it fulvous brown; posterior metapleural margin narrow, the exterior angle whitish; disk of venter with a pale spot posteriorly. Legs pale testaceous yellowish, the femora, except at apex, black, polished, tips of tarsi infuscated. Whole surface, elytra excepted, polished, coarsely punctate, clothed in part with very minute pale hairs.

Holotype, a unique female, No. 5132, Calif. Acad. Sci., Ent., taken on Anuda Island, just east of the Santa Cruz Islands, July 15, 1933.

Orthæa oculata Van Duzee, new species

Belonging to Stål's subgenus *Diplonotus*, section "ss" with the posterior lobe of the pronotum strongly punctate, the anterior lobe shorter than in *nigriceps* Dallas; castaneous-brown, head black, corium with a large rounded preapical pale spot, legs pale, antennal IV largely white. Length, 6 mm.

Head produced, longer than in *nigriceps;* polished, with minute golden hairs laterally before the antennæ; a little narrower than the anterior pronotal lobe, 18::21. Pronotum two-thirds as long as humeral width; anterior lobe as long as posterior, its length about one-half its basal width, 10::21, but moderately elevated, with a median band of shallow punctures, otherwise impunctate; collum strongly distinguished, with a single row of punctures; incised line shallow; posterior lobe strongly punctured, with a median line and the humeri smooth. Scutellum strongly punctate, with the usual Y slightly prominent, smooth. Elytra coarsely punctate, the median area nearly smooth, nervures prominent;

costa narrowly reflexed, its edge minutely serrate. Antennæ long, segment I passing tylus by one-half its length; segments as 12:18:21:24. Rostrum attaining hind coxæ. Anterior femora less incrassate than in *nigriceps,* with one subapical spine and two or three setaceous papillæ.

Color dark chestnut brown; head polished, black; tip of tylus paler; neck under the collum ochraceous either side; hind lobe of pronotum with an ochraceous vitta each side of the median line; reflexed elytral costa, veins more or less, base of corium, a small spot near inner angle and a large rounded one before apex ochraceous or whitish; legs, including coxæ, entirely pale yellowish; antennæ castaneous, narrow apex of segments II and III brown, IV white, the narrow base and apical third brown; beneath black, venter dark brown, rostrum pale. Superior surface nude, except for minute golden pubescence on head anteriorly and portions of antennæ.

Holotype, female, No. 5133, Calif. Acad. Sci., Ent., and one female paratype, taken at Uras Cove, Malaita Island, Solomon Islands, May 28, 1933. In the type the ocular pale spot at apex of corium is very conspicuous, less so on the paratype.

Dieuches finitimus Van Duzee, new species

In Stål's key (Enum. Hemipt., IV, p. 161, 1874) this species runs to *atricornis* Stål but is evidently distinct; black, becoming piceous on the legs and antennæ; pronotum and elytra with yellowish markings. Length, 7 mm.

Head about as in *consanguineous*, opaque, impunctate. Antennal segments as 16:30:30:30; segment I exceeding tylus by one-half its length. Segment I of rostrum attaining apex of head. Pronotum nearly as long as its basal width, laminate margins strongly reflexed, scarcely attaining the humeral angles; transverse depression deep; anterior lobe moderately convex, impunctate either side of the middle, finely punctate laterally; posterior lobe coarsely punctate. Median area of corium mostly smooth. Anterior femora moderately incrassate with a percurrent double row of short teeth; anterior tibiæ widened apically with a few small teeth.

Color black, becoming dark castaneous on head and piceous or brown on feet and antennæ; median line and two spots either side on hind lobe of pronotum, two discal points on scutellum, a short basal vitta on clavus, a short line on radial vein, a basal line on subcosta, an oblique spot or vitta before apex of corium, and a marginal spot on fourth and fifth connexival segments yellowish; narrow expanded costa to beyond middle and reflexed margin of

pronotum white, the latter becoming black over humeri, base of intermediate and hind femora whitish; intermediate tibiæ and tarsi, anterior at base, antennal I, base and apex of II, and base of III and IV paler brown or yellowish; membrane black.

Holotype, male, No. 5134, Calif. Acad. Sci., Ent., a unique taken at Kungava Bay, Rennell Island, Solomon Islands, June 16, 1933. In this species the transverse black elytral band is much obscured by the blackish shade of the elytra.

REDUVIIDÆ

Euagoras crockeri Van Duzee, new species

Size and aspect of *asseda* Stål but paler, rufo-fulvous; posterior lobe of head anteriorly and sometimes anterior lobe as far as base of antennæ more or less clouded with fuscous, at times becoming black; antennæ fuscous or almost black, segment I longer than head, pronotum, and scutellum together, with a very broad obscure pale annulus before middle and a white subapical annulus as wide as width of anterior lobe of pronotum, segment II one-third as long as I with an obscure paler median annulus, III and IV fuscous, III shorter than I, IV longer. Extreme tip of rostrum darker. Anterior tubercules of pronotum subacuate, directed outward; humeral spines long, directed outward and backward, mostly black; disk between these spines often with a black spot; clavus and inner margin of corium black; membrane fuscous, paler exteriorly; meso and metapleura and sides of ventrals IV and V with a large black spot; tips of femora, tibiæ, and tarsi black. The specimens from San Christoval Island differ in having the legs paler, the tibiæ and tarsi sometimes scarcely enfumed, the anterior femora usually with a black line, the posterior with two narrow fuscous annuli, one subapical, the other median. These also usually want the blackish discal spot on the pronotum. Length, 15 mm.

Holotype, male, No. 5135, and allotype, female, No. 5136, Calif. Acad. Sci., Ent., taken June 22, 1933, by Maurice Willows at the northwest end of Bellona Island; six paratypes and one nymph, same data; one male paratype, wanting the black thoracic spot, taken May 20, Kau Kau Plantation, Guadalcanar Island, by Mr. Willows. Six adults and one nymph from Star Harbor, San Christoval Island, July 1-3, differ only in the color of the legs but this character varies so that the legs may be entirely pale. In the typical form of this species the dark head and black knees are conspicuous characters.

CERCOPIDÆ

Genus CLOVIA Stål

This genus is represented in the Solomon Islands by a group of species characterized by a transverse median elytral vitta, usually more or less oblique, at least on the corium, and by an oblique, or almost longitudinal, apical vitta from behind the middle of the costa, toward but not attaining the apex of the elytra, this last usually broken into two maculæ of varying size and shape. In most of the species known to me the pronotum and vertex are transversely banded. This group of species is largely represented in New Guinea and adjacent island groups. The genus is found in Africa and over much of Oceanica, at least as far north as the Philippines. A good idea of this group, showing the form and pattern of marking, can be had by turning to the *Records of the Indian Museum*, Vol. III, plate 10, figure 9 (*moresbyensis* Distant) or the *Genera Insectorum*, fasc. 143, plate 2, figure 4 (*caput-ranæ* LeGuillon). The five species here described are closely, minutely punctate above, each puncture with a short pale hair. The following key will help to separate these species.

1. Apical pale vitta of corium entire as in *caput-ranæ*..... .....*fraternus* n. sp.
–. Apical vitta of corium broken into two spots.....2
2. Larger (11.5 mm.); head, pronotum and scutellum black, non-vittate; median elytral vitta transverse.....*lugubris* n. sp.
–. Smaller (5-9 mm.) head and pronotum transversely vittate....3
3. Head and pronotum pale yellow vittate with brown; scutellum and base of clavus to the transverse vitta also pale..... .....*clitellaria* n. sp.
–. Scutellum and base of clavus black or dark brown.....4
4. Median elytral vitta strongly oblique, with the broken apical vitta much reduced.....*crockeri* n. sp.
–. Median elytral vitta heavier, transverse on clavus, deflected posteriorly on corium; apical vitta forming two broad longitudinal vittæ, the costal acuminate posteriorly.....*sera* n. sp.

Clovia fraternus Van Duzee, new species

Near *antoni* and *formosula* Schmidt. Dark brown; vertex pale croceous with median and subapical vittæ; pronotum with one croceous vitta and an entire oblique apical vitta. Length, 7.5 mm.

Vertex a little shorter than broad between eyes (4::5), more produced than in the other species here described; pale yellow with a broad brown vitta between anterior angles of eyes and a shorter one on superior aspect of front; anterior edge slenderly black. Pronotum brown, darker posteriorly, with a complete bright croceous transverse vitta before middle, hind margin deeply excavated before scutellum, the latter dark brown. Elytra brown, becoming black medianly. Median vitta transverse on clavus, becoming moderately oblique and contracted to an obtuse point on corium and attaining middle of costal area; apical vitta entire, beginning behind middle of costa, running narrow and straight to beyond middle of corium, its apex broader and bent posteriorly. Face dark brown with a pale median vitta, broad on front and covering most of clypeus; base of front with a bright croceous vitta that passes under eyes, widens on propleura and fades out on mesopleura, this vitta bordered with black which becomes deep polished black behind eyes; base of femora, tibiæ and tarsi more or less embrowned. Male genital segment a little more than twice as long as its median width, narrowed to an obtuse apex.

Holotype, male, No. 5137, Calif. Acad. Sci., Ent., taken on the Island of Santa Catalina, Solomon Islands, July 2, 1933, by Maurice Willows. This insect pertains to the group represented by *caput-ranæ*, and seems to find its nearest relatives in *antoni* Schmidt and *formosula* Schmidt. From *antoni* it differs by the immaculate scutellum, in the median vitta not attaining the costa, and in the different genital characters. From *formosula* it differs in the shorter vertex, the longer median elytral vitta and the shorter and broader genital segment of the male.

Clovia clitellaria Van Duzee, new species

Apparently allied to *polita* Schmidt. Elytra ovate, the costa strongly arcuate; pale yellowish, two transverse bands on the vertex, three on the pronotum and much of the elytra blackish; whole of the surface above closely minutely punctate and clothed with short pale hairs. Length, 10 mm.

Vertex flat, one-half broader between eyes than long, obtusely angled at apex; a broad black band crossing at anterior angle of eyes, before which is a shorter brown band on reflexed base of front. Pronotum pale yellow with median and apical black bands, the latero-posterior and posterior margins narrowly black. Scutellum pale yellow. Elytra blackish fuscous with the following pale yellow areas: base of clavus to apex of scutellum, omitting slender

scutellar margin, a broad transverse band just beyond, scarcely attaining costa and sometimes connected with claval saddle, narrowed from radius to claval suture; apical oblique band broken into two subequal spots; apical submargin of elytra marked by a ferruginous band which includes the apical one-third of the clavus where it is most pronounced. Beneath pale yellow becoming somewhat testaceous on front and legs with the following black markings: a slender polished line on base of front, a broken longitudinal vitta behind eyes and another crossing pro- and mesopleuræ, apex of rostrum, tarsi above, tips of tibial spines and tibiæ more or less, embrowned; frontal striæ slightly darkened; female oviduct and tips of the male plates also blackened. Tergum apparently largely black. Wings hyaline with fuscous veins. Prothoracic epipleura distinctly wrinkled transversely to eyes. Extreme tip of scutellum blackened. Male plates parallel, truncate at apex, one-half longer than wide; valve square at apex, as long as broad.

Holotype, male, No. 5138, and allotype, female, No. 5139, Calif. Acad. Sci., Ent., taken at Mohawk Bay, Matema Island, Santa Cruz group, July 10, 1933, and three paratypes taken on Nupani Island, Santa Cruz group, May 8, 1933, by Maurice Willows. One male taken on Guadalcanar Island, Solomon Islands, in December, 1920, by J. August Kusche differs in having the elytra browner, the ferruginous apex of the clavus extended broadly onto the corium, the basal "saddle" of the clavus smaller, the oblique yellow apical spots larger and the pronotum anteriorly longitudinally rugose.

Clovia crockeri Van Duzee, new species

Pale yellow beneath, fuscous brown above with three pale transverse vittæ on the vertex, one on the pronotum, an abbreviated oblique median vitta and two subapical spots placed obliquely on the corium. Length, 8.5-10 mm., averaging smaller than *clitellaria.*

Vertex shorter than in *clitellaria,* its length three-fifths its width between the eyes. More finely punctured above than in *clitellaria,* the punctures becoming fine transverse rugæ on scutellum and partially so on pronotum posteriorly; pronotum anteriorly with a slender but distinct longitudinal carina which in some individuals may become more or less obsolete. Color fuscous brown above, vertex, a transverse vitta before middle of pronotum, a transversely oblique subinterrupted elytral vitta at apex of scutellum running from radial vein almost to commissure and angled at claval suture, and two subapical spots, whitish; vertex

with a median transverse vitta and a shorter one on reflexed base of front, brown. Front pale ferruginous with paler lateral striæ; basal margin of front black, bordered below by a pale vitta which extends back along sides of pleuræ. Legs testaceous-yellow, more or less embrowned, especially on tibiæ exteriorly and on tarsi; disk of sternum and venter pale yellow. Tergum, at least laterally, black. Prothoracic epipleuræ very narrow and smooth.

Holotype, male, No. 5140, and allotype, female, No. 5141, Calif. Acad. Sci., Ent., taken at Star Harbor, San Christoval Island, Solomon Islands, July 1, 1933, (holotype) and July 3, 1933 (allotype) by Maurice Willows. Paratypes, one female taken with the allotype and another taken at Mohawk Bay, Matema Island, Santa Cruz group, July 8, 1933. These paratypes are slightly larger than the types. The pale brown color, narrow shorter and more oblique median vitta, and the smaller subapical spots will most readily distinguish this species. The vestiture and punctation, except as noted, is similar in the species here described. In the present species the male genital segment is shorter and narrower at apex than in *clitellaria*.

Clovia sera Van Duzee, new species

Size and aspect of *crockeri* but more heavily marked with pale, the median elytral vitta transverse across the clavus, the apical vittæ heavier. Length, 9 mm.

Vertex slightly shorter than its width between eyes, polished black; disk with a blackish band between eyes and a shorter one before this, crossing reflexed base of front. Pronotum, scutellum and elytra blackish fuscous; pronotum with a transverse croceous vitta about its own width behind anterior margin. Elytra with a whitish vitta behind apex of scutellum, transverse across clavus, then oblique, terminating on radial nervure; posterior vitta in form of two elongated spots, the outer lying on costa, its inner margin following radial nervure along which it is produced to a point posteriorly and is as long as width of corium; inner spot forming a longitudinal vitta as long as greatest width of elytron and directed toward elytral apex; an indefinite costal area opposite transverse vitta and inner margin behind that vitta to near apex of corium more or less tinged with brown, and with a similar mark against costa exterior to apical vitta. Front and beneath honey yellow; base of front with a concentric pale vitta; tip of rostrum, a lateral vitta next the coxæ, tibiæ exteriorly and tarsi mostly, black; connexivum and apparently tergum black, polished.

Holotype, male, No. 5142, Mus. Calif. Acad. Sci., Ent., taken at Uras Cove, Malaita Island, Solomon Islands, May 28, 1933, by Maurice Willows. This species is near *crockeri* but the markings are broader, the transverse band becoming oblique only as it approaches the radial nervure. The pale color on the vertex and pronotum is more of a croceous and the male genital segment is much longer, more as in *clitellaria.*

Clovia lugubris Van Duzee, new species

A large black species, pale beneath, elytra with the usual pale vitta and a castaneous vitta about the apical margin. Length, 11.5 mm.

Vertex bluntly angled, distinctly broader between eyes than long (7::5); reflexed base of front more coarsely punctured than rest of upper surface. Above black; short impressed line behind eyes pale as in allied species. Pronotum with a very slender median carina on anterior one-third. Median transverse vitta of elytra whitish, but slightly oblique, terminating on radial nervure; apical spots small, the costal spot one-half its width from costal margin; apical spot about three times as long as costal; apical margin with a castaneous vitta from a little behind transverse vitta almost to apex, the margin slenderly black. Beneath pale yellowish, legs and front more croceous becoming castaneous on front; base of front with a polished pale vitta that is carried back broadly onto mesopleura and is bordered with black. Tibiæ exteriorly, tarsi and female oviduct black.

Holotype, a unique female, No. 5143, Calif. Acad. Sci., Ent., taken at Tal Lagoon, Malaita Island, Solomon Islands, May 29, 1933, by Maurice Willows. This species is quite distinct in its larger size, black color, short nearly straight median vitta and small apical spots on the elytra.

Fulgoridæ

Bennaria venosa Van Duzee, new species

Pale testaceous, the elytra whitish with fuscous veins. Length, 7 mm. to tip of elytra.

Vertex transverse, its median length one-half its anterior width, hind margin angularly emarginate, surface somewhat depressed, sides carinate, median line slenderly impressed. Front a little more than twice as long as its greatest width, 21::9, sides

strongly, obliquely elevated, median carina wanting; clypeus narrow, longer than front, median carina prominent; antennal segment II twice as long as wide. Pronotum one-fourth longer than anterior width of vertex; lateral carinæ sharp, median obsolete. Mesonotum tricarinate, the median slender. Elytra nearly three times as long as wide, 14::5, subcostal and inner claval veins weak, others heavy, all obscure close to base. Abdominal appendages two-thirds the length of anterior femora. Male plates as long as pygofer, approximate only at middle; their sides nearly parallel beyond middle, somewhat expanded at their rounded apex.

Color yellowish testaceous, tinged with brown on head, mesonotum, and coxæ, with some white bloom in places beneath; carinæ of head slenderly edged with brown; wings opaque whitish with brown nervures; pale apical margin closely transversely crenulate.

Holotype, male, No. 5144, Calif. Acad. Sci., Ent., a unique taken on the northwest end of Bellona Island, Solomon Islands, June 21, 1933. The articulated and apparently moveable abdominal appendages are a most remarkable feature of this genus and of *Benna* Walker. The type of this genus was described from the Philippines and is characterized by a round black spot near the inner angle of the elytra. The genus seems to differ from *Benna* principally in wanting a median carina on the front.

Ricania sigillata Van Duzee, new species

Form and general aspect of *pulverosa* but pale brown with a smaller stigmal spot; elytra with an apical black point and obscurely liturate with paler. Length of body, 5 mm., expanse, 17 mm.

Head broad as in *Euricania tristicula;* vertex seven times as wide as its median length, without a median carina; front subvertical above, tricarinate basally; subapical transverse carina not attaining elevated marginal carinæ; clypeus ecarinate; pronotum three times as long as vertex, its median carina abbreviated anteriorly; mesonotum tricarinate, the lateral forked anteriorly as in related species, not attaining margin posteriorly, anteriorly meeting median near pronotal margin. Elytra short triangular, the apical margin equal to claval suture; costal membrane nearly twice as wide as costal areole; radial and subradial nervures straight, parallel, forking from basal cell; costal membrane with about twenty transverse veins to stigma, two obvious lines of transverse veins, anterior to the basal of these transverse lines the two arcuate folds are distinct on disk.

Color brown, beneath and legs pale; margins of basal two genital sclerites marked with a deep black calloused line; elytra brown liturate with transverse pale lines or veins basally; costal membrane and clavus paler, the femora with two fuscous clouds before stigma; white stigmal spot small and obscured distally where it connects with a white mark and is followed by a black longitudinal mark; apex with a round black point anterior to which is a larger polished fuscous spot; wings dusky hyaline, darker at apex, veins fuscous.

Holotype, a unique female, No. 5145, Calif. Acad. Sci., Ent., taken by Mr. Willows at Uras Cove, Malaita Island, Solomon Islands, May 28, 1933. This species runs to *fumosa* in Melichar's key of 1898 but is quite distinct.

Ricania corusca Van Duzee, new species

Size of *pulverosa* but with broader elytra; uniformly polished fuscous brown with a small white stigmal spot. Length to tip of abdomen, 5 mm.; expanse, 16 mm.

Head broad as in *tristicula;* median length of vertex one-seventh its width, no median carina; front transverse, its sides elevated, broadly arcuate; discal carinæ complete, connecting with subapical transverse carina, prominent basally, becoming evanescent apically; median compartment longitudinally obscurely striate; clypeus ecarinate. Pro- and mesonotum as in *sigillata.* Elytra a little longer than wide (12::10); costal membrane but little broader than costal areole; radial vein forking some distance from basal areole, the two forks running about parallel to stigma; costal and apical margins with a row of short stiff hairs, each set in a black dot; transverse nervures few but forming two subapical lines.

Color yellowish brown; pro- and mesonotum blackish fuscous, tinged with castaneous between lateral carinæ; tergal segments with a pale vitta near base of each segment; under surface and legs pale, the femora and a large tumid area on mesopleura brown; elytra deep fuscous hyaline, polished, with a metallic purplish black reflection in certain lights, more noticeable toward apical margin; costa with a small oblique white mark at stigma; costal vein reddish, base of radial vein pale; a polished black spot indicated before apex of elytra; wings whitish hyaline, narrow, pale brown, becoming slightly enfumed toward apex.

Holotype, a unique female, No. 5146, Calif. Acad. Sci., Ent., taken by Maurice Willows on Santa Catalina Island, Solomon Islands, July 2, 1933.

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