The Coleopterists' Bulletin

A QUARTERLY PUBLICATION DEVOTED TO THE STUDY OF BEETLES

VOLUME 18, 1964

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Founded 1947 by Ross H. Arnett, Jr.

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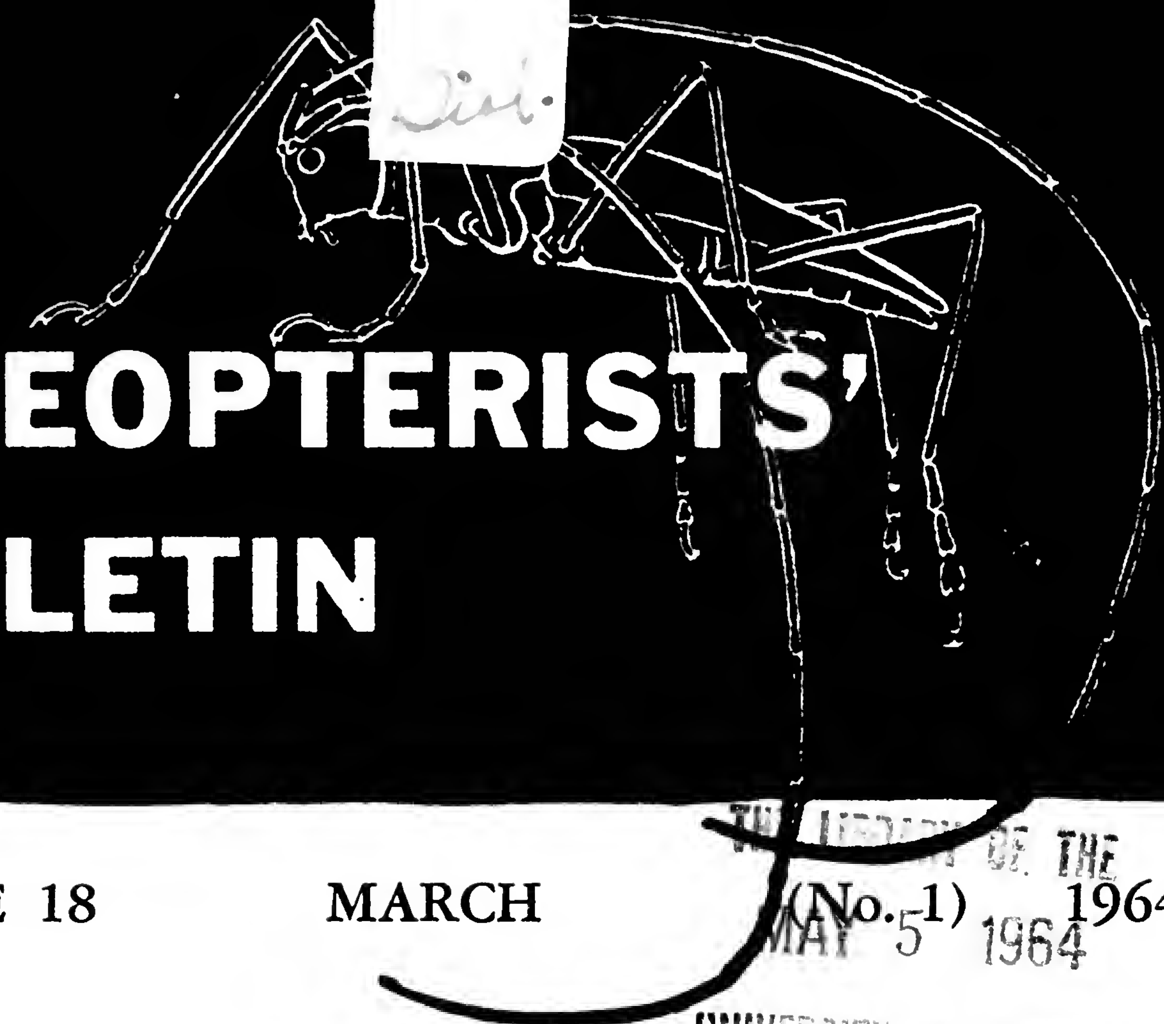

VOLUME 18 MARCH (No. 1) 1964

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A QUARTERLY PUBLICATION DEVOTED TO THE STUDY OF BEETLES

The Coleopterists' Bulletin

Volume 18 March (No. 1) 1964

NON-TROGLOBITIC CARABIDAE (COLEOPTERA) FROM CAVES IN THE UNITED STATES[1]

By THOMAS C. BARR, JR.[2, 3]

Much has been written concerning the troglobitic (=obligatorily cavernicolous) Carabidae of the United States. Beetles belonging to the genus *Pseudanophthalmus* Jeannel and other troglobitic genera of the tribe Trechini are widespread in caves of unglaciated areas in the eastern United States, within the region underlain by Paleozoic rocks (see Barr, 1960a, for generic key; Barr, 1960b, for bibliography). The aberrant troglobite *Horologion speokoites,* discovered in a West Virginia cave by Valentine (1932), is probably best considered the sole representative of the tribe Horologionini. It was placed in the Psydrini by Van Emden (1936) and in a distinct family, Horologionidae, by Jeannel (1949). Unfortunately, it is known only from the unique male type. *Rhadine* LeConte, a distinctive subgenus of *Agonum* (Agonini), includes several closely similar troglobitic species which inhabit caves in the eastern Edwards plateau of Texas (Barr, 1960c).

It is the purpose of this paper to emphasize the repeated occurrence of a limited number of non-troglobitic ground beetles in caves of the United States, in addition to the troglobitic representatives mentioned. In the terminology of J. R. Schiner, as amplified and defined by Racovitza (1907), these are *troglophiles* if they can and do complete their life cycle within a cave, or *trogloxenes* if they commonly occur in caves but must return to the surface for at least part of their life cycle. Troglophiles also occur outside of caves in dark, humid microenvironments, but do not exhibit the same degree of evolutionary modification which restricts troglobites to caves. The term *cavernicole* means simply, "an animal living in caves." Troglobites, troglophiles, and trogloxenes are all cavernicoles. Cave *accidentals* are not. This system of classification, still unfamiliar to some American zoologists despite widespread acceptance in Europe, is summarized in Table 1. An

[1] This investigation was supported in part by a grant (G-18765) from the National Science Foundation.

[2] Department of Zoology and Institute of Speleology, University of Kentucky, Lexington.

[3] I wish to thank Dr. Philip J. Darlington, Jr., Museum of Comparative Zoology, Harvard University, and Dr. Carl Lindroth, Zoological Institute, University of Lund, Sweden, for assistance in specific determinations of bembidiines. Leslie Hubricht, Meridian, Mississippi; Richard E. Graham, Rutgers University; John R. Holsinger, University of Kentucky; and James R. Reddell, Austin, Texas, collected some of the material reported in this paper.

example drawn from the Carabidae is given for each category. I assume that a non-troglobitic carabid may be considered a troglophile if a cave population of the species includes several larvae and/or tenerals.

TABLE 1.

Classification of Cave Animals

I. Cavernicoles

   A. Obligate

      1. Troglobites—e.g. *Pseudanophthalmus pubescens* (Horn)

   B. Facultative

      1. Troglophiles (entire life cycle in caves)—e.g. *Bembidion lacunarium* (Zimmermann)

      2. Trogloxenes (only part of life cycle in caves)

         a. Habitual—e.g. *Agonum reflexum* (LeConte)

         b. Occasional—e.g. *Patrobus longicornis* Say

II. Accidentals

   E.g. *Harpalus (Pseudophonus) compar* LeConte

Many carabids occur sporadically in the crepuscular (=twilight) zone of caves or are washed considerable distances underground by sinking streams. These can only be considered accidentals or, if commonly encountered in caves, threshhold trogloxenes. They include common epigean species, for the most part. For this group, I have U. S. records of species belonging to the following genera: *Acupalpus, Agonoderus,* Agonum,* Amara, Anillinus,* Anisodactylus,* Badister, Bembidion,* Bradycellus, Calathus, Carabus, Colliuris, Dyschirius, Galeritula, Harpalus,* Helluomorphoides, Lebia, Micratopus, Nebria,* Notiophilus, Odontonyx, Patrobus,* Pterostichus,* Scaphinotus, Selenophorus,* Sphaeroderus, Stenolophus,** and *Tachys.** Repeated occurrence of a genus is indicated by an asterisk (*). The other genera are probably all accidentals.

This list shows at least two things: first, that a variety of carabids crawl, fall, or are washed into caves; second, that most of the group consists of beetles usually found in meadows or fields, or under cover alongside streams. Common riparian species, such as *Agonum extensicolle* (Say), *Nebria pallipes* Say, and *Patrobus longicornis* (Say) apparently wander up the banks of streams issuing from caves and follow the streams underground. I have never found *Nebria* outside of the crepuscular zone, but *A. extensicolle* and especially *P. longicornis* occasionally wander a hundred meters or more inside a cave. It is probably significant that a late September (1963) abundance of *P. longicornis* along the Little Barren River in Green County, Kentucky, coincided with the appearance of numerous individuals of the species along the stream in Woodard Cave, near Donansburg. The cave stream is a direct tributary of the Little Barren. The *Scaphinotus* observed, *S. (Steniridia) loedingi* Valentine and *S. (Steniridia) andrewsi germari* Chaudoir, were seen near entrances walking over the rock walls of the caves. They were probably hunting for snails, many of which were nearby. The small, eyeless, depigmented bembidiines of the genus *Anillinus* Casey show some of the morphological attributes of good cave species, but are more common in deep soil and humus than in caves, where they probably occur under special, unknown conditions or accidentally.

Certain genera which are common on the surface in the cave regions are missing from the list or have been found only once or twice in hundreds of caves. There are only two cave records for *Calathus,* and one of these was at the bottom of a pit 30 meters deep. Both records are for single individuals. There is one cave record for a single specimen of *Lebia ornata* Say, taken in a small Alabama cave in February, where it may have been hibernating. Species of *Lebia* are predominantly arboreal, however, and are not likely to be accidentally washed into caves or to crawl along the banks of streams into caves. The same generalization may be applied to the species of *Calosoma,* which I have never found in a cave. It is more difficult to account for the absence of common streamside species of *Chlaenius, Ardistomis,* and *Clivina.*

Five common epigean species are frequently found in caves of the eastern United States, the Ozark plateau, and Texas. *Bembidion (Peryphus) lacunarium* (Zimmermann), *Agonum (Platynus) reflexum* (LeConte), and *Atranus pubescens* (Dejean) occur in caves throughout the region. *Bembidion (Amerizus) wingatei* (Bland) is a frequent inhabitant of caves from eastern Kentucky to West Virginia and Pennsylvania. *Tachys (Tachyura) ferrugineus* (Dejean) occurs rarely in eastern caves, but is extremely common in both the limestone caves of central Texas and the gypsum caves of northwest Texas, as shown by the abundant collections of Mr. James R. Reddell. I have seen all five species from many caves, have seen many tenerals, and have no doubt that all except *Agonum reflexum* are troglophiles. They have no close troglobitic relatives. *A. reflexum* is an habitual trogloxene which readily enters the aphotic zone.

Two groups of troglophiles remain for consideration. One is the genus *Trechus,* in the tribe Trechini. *T. (Microtrechus) tennesseensis* Barr and *T. (Microtrechus) tuckaleechee* Barr are known only from East Tennessee caves, and *T. (T.) cumberlandus* Barr occurs in caves and deep ravines in the Cumberland plateau of Tennessee and Kentucky (Barr, 1962). Cave tenerals of all three species have been collected, and they undoubtedly reproduce in the caves. A small colony of *T. (T.) ovipennis californicus* Motschulsky formerly inhabited Empire Cave, Santa Cruz Co., California, where Mr. Richard E. Graham collected specimens for me. I have seen no tenerals from Empire Cave. The cave is now permanently closed. None of these four species shows reduction of eyes or pigmentation in the cave colonies.

In the subgenus *Rhadine* (genus *Agonum*) we find not only troglobitic species but several troglophilic species, as well as species which probably never enter caves. Some *Rhadine* can be trapped in large numbers from rodent burrows. In caves they are often very abundant. I treated the cavernicolous *Rhadine* (both troglobites and troglophiles) in detail in an earlier paper (Barr, 1960c). The obviously and supposedly troglophilic species known at that time were *A. (R.) caudatum* (LeConte)—Va., Tenn., Ala.; *A. (R.) jonesi* Barr—Ala.; *A. (R.) ozarkense* (Sanderson and Miller)—Arkansas; *A. (R.) longicolle* (Benedict)—N. Mex.; *A. (R.) rubrum* Barr—Texas; *A. (R.) howdeni* Barr and Lawrence—Texas; and *A. (R.) babcocki* Barr—Texas. Since writing that paper I have seen three other, undescribed species of *Rhadine,* probably troglophiles, from Oklahoma, Texas, and Arizona, respectively. *A. (R.) longiceps* (Van Dyke), from southwest Texas, has also appeared in recent cave collections.

In summary, the non-troglobitic cave carabids of the United States, as presently known, consist of three groups: (1) a large number of accidentals and threshhold trogloxenes; (2) a small assemblage (4 troglophiles and 1 habitual trogloxene) of common epigean species which readily adapt to cave life; and (3) a moderate number (15 species) of troglophiles closely related to the two principal lineages of troglobitic carabids in the United States.

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NOTICE

The French magazine L'Entomologiste, Revue d'Amateur, has in each issue a section called "Offres et demandes d'echanges." That section is loaded with offers of and requests for beetles.

Wanted: Cerambycidae from the eastern United States. Offered in exchange: Beetles from the western United States. By Donald E. Rich, 4063 Moore St., Los Angeles 66, California.

NOMENCLATURAL CONSIDERATION OF NICROPHORUS (COLEOPTERA: SILPHIDAE)

By LEE H. HERMAN, JR.[1]

Fabricius (1775) erected a new genus using the name *Nicrophorus* including in it *N. germanicus* (L.) and *N. vulgaris*. The generic name was used subsequently by Fabricius (1776, 1778, 1787, 1792, 1800), Olivier (1790), Latreille (1796) and others not cited here. However, Illiger (1798) used *Necrophorus* and was followed in that spelling in 1801 by Fabricius. Subsequent workers have used the names interchangeably. The Leng Catalogue (1920) used *Necrophorus* but Hatch (1928) used *Nicrophorus;* supplements to the Leng Catalogue retained *Nicrophorus*. *Necrophorus* was acknowledged by Hatch (1932) as an emended spelling, and he further stated, "There is widespread authority for the use of such an emended spelling . . ." but did not mention which should be accepted. Mazokhin-Porshnyakov (1953) used *Necrophorus* and Mrocykowski (1959) used *Nicrophorus,* examples of the most recent new species descriptions using these names. Recently *Necrophorus* has been listed as a junior synonym by Hatch (1957) and Arnett (1961).

Another error was in the use of *Nigrophorus* by Fabricius (1787) on page 48 and *Nicrophorus* on page viii. The International Code of Zoological Nomenclature (1961) states an emendation must be a ". . . demonstrably intentional change in the original spelling . . ." [Art. 33(a)]. *Nigrophorus* does not satisfy this definition since the original spelling was cited in the same publication and cited again by its author (Fabricius) in 1792. The change is therefore unintentional, not an emendation, and as an incorrect subsequent spelling has no nomenclatural status [Art. 33(b)].

If *Necrophorus* is considered an unintentional change then Art. 33(b) applies and the name is rejected, but since the name is used several times by Illiger (1798, pp. 352-355, 498, 508) and Fabricius (1801, pp. xiv, 333) it can be considered an emendation (intentional change).

Emendations are either justified or unjustified. The former ". . . is the correction of an incorrect original spelling . . ." [Art. 33(a)(i)]. "The original spelling of a name is to be retained as the 'correct original spelling' unless there is in the original publication clear evidence of an inadvertent error . . ." [Art. 32(a)(ii)].

This problem seems to be one of transliteration. Transliteration of the Greek *νεκρος* is Necros and translates, a dead body or corpse; the Greek -phore translates bearer or carrier. The prefix Nicro- translates or transliterates from neither Greek nor Latin. One may presume that *Nicrophorus* was an incorrect transliteration and should have been *Necrophorus* meaning corpse carrier, a habit characteristic of this genus. There is no evidence of a "lapsus calami" since the name *Nicrophorus* was used twice in the original publication (Fabricius 1775, pp. 1, 71) and several times subsequently including Fabricius (1778, p. 111) when *Nicrophorus* was used with the Greek letters *νικροφορος* beside it.

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[1] Catholic University of America, Department of Biology, Washington 17, D. C.

Assuming this to be an incorrect transliteration Art. 32(a)(ii) would apply in stating ". . . (incorrect transliterations . . . are not to be considered inadvertent errors . . .)"; the original spelling should therefore be retained as correct.

By definition, the change made by Illiger (1798) was an unjustified emendation. Art. 33(a)(ii) states, ". . . any other emendation is an 'unjustified emendation'; the name thus emended has status in nomenclature with its own date and author, and is a junior objective synonym of the name in its original form."

The correct name is *Nicrophorus* Fabricius, 1775 [Art. 32(a) (ii)], rather than *Necrophorus* Illiger, 1798, a junior objective synonym of the original [Art. 33(a)(ii)]. *Nigrophorus* has no status [Art. 33(b)].

The type-species for *Nicrophorus* is *N. vespillo* (L.); a name listed as a junior synonym of *N. vulgaris* F. in the original publication. The designation was by Latreille (1810, p. 427).

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STUDIES ON THE GENUS ANTHONOMUS IN NORTH AND CENTRAL AMERICA (COLEOPTERA: CURCULIONIDAE) II. THE SUBGENUS ANTHONOMORPHUS DIETZ[1, 2]

By HORACE R. BURKE

The subgenus *Anthonomorphus* was erected by Dietz (1891:194) to include *Anthonomus fulvus* LeConte, *Anthonomus peninsularis* Dietz, and *Anthonomus pervilis* Dietz. Dietz considered the size and position of the eyes to be the most distinctive characters of the subgenus, describing these as "small, subrostral in their position and somewhat approximate upon the front." Comparison of the size of the eyes of members of this subgenus with those of other *Anthonomus* indicates that this character is of no taxonomic value in defining the subgenus; however, the position of the eyes is a useful criterion for distinguishing *Anthonomorphus* from most other species-groups of *Anthonomus*. The eyes appear to be located on the base of the rostrum rather than on the head; this illusion is accentuated by the head being somewhat conical and more or less constricted on the sides behind the eyes.

While searching for additional characters to define *Anthonomorphus*, a number of similarities between this subgenus and *Trichobaropsis* Dietz were noted. *Trichobaropsis* was proposed as a subgenus by Dietz (1891: 196) to include *Anthonomus texanus* Dietz, and was separated from other subgenera primarily on the basis of the emarginate prosternum and the seventh funicular segment of the antenna being somewhat more closely associated with the club. The first of these characters is shared with several species of *Anthonomus*, including *fulvus* and *peninsularis*, while the second one alone does not appear sufficiently distinct to justify recognizing *Trichobaropsis* as a subgenus. Since good subgeneric characters are lacking and as *texanus* shares many features in common with *fulvus* and *peninsularis*, *Trichobaropsis* is here considered a junior synonym of *Anthonomorphus*.

Males of *Anthonomorphus* can be readily recognized by the mesotrochanters. The male mesotrochanter (figs. 11, 13) is nearly parallel-sided, with the apex broadly angulate or obliquely truncate, and the extreme apical portion is free from the side of the femur. The outer margin of the mesotrochanter of the male does not form a continuous line with the inner margin of the femur as in other *Anthonomus*, including females of *Anthonomorphus*. The mesotrochanter (fig. 12) of the female is elongate-triangular, with the apex acutely pointed and applied closely to the side of the femur.

Some characters of apparent value in delimiting *Anthonomorphus* were also found in the male genitalia. The median lobe (figs. 7-10) is a fairly stout, flattened structure with rather long, slender basal apodemes. The most

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[1] The first paper of this series was published in the Southwestern Naturalist, 1962, 7(3-4):202-210.

[2] Technical Contribution No. 4514, Department of Entomology, Texas Agricultural Experiment Station, Texas A & M University, College Station.

distinctive feature of this component of the genitalia is the broad apex with the usually well defined median projection and poorly to well developed lateral processes. This form of apex of the median lobe has not been observed in any other of the approximately 100 species of *Anthonomus* I have dissected for examination of genitalia. In addition to possessing characters apparently diagnostic for the subgenus, the median lobe is also useful in separating species of *Anthonomorphus*. It should be used with caution for this purpose since considerable intraspecific variation was observed in the material at hand. However, this does not present a problem in recognition of the species since they are easily identifiable by external characters.

An additional sexual dimorphic character is found in the apical armature of the metatibiae. The metatibia of the male is expanded apically into a large mucro (fig. 14) which is roughly triangular, somewhat twisted, and deeply concave on the outer side. The female mucro (fig. 15) is much smaller and more spike-like in appearance. The two sexes may be easily separated by this character, a fact which to my knowledge has not heretofore been mentioned in connection with *Anthonomus*. Some other species of the genus have this type of male mucro, but it is usually not as prominent as in *Anthonomorphus*.

In addition to the weevils originally placed here by Dietz, several Nearctic and Neotropical species have been assigned to *Anthonomorphus* and *Trichobaropsis* by more recent workers (Hustache, 1929; Schenkling and Marshall, 1934; Voss, 1944). I have examined several of these species (*A. eugenii* Cano, *A. fulvipes* Champion, *A. grandis* Boheman, *A. griseisquamis* Champion, and *A. rubiginosus* Champion) in light of the new taxonomic characters presented here and they are clearly not assignable to *Anthonomorphus*. It is obvious from descriptions alone that other species have been incorrectly assigned to the subgenus. *Anthonomus grandis* is the only one of the above-mentioned species which presents much of a problem as to its relationship to members of the subgenus. I have been unable to find characters which would exclude females of *grandis* from *Anthonomorphus*, but it is quite evident from males that this species belongs elsewhere. Although males of *grandis* resemble species of *Anthonomorphus* by having the eyes evenly convex and somewhat subrostral, and the head feebly constricted on the sides behind the eyes, they differ distinctly in the mesotrochanters and genitalia.

This study is based on material in the following collections: Boll Weevil Research Laboratory of the U.S. Dept. of Agriculture, British Museum (Natural History), Canadian National Collection, California Academy of Sciences, California Department of Agriculture, Carnegie Museum, Cornell University, Illinois Natural History Survey, Museum of Comparative Zoology, Michigan State University, Ohio State University, Oklahoma State University, Texas A & M University, University of California at Berkeley, University of Kansas, U.S. National Museum, and the private collections of D. G. Kissinger and C. W. O'Brien. I am deeply indebted to persons in charge of the above collections for their generous loan of material for study. I would especially like to thank Hugh B. Leech of the California Academy of Sciences for the loan of a large series of *peninsularis* and for

making available to me most of the specimens on which the description of *cognatus* is based. The assistance of V. S. House of College Station, Texas, in making the photographs included in this paper is also gratefully acknowledged.

Measurements reported herein were made as described in the first paper of this series.

Subgenus *Anthonomorphus* Dietz

Anthonomorphus Dietz, 1891, p. 194 (type, *A. fulvus* LeConte, by original designation); Voss, 1944, p. 45; Gilbert, 1953, p. 41.

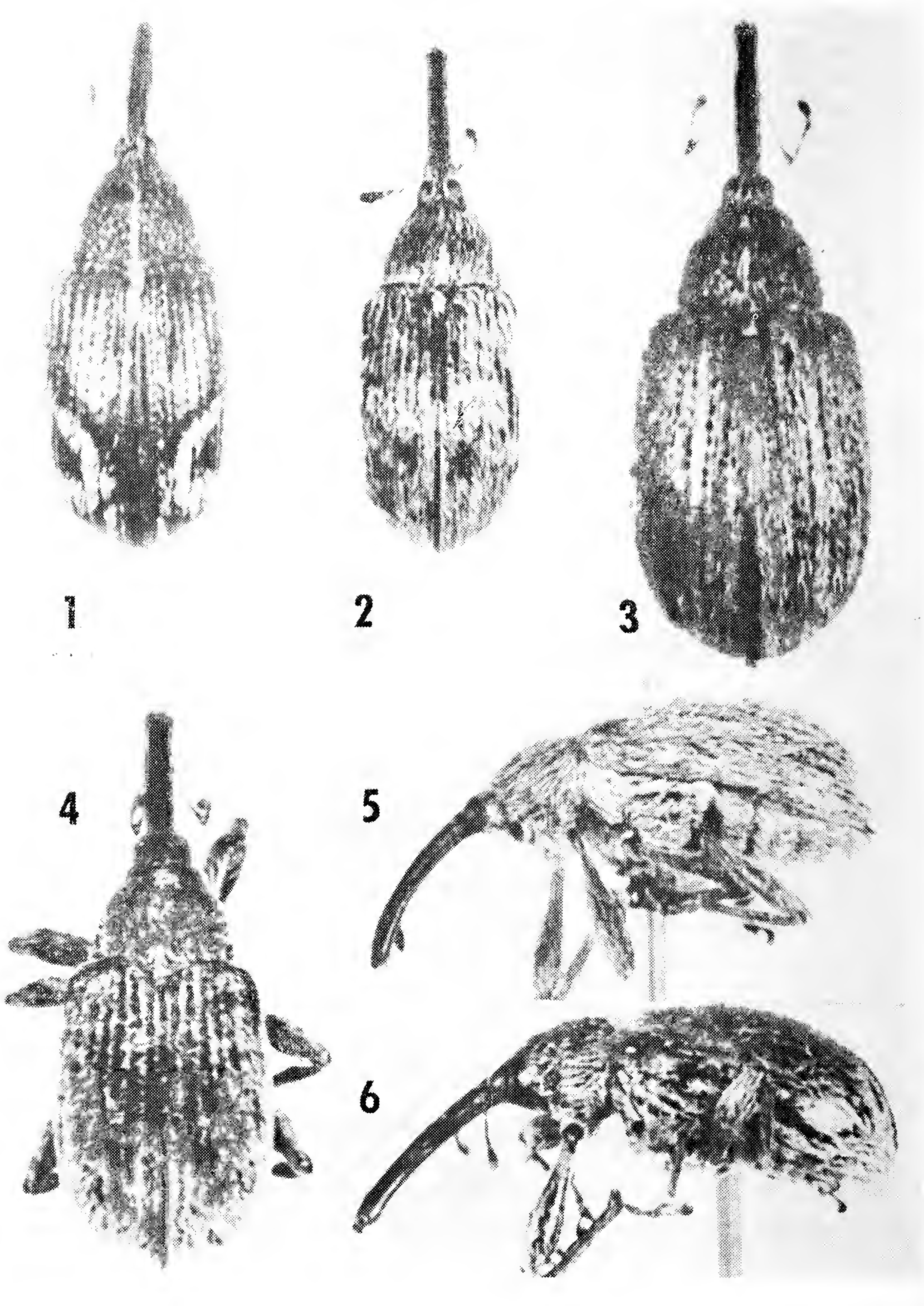
Trichobaropsis Dietz, 1891, p. 196 (type, *A. texanus* Dietz, by original designation and monotypy). (NEW SYNONYMY)

Body elongate-oval; pubescent. Rostrum slender, slightly to distinctly curved; dorsally with three prominent carinae extending from base to point opposite antennal attachments; lateral rostral groove directed toward lower front margin of eye. Antennal funicle 7-segmented; club elongate-oval. Eyes evenly, moderately convex, not free behind; located at base of rostrum. Head conical, sides feebly to distinctly constricted behind eyes; front foveate. Prothorax with sides feebly rounded and strongly narrowed from base to apex; prosternum emarginate before coxae. Elytra slightly to distinctly wider at base than prothorax; humeri feebly to strongly rounded. Femora bidentate, outer tooth smaller and may be absent on hind femora. Mesotrochanter of male prominent, apex broadly angulate to obliquely truncate, extreme apical portion free from side of femur; female mesotrochanter elongate-triangular, closely applied to side of femur throughout entire length, apex acutely pointed. Tibiae along inner margins distinctly sinuate and finely carinate; metatibia of male with large, triangular apical mucro, that of female small, inconspicuous, spike-like. Tarsal claws each bearing a long, slender tooth on inner side. Median lobe of male genitalia feebly curved in lateral view, flattened dorsoventrally; median dorsal and ventral pre-phallotremic areas entirely membranous; endophallus (internal sac) bearing numerous small spines; apex broad, with a short median projection and with poorly to well developed lateral processes.

Key to Species of the Subgenus Anthonomorphus

(Measurements made from 30 specimens of each species)

1. Coarse, white pubescence forming patterns on elytra, elsewhere vestiture finer, less dense (fig. 1); meso- and metasternum, and sometimes also abdominal sternites, piceous or black, distinctly darker than rest of body; length of body, 3.70-5.37, average 4.62 mm.; width, 1.81-2.59, average 2.18 mm.---------------------FULVUS
   Elytral pubescence moderately dense, evenly distributed, never forming patterns; meso- and metasternum not noticeably differing in color from rest of body------ 2
2. Prothorax at base distinctly narrower than elytra; length of prothorax along dorsal midline equal to, or but slightly greater than, width of an elytron immediately behind humerus; humeri prominent (fig. 3); length of body, 4.18-5.70, average 4.92; width, 2.00-2.74, average 2.44 mm.------------------------PENINSULARIS
   Prothorax at base only slightly narrower than elytra (figs. 2, 4); length of prothorax along dorsal midline distinctly greater than width of an elytron behind humerus -- 3
3. Elytral humeri slightly rounded (fig. 4); most setae on antennal funicle tapering to fine points; antennal club not longer than preceding four funicular segments combined; body robust; length of body, 4.33-5.55, average 4.88 mm.; width, 1.96-2.59, average 2.21 mm.--------------------------------------COGNATUS
   Elytral humeri less strongly rounded (fig. 2); most setae on antennal funicle parallel-sided with blunt apices; antennal club slightly to distinctly longer than preceding four funicular segments combined, sometimes as long as preceding five; body narrower, usually smaller; length of body, 3.22-4.80, average 4.11 mm.; width, 1.59-2.22, average 1.89.--------------------------------------TEXANUS



FIGURES 1-6. *Anthonomus* spp. 1—*A. fulvus,* male, dorsal view. 2—*A. texanus,* male, dorsal view. 3—*A. peninsularis,* male, dorsal view. 4—*A. cognatus,* holotype male, dorsal view. 5—*A. peninsularis,* female, lateral view. 6—*A. cognatus,* female, lateral view.

Anthonomus fulvus LeConte
(FIGS. 1, 7, 13-16)

Anthonomus fulvus LeConte, 1858, p. 79; LeConte and Horn, 1876, p. 197; Dietz, 1891, p. 195.

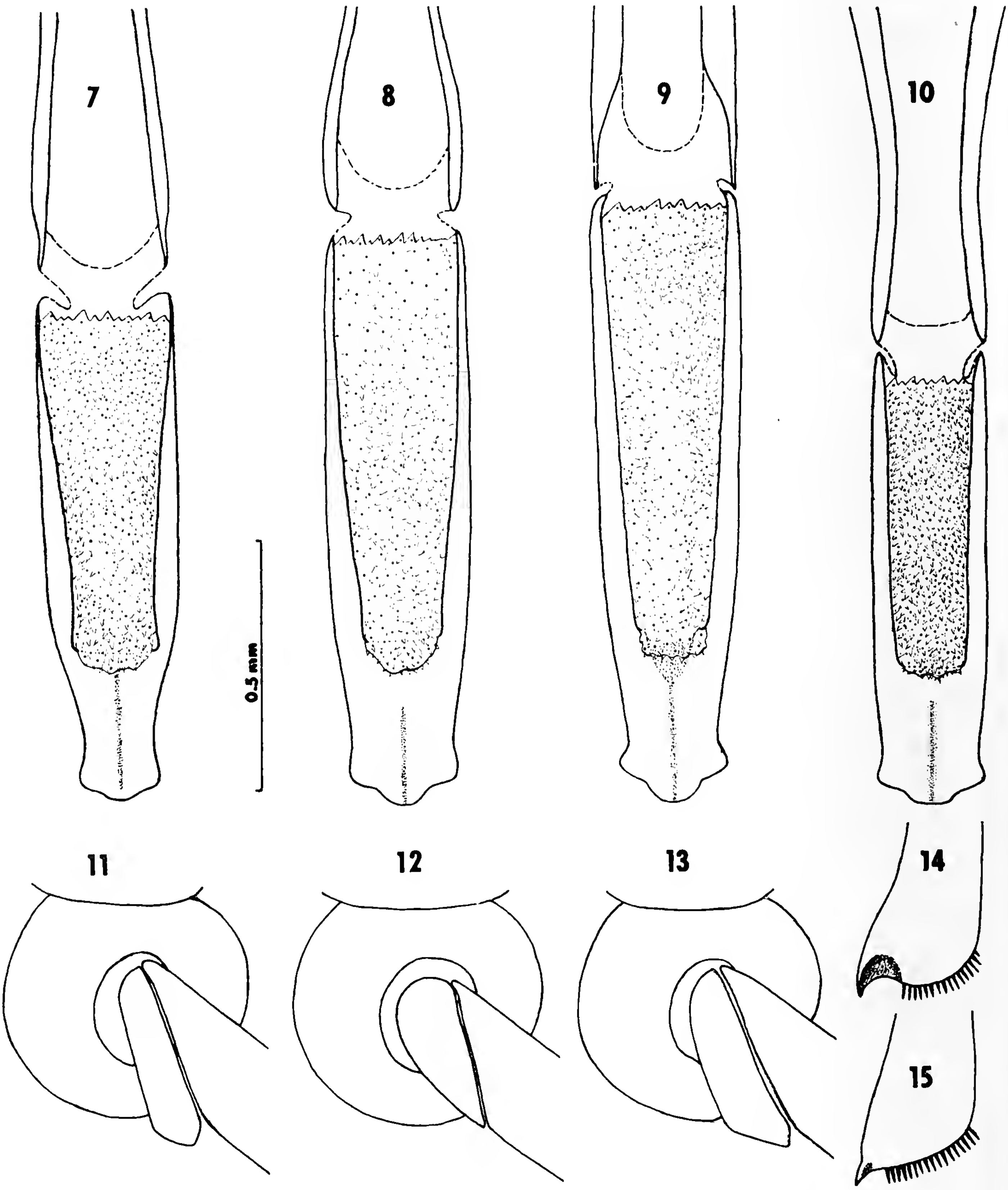
Anthonomus fulvus is easily recognized by its reddish brown body with the darker meso- and metathorax, and the distinctive pattern of white scale-like pubescence on the elytra. The prothorax is usually more closely and coarsely punctate than in other members of the subgenus. The male median lobe is more strongly narrowed apically than in other *Anthonomorphus* and the apex usually has only poorly defined median and lateral processes.

This species was described by LeConte from specimens sent him by Lt. Horace Haldeman from Ringgold Barracks at Rio Grande City in Starr County, Texas. I have seen no specimens of *fulvus* which were definitely known to have been collected in the Lower Rio Grande Valley of Texas, but the occurrence of the species there would not be surprising since it is quite common about 150 miles north of the area. Haldeman collected in several localities in southern and southwestern Texas, all of which are within the known range of *fulvus*. In view of the lack of specimens of this large and distinctive species from the rather extensively collected Lower Rio Grande Valley, the possibility exists that the examples sent to LeConte from Ringgold Barracks were actually collected elsewhere in the State.

There is a male and female specimen of *fulvus* bearing type labels and a third specimen labeled only "Tex" in the LeConte Collection. In addition to these, I have examined 171 specimens from the following localities: *KANSAS*—CLARK CO.: (no other locality data). EDWARDS CO.: Nettleton. GOVE CO. (no other locality data). PAWNEE CO.: Larned. SCOTT CO.: Scott State Park. SEDGWICK CO.: Mount Hope. ST. JOHN CO. (no other locality data). SUMNER CO.: Wellington. THOMAS CO. (no other locality data). WALLACE CO.: Wallace. *OKLAHOMA*—CARTER CO.: Ardmore. CHOCTAW CO.: Hugo. GRADY CO.: Chickasha. *TEXAS*—BEXAR CO.: San Antonio. BRAZOS CO.: College Station. BREWSTER CO.: Marathon. DALLAS CO.: Dallas. LAVACA CO.: Hallettsville. LEE CO.: Fedor. MARION CO.: Jefferson. REFUGIO CO.: Austwell. SAN PATRICIO CO.: 2 mi. S. Gregory. VICTORIA CO.: Victoria.

I have also seen a specimen of *fulvus* labeled "Olympia, Wash" in the California Academy of Sciences and another one labeled "Ohio" in the Museum of Comparative Zoology. Since these localities are considerably outside the range of *fulvus* as now understood, and as I am unable to find additional evidence of the occurrence of the species in the two states, these records are here considered questionable.

Anthonomus fulvus has frequently been collected on *Callirrhoe involucrata* in Texas. According to Pierce (1907: 268) "The adults feed on the floral column [of *Callirrhoe involucrata*]. The egg is laid in the flower bud and the larva develops at the expense of the floral column, finally eating its way into the capsule and pupating, or if the flower has been sealed properly and prevented from opening, pupation may take place in the fallen corolla." Several specimens in the U.S. National Museum from San Antonio, Texas, bear label data indicating they were reared from *Callirrhoe digitata*.



FIGURES 7-15, *Anthonomus* spp. (7-10 drawn to same scale; 11-15 greatly enlarged.)

FIGURES 7-10, Male median lobe, dorsal view. 7—*A. fulvus*. 8—*A. peninsularis*. 9—*A. cognatus*. 10—*A. texanus*.

Figures 11-13, Lateral view of left mesocoxa, trochanter, and base of femur. 11—*A. texanus*, male. 12—*A. texanus*, female. 13—*A. fulvus*, male.

FIGURES 14-15, *A. fulvus*, outer aspect of metatibia. 14—Male. 15—Female.

Adults of this weevil have been collected from early April until the middle of July, with most of the available collection records being in April. Mitchell and Pierce (1911:54) found larvae in buds of *C. involucrata* as early as March 4 in Victoria County, Texas.

The pupa of *fulvus* was illustrated by Pierce (1907:299); the larva has not yet been described.

Anthonomus peninsularis Dietz
(Figs. 3, 5, 8, 16)

Anthonomus peninsularis Dietz, 1891, p. 195; Gilbert, 1953, p. 41.
Anthonomus pervilis Dietz, 1891, p. 196.

This species may be readily separated from other *Anthonomorphus* by having the prothorax smaller in comparison to the size of the elytra (fig. 3), and by the more nearly erect pubescence of the body. *Peninsularis* is most likely to be confused with *cognatus;* in fact, representatives of the two species were mixed in some collections I examined. These two species are quite different and may be readily separated by characters given in the accompanying key. Additional differences are presented under the discussion of the relationships of *cognatus.*

Gilbert (1953:41) synonymized *pervilis* with *peninsularis,* attributing the differences described by Dietz to sexual dimorphism involving the degree of convexity of the eyes and the color of the body. After examining the types of *peninsularis* and *pervilis* (both in the Ulke Collection at the Carnegie Museum), I agree that this synonymy is warranted. However, the differences between these two specimens are due to normal intraspecific variation rather than sexual dimorphism. The types of both *peninsularis* and *pervilis* are males; Dietz considered the *pervilis* type to be a female and was apparently followed in this erroneous assumption by Gilbert. Sexual dimorphism in *peninsularis* is most noticeably exhibited in the mesotrochanters and apical armature of the metatibae. Members of this species do vary considerably in color, the body being usually black or ferrugineus with occasional intergrades, but this variation in color occurs about equally in both sexes. Gilbert *(loc. cit.)* states that the eyes of males of *peninsularis* are larger and more strongly convex than those of females. I have been unable to find any consistent differences in the size and degree of convexity of the eyes of the two sexes. The eyes of females of this species are often as prominent, and sometimes more prominent than those of males.

In addition to the type of *peninsularis,* I have examined 170 specimens from the following localities: *ARIZONA*—PIMA CO.: Molino Basin, Mt. Lemmon; Sabino Canon, Catalina Mts. YAVAPAI CO.: Jerome. *CALIFORNIA*—INYO CO.: Argus Mts.; 4 mi. E. Bigpine; Bishop; Cave Springs; Inyo Mts.; Keeler to Darwin Road; Lone Pine; Olancha; Owens Lake; Owens Valley; Panamint Mts.; Suprise Canyon, Panamint Mts.; Westgard Pass Plateau. RIVERSIDE CO.: Palm Springs; Pinon Flat, San Jacinto Mts. SAN DIEGO CO. (no other locality data). *NEVADA*—ESMERALDA CO.: Goldfield. LYON CO.: Yerington.

Dietz states that the type of *peninsularis* came from "Lower California; exact locality not given." This specimen in the Ulke Collection is labelled only "Cal."

According to label data, *peninsularis* has been collected on *Sphaeralcea ambigua, Malacothamnus orbiculatus,* and *Encelia farinosa* in California, and *Riddellia cooperi* in Arizona. *Sphaeralcea ambigua* is the most frequently listed plant on labels of material I have examined, but additional evidence is needed to determine whether or not it is a true host of *peninsularis*. This weevil has been collected in April, May, and June.

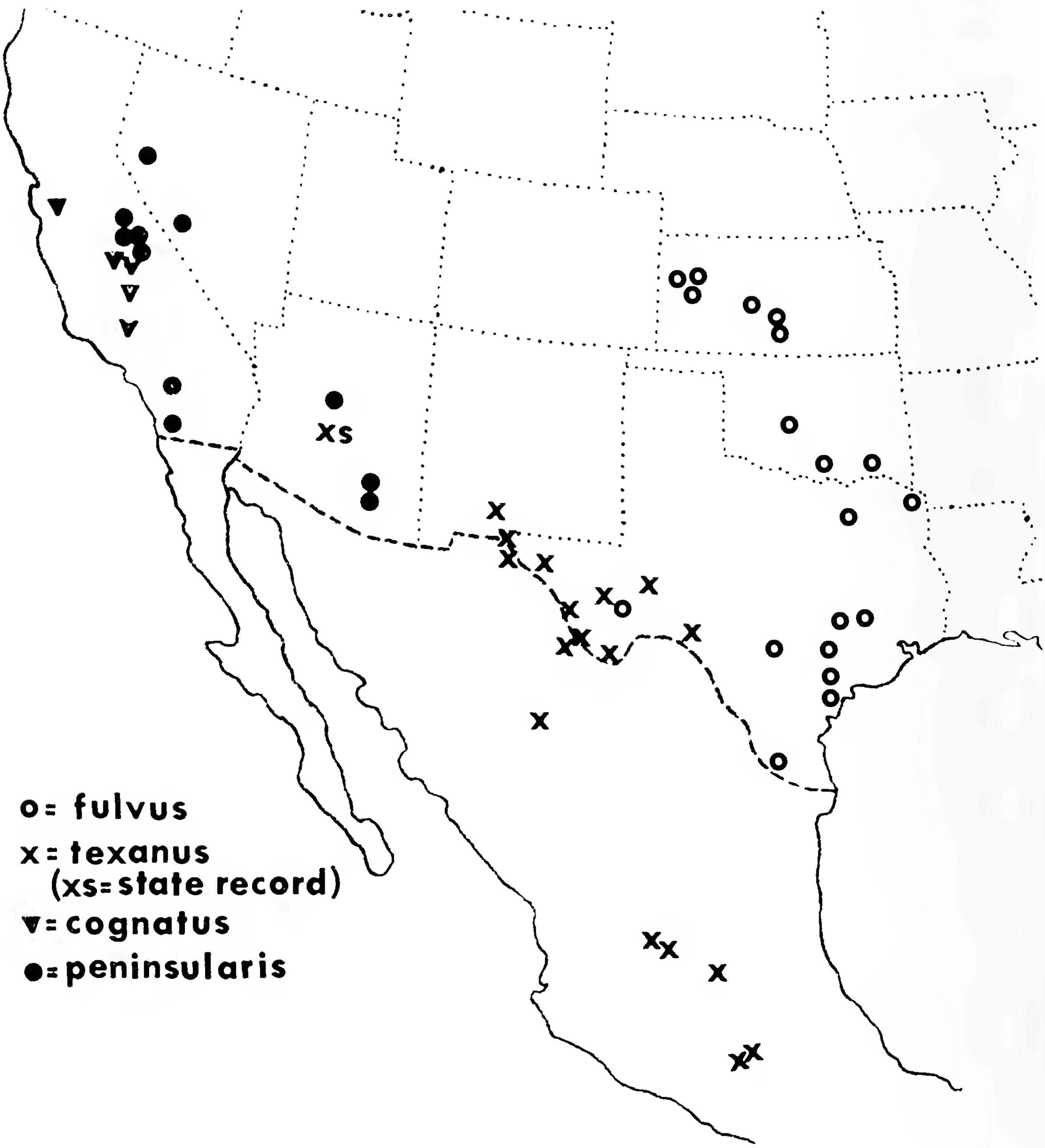


FIGURE 16—Geographic distribution of species of the subgenus *Anthonomorphus*.

Anthonomus texanus Dietz
(Figs. 2, 10-12, 16)

Anthonomus texanus Dietz, 1891, p. 197; Champion, 1903, p. 187; Pierce, 1908, p. 174.

Anthonomus texanus most closely resembles *cognatus* from which it is easily separated by the key characters. Specimens of *texanus* vary considerably in size, but are usually smaller and the body is narrower than that of other members of the subgenus. The median lobe of the male genitalia is stouter and the sides are only slightly narrowed toward the apex.

The male type from Texas in the Dietz collection in the Museum of Comparative Zoology has been examined. In addition, I have seen 70 specimens from the following localities: United States—*ARIZONA* (State label only). *NEW MEXICO*—DONA ANA CO.: Las Cruces. *TEXAS*—BREWSTER CO.: Chisos Mts.; Marathon; "Rio Grande." EL PASO CO.: El Paso. HUDSPETH CO.: Indian Hot Springs. PECOS CO.: 3.6 mi. N. Bakersfield. PRESIDIO CO.: Presidio; Ruidosa. VAL VERDE CO.: Devil's River. Mexico—*AGUASCALIENTES*—Pabellon. *CHIHUAHUA*—Guadalupe; 6 mi. WSW Jimenez; Ojinaga. *GUANAJUATO*—Tupataro; 9 mi. S. San Luis de la Paz. HIDALGO—Langunillo. MEXICO—Santa Clara; Teotichuacan.

Pierce (1908:174) reported rearing a specimen of *texanus* from a bud of *Sphaeralcea angustifolia* in Texas. Label data of specimens examined indicate *texanus* has been collected on *Sphaeralcea angustifolia, S. ambigua* and *S. emori-variabilis* in Texas, and on *S. fenderli* in New Mexico. This weevil has been collected on plants from April through September and in ground trash around cotton fields in January and February.

Anthonomus cognatus Burke, NEW SPECIES
(Figs. 4, 6, 9, 16)

Holotype male: Body-length, 4.85 mm. Rostrum-length, 2.04 mm. Prothorax-length, 1.26 mm.; width, 1.63 mm. Elytra-length, 3.70 mm.; width, 2.37 mm.

Oblong-oval; body black, rostrum and legs reddish brown, scape, basal segments of funicle and tarsi slightly paler in color; pubescence coarse, gray, uniformly distributed, semierect on dorsal surface, recumbent on abdomen and underside of thorax.

Rostrum slightly, evenly curved, feebly wider near apex; distinctly tricarinate from base to point opposite antennal attachments, carinae minutely punctate; apical portion shining, bearing small, oval, scattered punctures. *Antennae* attached slightly before middle of rostrum; scape slender, feebly curved, rather suddenly enlarged on apical fifth; first funicular segment slender and as long as 2 + 3, segment 2 as long as 3 + 4, remaining segments about equal in length, segment 7 distinctly broader, each segment bearing a whorl of inclining white setae which taper to fine points, setae becoming progressively longer toward club; club as long as preceding four funicular segments combined. *Eyes* strongly convex, nearly round, separated on front by distance equal to length of first funicular segment of antenna. *Head* with sides converging to a rather distinct constriction behind eyes; front rugosely punctate, striate between eyes; vertex finely punctate, bearing a few scattered coarse hairs; fovea deep, round. *Prothorax* with sides subparallel in basal two-thirds thence converging into a fairly distinct subapical constriction; disc rather densely covered with small, deep punctures, each of which has a slender scale-like hair arising from its posterior margin, raised areas between punctures smooth. *Scutellum* with sides subparallel, posterior margin broadly rounded. *Elytra* wider than prothorax at base; humeri moderately rounded; sides diverging slightly from behind humeri to about middle, thence rather evenly rounded to apices; intervals nearly flat on disc of elytra except at base where they are slightly more convex; striae deeply impressed throughout. *Abdomen* with first sternite depressed in middle; suture between sternites 1 and 2 indistinct, especially in middle. *Legs* slender; femora rather strongly clavate; tarsi slender.

Female allotype (body-length, 5.33 mm.; width, 2.44 mm.) differs from holotype in having a slightly straighter rostrum, antennae attached just behind middle of rostrum, and first abdominal sternite flattened in middle. Elytra and prothorax of allotype dark reddish brown whereas those of holotype are black, but this is an individual rather than sexual difference. Vestiture on head and rostrum (these areas rubbed in holotype) consists of semierect pubescence on and immediately above interocular area, and finer pubescence in striae on basal half of rostrum.

Paratypes agree well with holotype and allotype except for some slight size (for size range see measurements in key) and color differences. Vestiture of a few paratypes is more noticeably dense than in others due to their being in a better state of preservation. Vestiture of members of this species is very easily abraded by rubbing.

Anthonomus cognatus most closely resembles *texanus;* the several differences between these two species are given in the key and under the discussion of *texanus*. Since *cognatus* might also be confused with *peninsularis,* it should be noted that in addition to the characters used in the key, females of the two may be separated by the almost straight rostrum of *cognatus* as compared with the distinctly curved one of *peninsularis* (*cf.* figs. 5 and 6). The antennal club of *cognatus* is never longer than the preceding four funicular segments combined while that of *peninsularis* is always longer than these segments.

The only reference to a plant on the label data of members of the type series of *cognatus* is that accompanying five specimens from 22 miles west of Patterson, Calif., each of which is labeled "on Salix." Since it is either definitely known or strongly indicated that malavaceous plants are hosts of other members of the subgenus, the willow referred to on these labels was possibly serving only as a resting site.

Holotype male, Potwisha, Sequoia Natl. Park, California, V-9-1931, Van Dyke Collection, alt. 3000-5000 ft.; *Allotype female,* same data except collected V-19-1920 and alt. 2000-5000 ft.; and 60 *paratypes* as follows: 6 ♂ ♂, 8 ♀ ♀, same data on holotype; 2 ♀ ♀, same data as allotype; 12 ♂ ♂, 12 ♀ ♀, Potwisha, Sequoia Natl. Park, Calif., V-20-30, alt. 2000-5000, Van Dyke Collection; 1 ♂, Potwisha, Sequoia Natl. Park, V-19-30, 2000-3000 ft., A. T. McClay; 4 ♂ ♂, 3 ♀ ♀, Sequoia Natl. Park, Calif., V-9-31, A. T. McClay, 2 ♂ ♂, 2 ♀ ♀, Sequoia Natl. Park, Calif., VI-9-1931, A. T. McClay; 2 ♂ ♂, Lebec, Calif., alt. 4000 ft., V-15-1928, J. O. Martin; 1 ♀, 8 mi. N. Lake of the Woods, Kern Co., Calif. VII-15-61, 5200 ft., C. W. O'Brien; 4 ♂ ♂, 1 ♀, Adobe Creek 22 mi. W. Patterson, Calif., Stanislaus Co., IV-23-49, Hugh B. Leech, on Salix.

The holotype and allotype of *cognatus* are deposited in the California Academy of Sciences; paratypes are deposited there and in the collections of California Department of Agriculture, University of Kansas, Texas A & M University, and C. W. O'Brien.

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APION LONGIROSTRE OLIVIER, WIDELY DISTRIBUTED IN NORTH AMERICA (COLEOPTERA: CURCULIONIDAE)

Apion longirostre Olivier commonly known as the 'hollyhock weevil' is a species introduced from Europe and is recently coming to attention in the United States. It breeds in the seeds of hollyhock and is becoming widely distributed here. It has now been found in the following States: New York, Pennsylvania, Ohio, Maryland, Virginia, Illinois, Missouri, Arkansas, Kentucky, Tennessee, North Carolina and Wisconsin; and in Canada, in Ontario (Simcoe, Norfolk Co., and Chatham). Observations have indicated that *A. longirostre* feeds only on hollyhock, but according to Shchegolev, V. N., Znamenskii, A. V., and Bey-Bienko, G. J. (1937, Insect Pests of Field Crops, Moscow, 2nd ed.: 486-487) it is a pest of field crops in U.S.S.R. The name appears in a list of cotton pests by Iyriboz (1941, T. C. Ziraat Vekâleti Nesriyati Umum No. 237 [Turkey], Mahsul Hastaliklari No. 1:80). For information on the life history and habits of *A. longirostre* see Tuttle (1954, Ann. Ent. Soc. America 47(2):306) and Tattershall and Davidson (1954, Jour. Econ. Ent. 47(1): 182, figs. 1, 2).—Rose Ella Warner, *Ent. Res. Div., A.R.S., U. S. Department of Agriculture, Washington, D. C.*

TWO NEW NAMES FOR NORTH AMERICAN SPECIES OF SELONODON (COLEOPTERA: CEBRIONIDAE)

By J. P. MACNAMARA, S.J.[1]

The preparation of a revision of Dalla Torre's world catalog of the family Cebrionidae reveals two primary homonyms in the new world genus *Selonodon* Latreille, 1834. In a catalog of the type-species of the genera of the Cebrionidae, Arnett (1949) moved the "American species of 'Cebrio' (*Cebrio* of recent American authors and *Anachilus* LeConte)" to *Selonodon* Latreille. Those generic changes have temporarily obscured these two homonyms.

Selonodon josephi Macnamara, NEW NAME

In 1916 Schaeffer described *Cebrio antennatus* from Arizona which became a primary homonym of *Cebrio antennatus* Chevrolat, 1874, from Greece. This species is renamed *Selonodon josephi.*

Selonodon josephi Macnamara, NEW NAME

Cebrio antennatus Schaeffer, 1916 (not Chevrolat, 1874), Bull. Brooklyn Ent. Soc. 11:107.

Selonodon arizonensis Macnamara, NEW NAME

Another Arizona cebrionid, *Cebrio pallidipennis* Van Dyke, 1949, is a primary homonym of *Cebrio pallidipennis* Chevrolat, 1874. Van Dyke's *C. pallidipennis* is here referred to *Selonodon* Latreille, 1934, according to Arnett's 1949 paper which appeared prior to Van Dyke's description. This species is renamed *Selonodon arizonensis.*

Selonodon arizonensis Macnamara, NEW NAME

Cebrio pallidipennis Van Dyke, 1949 (not Chevrolat, 1874), Pan-Pacific Ent. 25:52.

The present composition of the genus *Selonodon* is as follows. The generic changes listed here should be credited to Arnett, 1949, with the exception of *Selonodon arizonensis* Macnamara.

Selonodon Latreille, 1834

Selonodon Latreille, 1834. Ann. Soc. Ent. France 3:136. (Type-species: *Selonodon bicolor* (Fabricius, 1801). Monobasic.)

Boscia Leach, 1824. (not Leach, 1814, Schweigger, 1819, or Ferussac, 1822) Zool. Jour. 1:37. (Type-species: *Boscia picea* Leach, 1824. Designated by Arnett, 1949, p. 53.)

Anachilus LeConte, 1861. Smithsonian Misc. Coll. 3:175. (Type-species: *Anachilus mandibularis* LeConte, 1863. By being the first included species, by LeConte, 1863, Smithsonian Misc. Coll. 6:86.)

[1] Department of Biology, Catholic University of America, Washington, D. C.

Selonodon abnormis (Werner, 1943).
    Cebrio abnormis Werner, 1943.
Selonodon arizonensis Macnamara, NEW NAME.
    Cebrio pallidipennis Van Dyke, 1949 (not Chevrolat, 1874).
Selonodon atokanus (Werner, 1943).
    Cebrio atokanus Werner, 1943.
Selonodon bicolor (Fabricius, 1801).
    Cebrio bicolor Fabricius, 1801.
    Boscia picea Leach, 1824.
    Cebrio picea (Leach, 1824).
Selonodon brusei (Werner, 1943).
    Cebrio brusei Werner, 1943.
Selonodon compositus (Fall, 1907).
    Cebrio compositus Fall, 1907.
Selonodon confusus (LeConte, 1853).
    Cebrio confusus LeConte, 1853.
Selonodon convexifrons (Knull, 1935).
    Cebrio convexifrons Knull, 1935.
Selonodon emarginatus (Schaeffer, 1916).
    Cebrio emarginatus Schaeffer, 1916.
Selonodon estriatus (Horn, 1881).
    Cebrio estriatus Horn, 1881.
Selonodon glaber (Leach, 1824).
    Boscia glabra Leach, 1824.
    Cebrio glaber (Leach, 1824).
Selonodon josephi Macnamara, NEW NAME.
    Selonodon antennatus (Schaeffer, 1916).
    Cebrio antennatus Schaeffer, 1916 (not Chevrolat, 1874).
Selonodon knause (Van Dyke, 1932).
    Cebrio knause Van Dyke, 1932.
Selonodon mandibularis (LeConte, 1863).
    Anachilus mandibularis LeConte, 1863.
    Cebrio mandibularis (LeConte, 1863).
Selonodon minutus (Leach, 1824).
    Boscia minuta Leach, 1824.
    Cebrio minutus (Leach, 1824).
Selonodon olivaceus (Leach, 1824).
    Boscia olivacea Leach, 1824.
    Cebrio olivaceus (Leach, 1824).
Selonodon punctatus (Leach, 1824).
    Boscia punctata Leach, 1824.
    Cebrio punctatus (Leach, 1824).
Selonodon simplex (LeConte, 1853).
    Cebrio simplex LeConte, 1853.
Selonodon speratus (Fall, 1928).
    Cebrio speratus Fall, 1928.

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CURRENT RESEARCH PROGRAMS

These announcements of research underway on beetles are not meant to be requests for specimens or information unless stated to the contrary; a letter to the researcher will determine whether or not specimens or information are wanted. All research workers are invited to send notices of research in progress to the Editor.

CERAMBYCIDAE: Revision of *Moneilema*. By Arthur G. Raske, Dept. of Entomology and Parasitology, Univ. of California, Berkeley, Calif.

CURCULIONIDAE: Study of cocooning and diapausing in *Hypera postica*. By Sara S. Rosenthal, Dept. of Entomology and Parasitology, Univ. of California, Berkeley, Calif.

CURCULIONIDAE: Revision of *Dorytomus*. By Charles W. O'Brien, Dept. of Entomology and Parasitology, Univ. of California, Berkeley, Calif.

DERMESTIDAE: Taxonomy of *Attagenus*. By Richard S. Beal, Jr., Arizona State College, Flagstaff, Ariz.

NITIDULIDAE: Review of *Stelidota* Erichson. By W. A. Connell, Univ. of Delaware, Newark, Dela. (Need specimens from Gulf States and southwestern United States and from Central and South America.)

SCAPHIDIIDAE: Revision of *Baeocera*. By Jim F. Cornell, Dept. of Entomology, North Carolina State College, Raleigh, N. C.

SCOLYTIDAE: Morphology of stridulating organ in *Ips*. By Barbara A. Barr, Dept. of Entomology and Parasitology, Univ. of California, Berkeley, Calif.

SCOLYTIDAE: Host selection behavior of bark beetles. By David L. Wood, Dept. of Entomology and Parasitology, Univ. of California, Berkeley, Calif.

SCOLYTIDAE: Biology of *Conophthorus lambertianae*. By William D. Bedard, U. S. Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.

SCOLYTIDAE: Efficiency of woodpeckers as predators on western pine beetle. By Imre S. Otvos, Dept. of Entomology and Parasitology, Univ. of California, Berkeley, Calif.

STAPHYLINIDAE: Review of the Nearctic Staphylinidae exclusive of the Steninae and Aleochariniinae. By Ian Moore, 547 El Monte Road, El Cajon, Calif.

A REVIEW OF THE SPECIFIC NAMES IN NORTH AMERICAN MIARUS (COLEOPTERA: CURCULIONIDAE)

By D. M. ANDERSON[1]

During a study of the immature stages of the North American species of the genera *Miarus, Mecinus,* and *Gymnaetron* (tribe Mecinini), it became evident that the status of most of the names proposed for North American species of *Miarus* was rather uncertain. Therefore, a study of the type specimens, and other material mentioned by the authors of those names, was undertaken. The synonymy proposed as a result of this study is presented below, with a discussion of each name following in subsequent paragraphs. Unless otherwise indicated, all specimens mentioned are located in the collection of the U. S. National Museum and have been examined by the writer.

Miarus Schoenherr, 1826

The original author of the name *Miarus* apparently is Schoenherr (1826, p. 320), as indicated by LeConte (1876), Pierce (1919), and Neave (1940), although Reitter (1907), Klima (1934), and more recent authors, such as Franz (1947) and Hoffmann (1958), have recognized Stephens (1831, p. 15) as the first author of that name.

Miarus hispidulus LeConte

Miarus hispidulus LeConte, 1876, p. 221. Lectotype, here designated: Female, labeled "Ill."; second of four syntypes in J. L. LeConte collection; Museum of Comparative Zoology Type No. 5225.

Miarus hispidulus Reitter, 1907, p. 46. (Described as a new species from "Andalusien"; type series not seen.) Preoccupied by *Miarus hispidulus* LeConte, 1876.

Miarus hispidus Bovie, 1909, p. 17. (New name for *Miarus hispidulus* Reitter, 1907.)

Miarus puritanus Casey, 1910, pp. 143-144. Type: Male, labeled "Mass."; U. S. National Museum Type No. 36782. (NEW SYNONYMY)

Miarus consuetus Casey, 1910, p. 143. Lectotype, here designated: Male (?), labeled "Ks."; first of two syntypes in T. L. Casey collection; U. S. National Museum Type No. 36781.

Miarus nanus Casey, 1910, p. 144. Type: Male (?), rostrum entirely missing, labeled "Mass."; U. S. National Museum Type No. 36783. (NEW SYNONYMY)

Miarus illini Casey, 1910, p. 144. Type: Female, labeled "Ill.," pin also bearing a white paper disc with "6/20" on it; U. S. National Museum Type No. 36784. (NEW SYNONYMY)

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[1] Entomology Research Division, Agric. Res. Serv., U. S. Department of Agriculture, Washington, D. C.

Miarus micros (Germar), 1821, sensu Pierce, 1919, p. 36. [Misidentification]

Miarus meridionalis (Brisout), 1862, sensu Pierce, 1919, p. 36. [Misidentification]

Miarus erebus Casey

Miarus erebus Casey, 1910, pp. 142-143. Lectotype, here designated: Female, labeled Mex. with a solid bar over e and x [from near Colonia Carcia, Sierra Madre Mts., Chihuahua, elev. 7,300 ft., collected by C. H. T. Townsend, according to the original description]; first of five syntypes in T. L. Casey collection; U. S. National Museum Type No. 36780.

Discussion

Miarus hispidulus Reitter (renamed *Miarus hispidus* by Bovie, 1909) was first placed in synonymy with *M. hispidulus* LeConte by Pierce (1919) without any indication of the reasons for this action. More recently, Franz (1947), having seen some specimens evidently used by Reitter (1907) in describing his *Miarus hispidulus,* decided that those specimens are examples of *M. hispidulus* LeConte, which were actually collected in North America but not so labeled by the collector (G. Strobl), and presented to Reitter, who had mistakenly thought that they had originated in southern Spain and that they represented an undescribed species.

Examination of the type specimens of *Miarus puritanus* Casey, *M. illini* Casey, and *M. nanus* Casey, all of which were described from single specimens, revealed no features that would consistently separate them from *Miarus hispidulus* LeConte, as represented by the lectotype specimen and by 102 specimens in the National Museum collection. A survey of the latter material, collected at various localities from Michigan south to Florida, indicated that individual variation would account for the distinguishing features given by Casey (1910) for his *M. puritanus, M. nanus,* and *M. illini.*

For reasons rather uncertain to the writer, Leng (1920) listed *nanus* and *illini* as varieties of *puritanus,* but listed *M. consuetus* Casey as a variety of *M. hispidulus* LeConte. Klima (1934) apparently followed Leng (1920) in listing *M. illini* as a synonym of *M. puritanus,* but his reasons for placing *M. nanus* as a synonym of *M. meridionalis* (Brisout) are not evident to the writer.

The two specimens from Kansas, upon which Casey (1910) based his *Miarus consuetus,* do differ from most of the *Miarus hispidulus* specimens examined in having all-white vestiture arranged in single rows on most of the elytral intervals, rather than a mixture of brown and white (or pale gray) vestiture arranged in two or more rows on each elytral interval. However, these differences are not entirely consistent. A few specimens in the National Museum collection from Kansas and Iowa were found to agree in all respects with the lectotype of *M. consuetus,* but other specimens from the same area (particularly Lake Okoboji, Iowa) were seen to be intermediate between them and most other specimens of *M. hispidulus* in having some brownish vestiture on the prothorax and elytra, or in having vestiture that is white but arranged in more than one row on each elytral interval. No differences in the genitalia of either sex or consistent differences in other characters, such as size and body shape, could be found between specimens agreeing with the lectotype of *M. consuetus* and examples conforming with the lectotype of *M. hispidulus*. Because of the lack of consistent differences between the specimens studied, *M. consuetus* and *M. hispidulus* are interpreted here as one species.

The two specimens from Winnipeg, Manitoba, identified as *Miarus micros* (Germar) by Pierce (1919) are also apparently representatives of *Miarus hispidulus* LeConte having whitish vestiture. They definitely do not agree with European specimens identified as *Miarus micros* in the National Museum collection, which have a yellowish decumbent vestiture, nor do they agree with Germar's (1821) original description of *M.* (then *Cionus*) *micros*, or with the more recent description and drawings of that species by Hoffmann (1958).

The single specimen from Douglas Co., Kansas, identified by Pierce (1919) as *Miarus meridionalis* (Brisout) does, as stated by Pierce, agree closely with the specimens described by Casey (1910) as *Miarus consuetus*, and is likewise interpreted here as an example of *Miarus hispidulus* LeConte having white vestiture.

Miarus erebus Casey is evidently a distinct species. The specimens in the type series are easily separated from *Miarus hispidulus* LeConte by the characters given in the key by Casey (1910), particularly by the long, white, erect vestiture of the prothorax (and to some extent, the elytra), which gives *M. erebus* a much more hirsute appearance.

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BEETLE TALK

Under this department, Beetle Talk, we solicit your opinions, ideas, news, questions, answers, impressions, challenges, complaints, announcements, etc., or just about anything of an informal nature. Perhaps one of our readers has the answer to some of the questions now vexing you. Here, under Beetle Talk, you can put those questions to quite a few coleopterists. We solicit your beetle talk.

It may be wondered whether the "Origin of Species" would have been written if Mr. Lawson had not existed. . . . Of course, Mr. Lawson's part in no way diminishes Darwin's achievement, for it was not so much the fact of geographical variation, as its interpretation, that required genius. Nevertheless, credit should be given, as Darwin gave it, to Mr. Lawson, who must have been a naturalist of perspicacity and accuracy. Herein lies the moral, for perhaps one of us will unknowingly provide, perhaps has already provided without knowing it, a key fact for the Darwin of the next generation.—David Lack, American Scientist 51:13, 1963.

The spread of education adds to the writer's burdens by multiplying that pestilent fellow the critical reader. No longer can we depend on an audience that will be satisfied with catching the general drift and obvious intention of a sentence and not trouble itself to pick holes in our wording; the words used must nowadays actually yield on scrutiny the desired sense; to plead that anyone could see what you meant, or so to write as to need that plea, is not now permissible—H. W. Fowler, A Dictionary of Modern English Usage, 1937, p. 256.

ON THE SUPPOSED NORTH AMERICAN TRACHODINAE (COLEOPTERA: CURCULIONIDAE)

By ELWOOD C. ZIMMERMAN[1]

While working on a problem concerning Indo-Pacific weevils, I have had to study the "Trachodinae" of the world, and I have found that the species assigned to this subfamily in America do not belong to it. Instead of having the results of my study of the North American species immersed entirely in my Pacific monographs, I have thought it best to present these few notes where they will be easily available to North American students.

This work was accomplished during the tenure of National Science Foundation research grant G-18933, "Pacific Island Weevil Studies," for which I am most grateful. I am also indebted to Rose Ella Warner Spilman who assisted me in this study at the United States National Museum, and for arranging for the loan of specimens from that institution, and to the Museum of Comparative Zoology, Harvard University, for use of their excellent library and for permission to study the great collections of LeConte and Fall.

LeConte (1876:190) erected the "Tribe Trachodini" for the genus *Trachodes* Germar, and in it he placed the following three species: *Trachodes ptinoides* Germar, 1824, *Trachodes quadrituberculatus* (Motschulsky, 1845) Mannerheim, 1852, and *Trachodes horridus* Mannerheim, 1852. Unhappily, none of these species belongs to *Trachodes*. Thus, the characters upon which LeConte based his "Trachodini" do not agree with the type genus, *Trachodes*.

The three species named above were listed in *Trachodes* by G. R. Crotch in his "Check List of the Coleoptera of America North of Mexico," 1873, and repeated in E. P. Austin's "Supplement" to that work in 1880. In 1885, the three species again were catalogued similarly by Samuel Henshaw in his "List of the Coleoptera of America, North of Mexico." None of these references listed localities or gave bibliographic notes, but that information was then to be found in the Gemminger and Harold "Catalogus Coleopterorum," 1871, where the species are also listed under *Trachodes*. After a lapse of 35 years from the publishing of Henshaw's catalogue, the "Leng Catalogue" appeared in 1920, and there we find *ptinoides* and *quadrituberculatus* under *Trachodes* and *horridus* under *"Aparapion."* These are placed in the "Trachodini" which is situated between the "Erirhinini" and the "Tychini." Various errors were made in these listings. The "Trachodini" are not allied to the groups between which they were placed; *Trachodes quadrituberculatus* is credited to Mannerheim instead of to Motschulsky, and *"Aparapion"* is a misspelling for *Aparopion*. No authority for the transfer of *horridus* to *Aparopion* was given, but it was Heyden, 1879:167.

In 1936, L. L. Buchanan, a devoted and excellent worker, wrote a paper entitled "Systematic Notes on the Trachodinae." Buchanan demonstrated that none of the species we are concerned with belongs to *Trachodes*

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[1] Peterborough, New Hampshire.

(whose type was designated by Schoenherr in 1826 as the European *hispidus* Linnaeus). Buchanan resurrected *Sthereus* Motschulsky, 1845 (which incorrectly had been synonymized with *Trachodes* by Lacordaire, who had not seen specimens of the genus), for *quadrituberculatus* Motschulsky (which Buchanan designated type of *Sthereus), ptinoides* (Germar) and a new species, *multituberculatus* Buchanan. Buchanan created a new genus, *Lobosoma,* for *Trachodes horridus* Mannerheim, and he also erected a new allied genus, *Gastrotaphrus,* for *barberi,* a new species. Peculiarly, Buchanan did not describe his *Lobosoma,* although he gave a lengthy description of *Gastrotaphrus.* He said of *Lobosoma* only: "LOBOSOMA, new genus. *(Aparopion* of American lists, not Hampe.)". Unfortunately, the results of Buchanan's studies were not included in Schenkling and Marshall's "Coleopterorum Catalogus," pars 154, Trachodinae, 1937.

Further confusion exists in literature because of some errors made by Sir Guy Marshall. In 1932:344, Sir Guy referred *Sthereus* and *Trachodes* to the Trachodinae. (Bedel, 1884:92, footnote, had earlier stated that *"Stereus"* [*sic*] belonged to the "Trachodini," and he gave characters to separate it from *Aparopion* with which some authors had merged it.) The Marshall usage was followed by Schenkling and Marshall in 1937, in "Coleopterorum Catalogus," pars 154, Trachodinae, but there the confusion is compounded further, because *Sthereus* is erroneously placed as a synonym of *Trachodes.* In 1948:427, Marshall continued to be confused by considering *Sthereus* to be a synonym of *Trachodes* and incorrectly believing the type of *Trachodes* to be *ptinoides.* He noted then that *ptinoides* is a hylobiid, and he erected a new genus, *Metrachodes,* for *hispidus* (Linnaeus) and other species which he assigned to the Acicnemidinae. Evidently, he discovered his errors when his paper was in page proof, because there is a footnote beneath his description of *Metrachodes* stating, correctly, that the type of *Trachodes* is *hispidus,* and therefore his *"Metrachodes* falls as a synonym of *Trachodes."* [Morimoto has failed to note this synonymy, and he uses *Metrachodes* incorrectly for *Trachodes subfasciatus* Voss, in his recent "Preliminary Check List of the Families Curculionidae (II) and Rhynchophoridae of Japan," of 1962.]

The original purpose of this paper was to demonstrate that not only do none of the American species discussed belong to *Trachodes,* but none of them belong to the "Trachodinae." They are all flightless Hylobiinae. Hence, the subfamily "Trachodinae" should be deleted from the American faunal lists, and the included species should be transferred to the Hylobiinae. Moreover, the name Trachodinae (LeConte, 1876) is a synonym of Acicnemidinae (Lacordaire, 1866). In so far as is now known, the Acicnemidinae are an Old World group whose present great proliferation of species is in the Indo-Pacific area.

It should be noted here, also, that the genus *Ancylocnemis* Marshall, now listed in the Trachodinae in "Coleopterorum Catalogus," should be transferred to the Anthonominae and evidently placed near *Bradybibastes.* When Marshall described the genus, he placed it in the Anthonominae, but in 1932:344, he incorrectly transferred it to the Trachodinae. Heller, 1930:5, considered it to belong to the Anthonominae. Although it may be shown eventually that *Ancylocnemis* is not a typical member of the

Anthonominae, it is obvious that it does not belong to the Acicnemidinae. During this study, I have examined only *Ancylocnemis sternalis* Marshall. It differs from the Acicnemidinae in facies, it lacks postocular lobes, it lacks the peculiar scaling along the metepisternal suture that is typical of the Acicnemidinae, its fore coxae are contiguous, the eyes are more frontal and the claws are appendiculate. *Ancylocnemis* species are known to attack fruits, and this is a habit characteristic of many Anthonominae but foreign to the Hylobiinae and the Acicnemidinae whose larvae are characteristically wood-borers.

The geographical distribution of the flightless Hylobiinae now under discussion is significant. They are distributed from northern California through Oregon, Washington, northwestern Idaho, British Columbia, Alaska and across the Aleutian Islands to Kamchatka.

These weevils are inhabitants of forest ground litter and are also found in and under driftwood. Comparatively few specimens have been collected, and the ranges of the species remain to be determined.

Key to the North American Associates of Sthereus

1\. Anterior margin of prosternum entire, not emarginate; pronotum without a median carina; length less than 3.5 mm. ---------------------------- STHEREUS Motschulsky

Anterior margin of prosternum deeply, conspicuously emarginate (somewhat resembling the formation found in some Cryptorhynchinae); pronotum with a narrow median carina; length usually greater than 3.5 mm. ---------------------- 2

2(1). Metasternum and ventrites one and two with large, deep, extraordinary excavations -- GASTROTAPHRUS Buchanan

Metasternum and venter without any excavations ---------------------------- 3

3(2). Antennal club elongate-ovate, less than one-half as broad as long, broadest near distal one-third; dorsum conspicuously multituberculate; legs densey squamose, femora each with a low, obtuse tooth within a cluster of setae, vestiture of coxae dense and conspicuous, anterior and middle coxae moderately densely squamose; metepisternum almost completely indistinguishable; distance between metacoxae less than median length of metasternum; first abdominal suture continued coarsely and conspicuously across middle of venter -------- LOBOSOMA Buchanan

Antennal club stoutly ovoid, about three-fourths as broad as long, broadest at about middle; dorsum not tuberculate; legs finely setose, femora not toothed, coxae appearing bare and shiny (with only a few fine setae); underside sparsely setose; metepisternum distinct throughout its length; distance between metacoxae greater than median length of metasternum; first abdominal suture obsolete across middle of venter -- PHILOSTRATUS Zimmerman

It was not my intention when I began this research to describe new American categories, because for nearly 30 years I have confined my work to the faunas of the Pacific Ocean. However, I have found that the generic name *Sthereus* has included two American genera. One of these is unrecognized in literature and requires description. Hence, to record more fully the results of my research, the genus *Philostratus* is described below.

The following are the American genera and species that should be transferred from the "Trachodinae" to the Hylobiinae:

Genus *Sthereus* Motschulsky

Motschulsky, 1845:373.
Lacordaire, 1863:374, footnote, there in synonymy under *Trachodes.*
Buchanan, 1936:178.
Bedel, 1884:92, footnote. *Stereus* [*sic*]

Type-species: *Sthereus quadrituberculatus* Motschulsky, designated by Buchanan, 1936:178.

Key to the American Species of Sthereus

1. Pronotum without any fascicles of erect setae; tubercles on elytra low and poorly developed, most prominent on interval three and obsolescent or absent on intervals five and seven; intervals three, five and seven not or only feebly elevated between the fascicles ------------------------ QUADRITUBERCULATUS Motschulsky
2. Pronotum with four fascicles of erect setae on a transverse line cephalad of middle, the two fascicles on the disc most prominent and those at the sides obsolescent in some examples; tubercles on elytral intervals three, five and seven very prominent and the intervals prominently elevated between the tubercles ----- --MULTITUBERCULATUS Buchanan

In addition to these species, *Sthereus borealis* Motschulsky, 1845:374, and *Sthereus fasciculatus* Motschulsky, 1845:374, both from Kamchatka, which are presumed to belong to *Sthereus,* but which I have not seen, should follow the American species into the Hylobiinae. It is possible, however, that these species belong to *Philostratus*. LeConte, 1876:190, said that he had received from Col. Motschulsky, specimens of *Sthereus ptinoides* under the name *Sthereus fasciculatus,* and this statement might be construed to mean that *fasciculatus* is a synonym of *ptinoides* (placed herein under *Philostratus*). This has evidently led to the incorrect listing of such synonymy in "Coleopterorum Catalogus." Motschulsky, 1845:374, said that he had been confused by the two species, but he noted that on *fasciculatus* the pronotum is "in medio caniculato," whereas *ptinoides* has a fine median carina on the pronotum. I have examined the Motschulsky specimens mentioned by LeConte in his collection at the Museum of Comparative Zoology at Harvard, and they are *ptinoides* as we now recognize it. Unfortunately, the specimens lack locality data.

Sthereus multituberculatus Buchanan, 1936:179.
Oregon (type locality: Astoria) to Alaska.

Sthereus quadrituberculatus Motschulsky, 1845:375, pl. 7, fig. 4, I-V.
Buchanan, 1936:178.
Trachodes quadrituberculatus (Motschulsky) Mannerheim, 1852:355.
LeConte, 1876:190.

Northern California to Alaska (type locality: Sitka).

Mannerheim (1832:355) said that this species had been found on bark and in logs of pine.

Genus *Philostratus* Zimmerman, NEW GENUS

Rather similar to *Lobosoma,* but dorsum not tuberculate and vestiture less dense, especially on ventral surfaces which are not hidden by vestiture as they are on *Lobosoma.*

Head with eyes moderately convex, coarsely faceted, the individual facets conspicuously convex; interocular distance fully as great as greatest breadth of base rostrum. *Rostrum* with several fine carinae behind antennal insertions; mandibles tri-dentate, but the basal tooth small and much less conspicuous than the prominent middle and anterior teeth; upper margin of scrobe directed to lower corner of eye; without any long, tactile setae on sides just behind bases of mandibular sinuses or on underside behind maxillary sinuses and none on prementum. *Antennae* sparsely setose, inserted just beyond middle of rostrum; apex of scape nearly reaching eye (separated by about one-fourth the diameter of club of scape from eye on type, viewed from side); funiculus with first two segments elongate, first segment somewhat longer and much stouter than second, second as long as three plus four combined, segments three to seven subspherical; club compact, stout, ovoid, about three-fourths as broad as long, broadest near middle, about as long as preceding four funicular segments. *Prothorax* rather loosely squamose, punctate, finely granulate; dorsum moderately uneven, with a fine, longitudinal, median carina and a sulcus along basal margin; subapical constriction well developed on sides and continued across prosternum; sides with moderately developed postocular lobes which partly cover the eyes when head is retracted, and the inner edges of the lobes behind the eyes armed with a fringe of setae (post-ocular vibrissae) which extend over the posterior edges of the eyes when head is retracted. *Scutellum* concealed. *Elytra* ovate, without humeri, setose and squamose, ten-striate, stria ten well impressed only basad of metacoxae and at apex but marked by a continuous line of punctures between these areas; stria nine continuous to base. *Wings* absent. *Legs* slender; femora not dentate, hind pair reaching about to apex of ventrite four; tibiae slightly sinuous, strongly uncinate; tarsi long and slender, hind tarsi more than half as long as tibiae, sparsely setose dorsally and much less densely setose beneath than *Lobosoma* (obviously not "spongy"), third tarsal segment deeply cleft, the sinus reaching near base (on type the inner lobe is smaller than outer lobe on hind tarsus). *Sternum* sparsely, finely setose; coxae and trochanters appearing mostly bare, with only a few fine setae; anterior margin of prosternum conspicuously, broadly, arcuately emarginate in front, the disc broadly and shallowly concave; the anterior and posterior intercoxal processes well separated and the coxal cavities thus distinctly coalescent; procoxae large, strongly protuberant; mesosternum with intercoxal process steep, subtruncate behind, the distance between the mesocoxae equal to one-third or more of the length of the metasternum at its narrowest point between meso- and metacoxae; division between mesepisternum and mesepimeron visible; mestasternum with narrowest point between meso- and metacoxae subequal to breadth of a mesocoxa; metacoxae eye-shaped, obviously transverse (less than three-fourths as long as broad on type); metepisternum distinct throughout its length, but the suture well defined only basad of middle. *Venter* with intercoxal process of first ventrite broadly arcuate, its breadth between the metacoxae greater than median length of mesosternum; median length of first ventrite subequal to lengths of ventrites two and three combined; its narrowest point behind the metacoxae one-half the median length; suture between first and second ventrites obsolete on disc, well impressed laterad, the other sutures vertical and very strong; ventrite two as long next to the elytra as ventrite three plus about one-half of four; ventrite five subequal in length to ventrite three plus four; thickened ventral margin of pygidium visible beyond ventrite five in male.

Type-species: *Sthereus (Trachodes) ptinoides* (Germar) Buchanan.

Philostratus is derived from the Greek character of that name and is masculine.

The concave anterior margin of the prosternum removes this genus easily from *Sthereus* and associates it with *Lobosoma* and *Gastrotaphrus*. *Gastrotaphrus* is easily distinguished by its unusual underside as well as other features. *Philostratus* is much like *Lobosoma,* but there are numerous differences between the two, and the more obvious differences are summarized in the key. *Lobosoma* has a narrower sternum with the intercoxal processes of the meso- and metasternum and first ventrite all narrower and more accuminate. The hind coxae are more nearly round on *Lobosoma* (only about one-fifth broader than long), but they are obviously more transverse on *Philostratus.*

Philostratus ptinoides (Germar) Zimmerman, NEW COMBINATION.

Trachodes Ptinoides Germar, 1824:327. Schoenherr, 1836:513. Fahraeus, 1843:408. Mannerheim, 1853:240, *"Var. b."* LeConte, 1876:190.

Pissodes ptinicollis Sturm, 1826:184, *nomen nudum.*

Sthereus ptinoides (Germar) Buchanan, 1936:178.

Northern California to the Aleutian Islands, Alaska (type locality: Unalaska), and Kamchatka (new record).

The Kamchatka record is based upon my determination of two males in the U. S. National Museum which bear the following data: Peptropaulski, Kamtschatka, June and July, 1882, L. Stejneger collector. These specimens appear to come within the range of variability of *ptinoides,* and the aedeagi are similar.

Mannerheim, 1853:240, and Van Dyke (1921:166) say that this weevil breeds in or is found under driftwood.

It is possible that *Sthereus borealis* Motschulsky and *Sthereus fasciculatus* Motschulsky, from Kamchatka, belong here. See the discussion after the key to *Sthereus,* above.

Genus *Lobosoma* Buchanan

Buchanan 1936:180.

Type-species: *Trachodes horridus* Mannerheim, by original designation and monotypy.

Lobosoma horridum (Mannerheim) Buchanan, 1936:180.

Trachodes horridus Mannerheim, 1852:345. LeConte, 1876:190. Schenkling and Marshall, 1937:2.

Aparopion horridus (Mannerheim) Heyden, 1879:167.

Aparapion [*sic*] *horridus* Mannerheim, Leng, 1920:320.

Oregon to Alaska (type locality: Sitka).

W. W. Baker, as recorded by Buchanan (1936:180), stated that he collected this weevil "by sifting debris from the forest floor or close to the edges of timber."

Genus *Gastrotaphrus* Buchanan

Buchanan, 1936:180.

Type-species: *Gastrotaphrus barberi* Buchanan, by original designation and monotypy.

Gastrotaphrus closely resembles *Lobosoma,* and the dorsum of each is conspicuously multituberculate. The conspicuously foveate sternum and abdomen of *Gastrotaphrus* makes possible the easy separation of the two groups, and I have used this feature as an easily observed character in the generic key. However, I would not have considered the foveae by themselves as of generic importance, but there are other differences between *Gastrotaphrus* and *Lobosoma,* and some of the more obvious features may be assembled as follows:

Club of antenna elongate-ovate; eyes about ten facets broad; all coxae conspicuously squamose overall, internally and externally; femora with a low tooth beneath and the hind pair reaching about to apex of elytra; third tarsal segment with the distal emargination (as seen from beneath) extending basad of middle ---------- LOBOSOMA

Club of antenna stoutly ovoid; eyes only about five facets broad; coxae with squamae confined to a patch on mesal areas of pro- and mesocoxae only, bare elsewhere; femora not toothed, the hind pair reaching about to middle of ventrite five; third tarsal segment (viewed from beneath) with the distal emargination not reaching the middle ---------------------------.-------------------- GASTROTAPHRUS

Gastrotaphrus barberi Buchanan, 1936:181.

California (type locality: Eureka), and probably also Oregon, Washington and British Columbia.

It is probable that this species has been taken by sifting ground litter in redwood forests.

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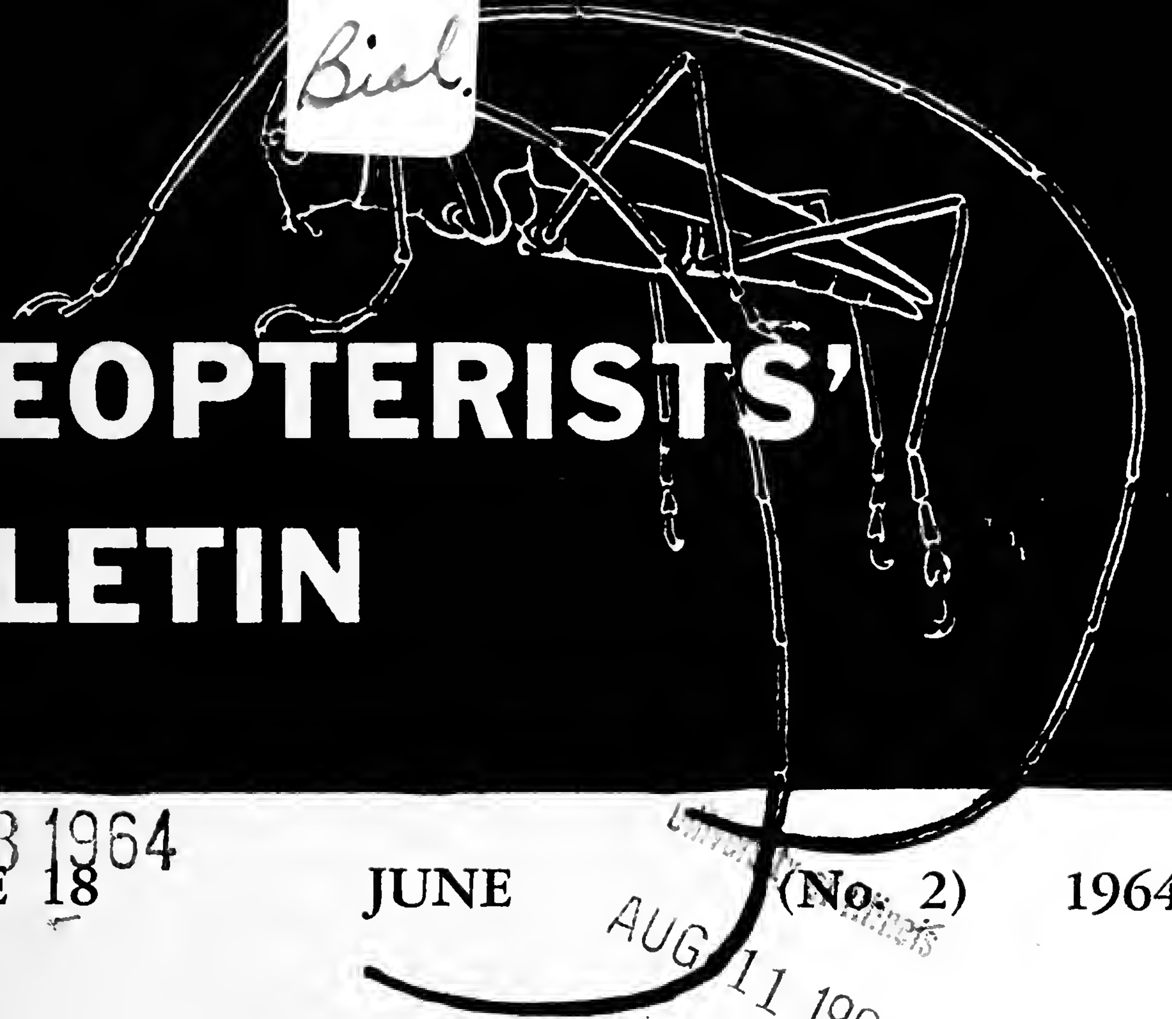

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A QUARTERLY PUBLICATION DEVOTED TO THE STUDY OF BEETLES

The Coleopterists' Bulletin

Volume 18 June (No. 2) 1964

SOME NOMENCLATURAL CHANGES IN OEDEMERIDAE (COLEOPTERA)[1]

By ROSS H. ARNETT, JR.[2]

In the course of world studies of the family Oedemeridae, including a detailed cataloging of the literature, as well as a study of type specimens, a number of nomenclatural changes have become necessary and these should be recorded in the literature. These changes are documented in this paper.

Acknowledgments—I wish to acknowledge the help of Mr. J. P. Macnamara. He gave invaluable aid in searching out the literature. Through the cooperation of Dr. J. F. G. Clarke of the U. S. National Museum, we were able to make use of the entomology library. The help of these people is gratefully acknowledged.

Hypasclera Kirsch, 1866

The type-species of the genus *Hypasclera* is *Hypasclera schistacea* Kirsch, 1866. An examination of the holotype specimen of this species shows it to be congeneric with *Nacerda dorsalis* Melsheimer, 1846, the type species of the genus *Alloxacis* Horn, 1896. Previous authors, including myself, have considered *H. schistacea* to be congeneric with *Asclera cana* LeConte, 1854, the type-species of *Oxacis* LeConte, 1866; thus, *Hypasclera* was considered a junior synonym of *Oxacis*. However, the two type-species are clearly generically distinct. *Alloxacis* Horn is therefore a junior synonym of *Hypasclera* Kirsch. All of the species now assigned to *Alloxacis* must be reassigned to *Hypasclera*. A review of the genus *Hypasclera* is contemplated in a later study; therefore, a completed catalog of the species will be published then.

Oxacis LeConte, 1866

Since the publication of the previous paper in this series (1963, Coleopt. Bull., 17:6-18) additional nomenclatural changes in *Oxacis* must be noted. The following species must be removed from the genus as explained under *Hypasclera*. *Oxacis schistacea* (Kirsch, 1866), the type-species of the genus *Hypasclera*, is therefore removed from the genus *Oxacis* because it is not congeneric with the type-species of *Oxacis*. The species thought to

[1] Contribution towards a monograph of the Oedemeridae, no. 20.

[2] Professor of Biology, The Catholic University of America, Washington, D. C.

be *Hypasclera schistacea* by Champion was, at the time Champion wrote, not yet described. So far as can be determined at the present time without examination of the Pic holotype, the following name applies to this species.

Oxacis durangosa Pic

Oxacis durangosa Pic, 1924. Mél. Exot.-Ent. 42:20.

Oxacis schistacea Champion, 1890 (not Kirsch, 1866). Biol. Centrali-Americana, Ins., Col. 4, (2):162.

The type locality of *O. durangosa* is given as "Mexico," but we may assume that it is from the Mexican state of Durango. I have not examined the holotype, but if Pic has properly placed this species in the genus *Oxacis,* then it is very likely that this name can be used for the species Champion thought to be *O. schistacea* (Kirsch).

Oxacis trirossi Arnett, NEW NAME

Oxacis championi Arnett, 1956 (not Pic, 1927), Coleopt. Bull. 10:57.

Oxacis cana var. β Arnett, 1956 (not Champion, 1890). Coleopt. Bull. 10:57.

It has been discovered that Pic named *Oxacis cana* var. *championi* in 1927, thus my 1956 name was preoccupied. Pic's name was in a footnote and like many other Pic names had escaped the notice of all previous catalogers. (See under *O. trimaculata* Champion for bibliographic deails.)

Oxacis trimaculata Champion

Oxacis trimaculata Champion, 1890. Biol. Centrali-Americana, Ins., Col. 4, (2):161, pl. 7, fig. 20. (Type locality: Pinos Altos, Chihuahua, Mexico.)

Oxacis semicincta Pic, 1924. Mél. Exot.-Ent. 42:19 (NEW SYNONYMY). (Type locality: "Central America.")

Oxacis cana var. α Champion, 1890. Biol. Centrali-Americana, Ins., Col. 4, (2):159, pl. 7, fig. 19 (NEW SYNONYMY). (Type locality: Atoyac, Vera Cruz, Mexico.)

Nacerdes chevrolati Dejean, 1838, nom. nud., Champion, 1890. Biol. Centrali-Americana, Ins., Col. 4, (2):159

Oxacis cana var. δ Champion, 1890. Biol. Centrali-Americana, Ins., Col. 4, (2):159 (NEW SYNONYMY). (Type locality: Guanajuato, Guanajuato, Mexico.)

Oxacis concolor Dugès, nom. nud., Champion, 1890. Biol. Centrali-Americana, Ins., Col. 4, (2):160.

Oxacis cana var. *championi* Pic, 1927. Échange, 43:4, footnote (new name for *O. cana* var. α Champion). (NEW SYNONYMY.)

There is much yet to be said about this species and the variable populations assigned to this name. It is hoped that the complex nomenclature is now clarified.

Oxacis josephi Arnett

Oxacis josephi Arnett, 1963. Coleopt. Bull. 17:14. (Type locality: 15 km. E. Sombrete, Zacatecas, Mexico.)

Oxacis cana var. β Champion, 1890. Biol. Centrali-Americana, Ins., Col. 4, (2):160 (NEW SYNONYMY). (Type locality: Durango, Durango, Mexico.)

Oxacis sericea Dugès, nom. nud. (not Horn, 1896) Champion, 1890. Biol. Centrali-Americana, Ins., Col. 4, (2):160.

Oxacis pilosa Champion

Oxacis pilosa Champion, 1890. Biol. Centrali-Americana, Ins., Col. 4, (2):156, pl. 7, fig. 15. (Type locality: San José, Guatemala.)

This species has been reported by Blair (1928. Ann. Mag. Nat. Hist. 10, (1):673) from James Island, Galapagos Islands. Blair's description indicates that the species he was dealing with is not this species but a member of the genus *Oxycopis,* and therefore is not *Oxacis pilosa* Champion.

Oxycopis Arnett, 1951

The following note applies to a member of this genus. This large genus remains in need of revision. There are still several species to be described.

Oxycopis floridana (Horn)

Oxacis floridana Horn, 1896. Proc. California Acad. Sci., 6:415. (Type locality: Florida.)

Oxacis (Oxycopis) luteostriata Arnett, 1951. American Midl. Nat. 45, (2):327. (Type locality: Palmetto Key, Florida.) (NEW SYNONYMY.)

In 1956 (Coleopt. Bull. 10:58) I pointed out that the species I called *Oxacis floridana* Horn in my 1951 revision (American Midl. Nat. 45, (2):312) was an undescribed species from Mississippi which I named *Oxacis barbara* (Arnett, 1956, Coleopt. Bull. 10:58). At that time I said that the status of *O. floridana* would be discussed later. It is now necessary to make the correction as indicated in the above bibliography.

A recent reexamination of the Horn type in the Philadelphia Academy of Natural Sciences has reconfirmed the generic assignment of *O. floridana* as stated in the 1956 paper, namely, that it belongs in the genus *Oxycopis* because of the bifid mandibles. Once this generic change is made, it immediately becomes apparent that the true *Oxacis floridana* is the same as my *Oxacis luteostriata.*

Horn's rather poor and misleading description is a surprise to all who are aware of the generally highly accurate and detailed descriptions characteristic of Horn. This, plus the fact that it is impossible in the United States to compare holotype specimens side by side unless they are in the same collection, has contributed to this unfortunate confusion of descriptions.

To untangle this species, the following changes are necessary. My description of the supposed Horn species, *Oxacis (Oxacis) floridana* in 1951, (*op. cit.,* 312) applies to *Oxacis barbara* Arnett with the exception of the Horn holotype specimen mentioned in my redescription. So far, *Oxacis barbara* is known only from Mississippi and Texas.

My description of *Oxycopis luteostriata* in 1951 applies to *Oxycopis floridana* (Horn). This species is known only from Miami south through the Florida Keys, and in Bimini. I treated this species as *O. luteostriata* in my 1953 paper on the Oedemeridae of the Bimini Islands (American Mus. Novitates no. 1646, p. 8).

There should be added to the description of this species the following note on the holotype. There are three costae evident on each elytron in addition to the marginal and sutural costae. The basic number of discal costae for the species of *Oxycopis* is four. By numbering the costae with number one as proximal to the sutural costae, it appears that costa number three is missing from each elytron (number four is usually referred to as the submarginal costa). All of the costae are covered by somewhat denser white hairs, giving the appearance of white costae.

LITERATURE NOTICE

FOREST COLEOPTERA OF GHANA, BIOLOGICAL NOTES AND HOST TREES. By G. H. Thompson. Oxford Forestry Memoirs No. 24, 78 pp. 1963.—This work discusses the habits of 371 species of beetles in or on the stems or trunks of 56 different kinds of trees. Most species of beetles have only short statements of their habits; some, however, are discussed at greater length. The Cerambycidae, Curculionidae, Scolytidae, and Platypodidae predominate. This memoir will be welcomed by students of the biology of wood borers.

Many specimens can be damaged by a single specimen or part of a specimen that has come loose in a schmitt box being sent through the mails. A little wad of absorbent cotton securely pinned in the corner of the box will catch and hold most loose specimens or parts.

A NEW SPECIES OF HYPHANTUS, A SYNONYM, AND VARIOUS NOTES (COLEOPTERA: CURCULIONIDAE: OTIORHYNCHINAE)

By PATRICIA VAURIE[1]

The 35 species of the South American otiorhynchid genus of flightless weevils *(Hyphantus* Germar) are ant-like in appearance, with long, thin legs and antennae; short, stout beaks; subocular vibrissae but no subocular lobe; petiolate, globose thorax; convex, declivous elytra, and tubercular surface. Males of some species and females of others have marked secondary sexual characters.

The new species described below is named in honor of the coleopterist, Johann E. Faust (1832-1903), who wrote on the Curculionidae of many parts of the world and who evidently had intended to describe the present species. I am grateful to Dr. Rolf Hertel, of the Museum für Tierkunde in Dresden, for lending me Faust's original specimens and for checking the fact that Faust's manuscript name was a *nomen nudum*.

Hyphantus fausti Vaurie, NEW SPECIES (FIGS. 1-5)

Holotype, male, Blumenau [Santa Catarina, Brasil], collected by Reitter, and a female paratype, with same data, in collection of Staatliches Museum für Tierkunde, Dresden; a male paratype with same data, and a female from "Brasil" in collection of the American Museum of Natural History.

Diagnosis: Differing from other species by having thorn-like spine on inner edge of hind tibiae in males, and slight thickening in the same spot in females, and also by having a projection in the males on the inner apical angle of the hind tibiae (figs. 3, 4). Aside from secondary sexual characters, this new species resembles *hustachei* Vaurie, *minutus* Vaurie, and *subminutus* Vaurie, having about the same shape, tuberculation, and vestiture of the pronotum and elytra (figs. 1, 2) as those species; the new species also has the same aedeagus (fig. 3) as does *hustachei*.

Description of Holotype, Male: Length, 6.5 mm. Beak, dorsal view, about twice length of eye; feebly tricarinate; apical V-shaped plaque distinctly elevated, feebly concave within; surface rugose; base transversely sulcate; in profile of same thickness throughout. Antennae with first segment of funicle scarcely longer than second, second twice as long as third, third slightly longer than each of following segments; scrobes broad, reaching vaguely to eye. Eyes bulbous. Head rugose.

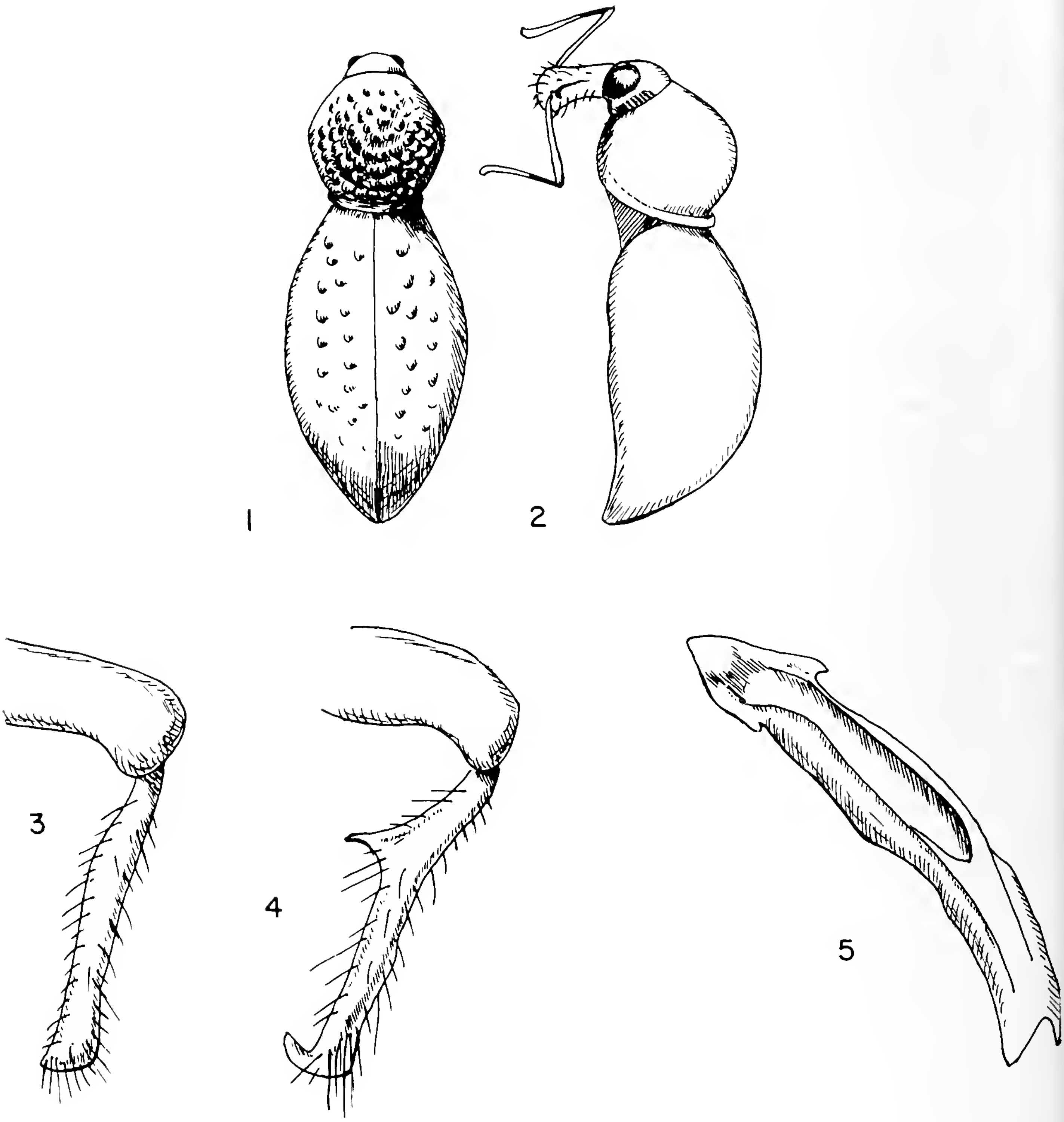
Pronotum about as wide as long, more than one-half of length of elytra, sides strongly arcuate; tubercles convex, round, subcontiguous, approximately 16 to 20 across disc at its widest part; a few fine hairs, as well as coarse setae of tubercles. Elytra at widest part wider than pronotum, with scattered fine hairs, especially on declivity; sides subparallel to declivity, thence convergent to rounded-truncate apex; tubercles on alternate rows larger than those on pronotum, widely separated longitudinally by three or four times their diameters; true tubercles lacking on other rows, but front edge of strial punctures slightly tumid; profile of elytra rather evenly arcuate but slope of declivity steeper and longer than slope of base.

---

[1] American Museum of Natural History, New York, N. Y.

Front femora bulbous, minutely toothed within near apex; front tibiae slightly sinuate within, incurved at apex; middle tibiae straight; hind tibiae near base bent inward on outer side and with thorn-shaped tooth on inner side, inner apex also with thorn-like projection. Abdomen with first and second segments separated by feebly impressed line, other segments by wider, deeper sulci, segments not notably bulbous, second segment longer than either third or fourth, fourth arcuate at sides, fifth as long as three preceding segments combined, apex emarginate. Aedeagus acuminate at apex, sides incised, dorsal orifice long (fig. 5).

Variations from holotype: Females lack the spine and the apical projections of the hind tibiae, but have a slight sinuation on the inner side where the spine of the male would be; females have the elytra proportionately wider and shorter than do males. Some paratypes differ slightly by being smaller (6 mm.), by having the rostral carinae or the scrobes of the antennae more distinct, by having more hairs on the pronotum or elytra, or the pronotal tubercles closer together.



FIGURES 1-5, *Hyphantus fausti* Vaurie, new species. 1—Dorsal view. 2—Lateral view. 3—Hind tibia, female. 4—Hind tibia, male. 5—Aedeagus, three-quarter view.

Remarks: This species belongs with the seven species of the *argentinensis* group. In my key to the species (Vaurie, 1963, p. 254) it could be placed after couplet 18; the couplet containing the new species then reading:

Hind tibiae of males with thorn-like spine on inner side, of females with feeble sinuation in same area . . . . *fausti*

Hind tibiae of both sexes straight . . . .

Although this is the only species in which the hind tibiae are toothed in males, the middle tibiae are toothed in males of *hustachei* Vaurie, and the front tibiae in males of *longicauda* Vaurie; the hind femora are toothed in males of *sulcifrons* Boheman and *simulans* Vaurie.

New Synonymy and Distribution

Several items of interest have been found in additional material received after publication of my revision of the genus. This material includes about 230 specimens from the collections of the Departamento de Zoologia, São Paulo, and of the Museum Frey, Munich, through the courtesy, respectively, of Padre F. Pereira and Dr. E. Haaf, 30 specimens from Padre P. Buck, Colegio Anchieta, Rio Grande do Sul, and nine from the United States National Museum, through Mrs. T. J. Spilman. The species are listed below. All page numbers in parentheses refer to my revision (Vaurie, 1963).

Hyphantus longicauda Vaurie (1963, p. 295)=*Hyphantus lanceolatus* Vaurie (1963, p. 297). [NEW SYNONYMY.] In my revision *(loc. cit.)* I suggested that *lanceolatus,* of which I had three males (the type from Rio de Janeiro, one paratype from São Paulo, one from Nova Petrópolis, Rio Grande do Sul) might prove to be the male of the unique type of *longicauda* (São Leopoldo, Rio Grande do Sul). Two males and two females recently received from Padre Buck seem to show that this is so, that there is but one strongly dimorphic species, in which males have a thorn-like spine within the front tibiae, and females have very long, paired, tubular projections or "tails" on the sutural declivity of the elytra. The new specimens are from the state of Rio Grande do Sul, a male from the type locality of *longicauda,* and a male and two females from São Salvador, about 50 kilometers northwest of São Leopoldo. One of the females was taken on April 7, 1960, the other female and the male on the same date, December 7, 1962. The locality of one of the paratypes of *"lanceolatus,"* Nova Petrópolis, is in the same vicinity. All these localities are not far from Porto Alegre.

The aedeagus of the two males from Rio Grande do Sul resembles the aedeagus illustrated for the paratype of *"lanceolatus"* from the same state (p. 300); it is not quite like that of the type of *"lanceolatus,"* but I believe now that the difference is explicable by individual variation and the larger size of the southern specimens from Rio Grande do Sul.

Hyphantus angulatus Vaurie. The type locality of this species was given as Tainhas, Rio Grande do Sul (p. 282), from notations by G. Bondar, but Padre P. Buck, who sent the specimens to Bondar, writes me that all the insects given as coming from this town were actually collected at

Taimbezinho, which is slightly to the northeast of Tainhas. The locality of two of my paratypes, which seemed to read "Jaimbé," should be, according to Padre Buck, Taimbé, an abbreviation of Taimbezinho. Two additional males examined from Padre Buck's collection are from São Francisco de Paula, not far from Taimbezinho.

Hyphantus argentinensis Hustache, which I stated (p. 290) was the only species not found in Brazil, does occur there, as shown by 25 males and one female (in the Frey Museum), from Itapera, São Paulo, collected January, 1959, by K. Hudepohl, and by four males and two females from Osorio, Rio Grande do Sul, January, 1958, from Padre Buck's collection.

Hyphantus carinatus Vaurie, previously recorded from the state of São Paulo only, is represented in the new material by specimens from farther south (Curitiba, Paraná, and Rio Grande do Sul at Teresópolis near Porto Alegre). Although the apex of the aedeagus in three of these specimens is of the characteristic shape as illustrated by me (1963, fig. 74), the "carinate" part behind the dorsal orifice is not carinate, probably because the sides behind the orifice are spread open by the intruding inner tube, thus obliterating the carina.

Hyphantus distinguendus Desbrochers des Loges, of which I had seen specimens from the states of Bahia, Rio de Janeiro, São Paulo, and Santa Catarina, is found also in some of the states within this range: Minas Gerais (Porto Alegre), and Paraná (Curitiba).

Hyphantus hustachei Vaurie. A male from the collection of the United States National Museum, taken in March, 1935, by D. Cochran, at Lassance, Minas Gerais, extends the range of the species far to the north (Lassance is about 160 miles northwest of Belo Horizonte). Previous records (39 specimens) are from Santa Catarina and Paraná in southern Brazil, from Paraguay, and northern Argentina.

Hyphantus matronalis Vaurie, known only from the female type and paratype (region of Rio de Janeiro), is represented by two additional females collected by Alvarenga, December, 1956, at Floresta da Tijuca, Rio de Janeiro.

Hyphantus serpentis Vaurie, recorded by me from the state of Rio de Janeiro only, was collected by Hudepohl at the same locality and on the same date as *carinatus* (Teresópolis, Rio Grande do Sul, March 3, 1962). These specimens (five males) were dissected, as the aedeagus is the only certain distinguishing character between *serpentis* and *carinatus*.

Hyphantus sulcifrons Boheman, one of the most abundant species of the genus, ranging from Uruguay and Buenos Aires north to Paraná in southern Brazil, is here recorded from slightly farther north, at Itapera, São Paulo (four males and five females, January, 1959, collected by Hudepohl).

Two Corrections

Dr. E. Haaf wrote to me that the notations "G. Barb. Frey" on the labels of many specimens of *Hyphantus* in the Frey Museum, which appeared in my revision between quotation marks, refer to the collectors, George Frey and Barbara Frey.

Mr. Hans Reichardt, who collected many of the specimens of *Hyphantus* which I used in the revisional study, writes me that one of the localities (Diadema) that I could not find is a rather new place near São Paulo, about 10 kilometers in the direction of Santos.

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CURRENT RESEARCH PROGRAMS

These announcements of research underway on beetles are not meant to be requests for specimens or information unless stated to the contrary; a letter to the researcher will determine whether or not specimens or information are wanted. All research workers are invited to send notices of research in progress to the Editor.

AQUATICS: Study of the water beetles of North Dakota. By Robert Gordon, Dept. of Entomology, North Dakota State Univ., Fargo, N. D.

CHRYSOMELIDAE: Natural history of *Oulema melanopa*. By Thomas Castro, Dept. of Entomology, Michigan State Univ., East Lansing, Mich.

CURCULIONIDAE: Study of the weevils of North Dakota. By David Aarhus, Dept. of Entomology, North Dakota State Univ., Fargo, N. D.

MELOIDAE: Revision of *Pyrota* and allied genera and a comparative study of meloid sexual behavior. (Interested in obtaining live material for the latter study.) By Richard B. Selander, Dept. of Entomology, Univ. of Illinois, Urbana, Illinois.

STAPHYLINIDAE: Field and taxonomic studies of Euasthetinae and Pygostenini. By D. H. Kistner, Chico State College, Chico, California.

THE OCULAR INDEX AND ITS APPLICATION TO THE TAXONOMY OF THE ALLECULIDAE (COLEOPTERA)

By J. M. CAMPBELL[1] and JAMES D. MARSHALL[2]

The last work of a revisionary nature on the North American Alleculidae was a treatment of the genus *Pseudocistela* Crotch by Hopping (Canadian Ent. 1933:65 (12):281-286). After almost thirty years of neglect, studies have started anew on this interesting group of beetles. Both authors of the present paper are currently involved in studies that should lead to a better understanding of the North and Central American components of this family of insects.

In many of the earlier works on the Alleculidae a great amount of emphasis was placed on the distance separating the eyes. Successful use of the majority of the older keys depends upon correctly interpreting the eyes to be separated by a distance "greater than," "subequal to," or "less than" their own width. Such expressions of this character have long been known to be ambiguous and not at all dependable. It has been necessary to resort to this character again in current revisionary studies on this group, but an effort has been made to find a more precise means of expressing it. Both authors of this paper independently arrived at the same solution, and it was decided to express this character as the "Ocular Index," or, more simply, "OI."

The Ocular Index is calculated by measuring the minimum distance between the eyes (fig. 1, B), and dividing this value by the maximum dorsal width across the eyes (fig. 1, A). The quotient resulting from this division is then converted into an index by multiplying by 100, i.e.,

$$\frac{\text{Minimum Distance Between Eyes}}{\text{Maximum Dorsal Width Across Eyes}} \times 100 = \text{Ocular Index}$$

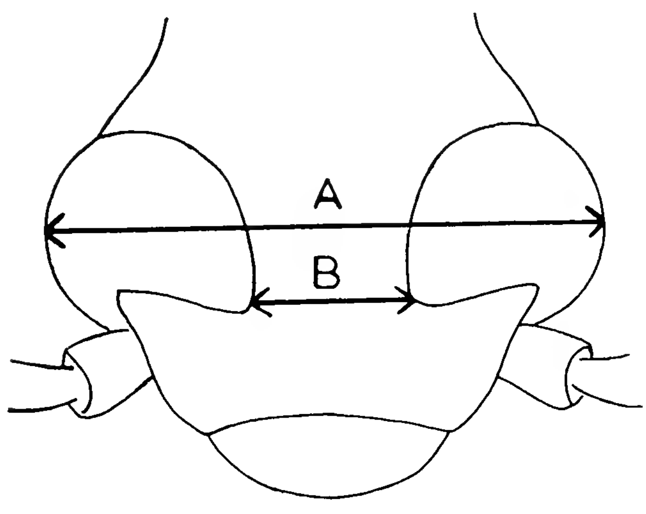

FIGURE 1. Ocular distances.

The use of this index (1) permits making a positive statement with regard to the distance separating the eyes, and (2) facilitates treating an important key character quantitatively. Thus far this character has been found to have general application in the family Alleculidae, and studies of a very preliminary nature indicate that it could likely be used effectively in the Lagriidae, the Tentyriinae of the Tenebrionidae, and probably in the Heteromera in general.

[1] Department of Biology, Eastern Kentucky State College, Richmond, Kentucky.
[2] Department of Entomology, Cornell University, Ithaca, N. Y.

A SYNOPSIS OF THE GENUS CRYPTOGLOSSA SOLIER (COLEOPTERA: TENEBRIONIDAE)

By C. A. Triplehorn[1]

A large number of specimens belonging to the genus *Cryptoglossa* Solier have accumulated in collections since Blaisdell (1945) revised the group. Many of these were taken in long series and come from areas hitherto unreported. As a result of this study, certain relationships within the genus have become clearer, necessitating several nomenclatural changes.

This genus is composed of a small number of moderately large species inhabiting the arid portions of the Sonoran Region of southwestern United States and adjacent portions of Mexico and Baja California. They are distinguished from the closely related genus *Centrioptera* Mannerheim by the form of the terminal antennal segment. In *Centrioptera* this segment is globular and as long as or longer than the penultimate segment; in *Cryptoglossa* it is smaller, truncate apically and partially retracted into an excavation of the penultimate segment which greatly exceeds it in size.

A sexual character which has not been reported previously was discovered. Males have tufts of long silken hairs on antennal segments 4, 5 and 6 while females have fewer and shorter hairs, not forming tufts, on these segments. Neither male nor female genitalia was found to be useful in distinguishing between the closely related taxa recognized in this paper.

This study has been based primarily on specimens from the following institutions: California Academy of Science (CAS), Cornell University (CU), Florida State Collection of Arthropods (FSCA), Long Beach State College (LBSC), Michigan State University (MSU), Museum of Comparative Zoology (MCZ), New Mexico State University (NMS), The Ohio State University (OSU), University of California (UCal), the United States National Museum (USNM) and from my own field work in Texas sponsored by the American Philosophical Society (Grant Number 3091, Penrose Fund). Grateful acknowledgment is made to the various individuals in charge of the above collections.

Catalog of Known Species of Cryptoglossa[2]

Cryptoglossa Solier, 1836, p. 680 (type: *C. bicostata* Solier, by monotypy).

Asbolus LeConte, 1851, p. 129 (type: *A. verrucosus* LeConte, NEW DESIGNATION).

1. *bicostata* Solier, 1836, p. 681, pl. 24, figs. 11-13.

2a. *verrucosa verrucosa* (LeConte), 1851, p. 129. *(Asbolus).*

2b. *verrucosa carinulata* Blaisdell, 1945, p. 25.

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[1] Department of Zoology and Entomology, The Ohio State University, Columbus, Ohio.

[2] Blaisdell (1945) published complete literature citations to the above taxa; for the sake of brevity, they are not repeated here.

3a. *laevis laevis* (LeConte), 1851, p. 130. *(Asbolus).*
laevis subsimilis Casey, 1924, p. 308. [NEW SYNONYMY.]

3b. *laevis papillosa* NEW SUBSPECIES.

4a. *mexicana mexicana* Champion, 1884, p. 73, pl. 3, fig. 21.

4b. *mexicana granulifera* Champion, 1892, p. 508. [NEW COMBINATION & STATUS.]

5. *angularis* (Horn), 1894, p. 414, pl. 7, fig. 4. *(Centrioptera)*

Key to the Known Species and Subspecies of Cryptoglossa.

1. Fifth elytral interval forming an unbroken costa from base to one-third the distance from apex; other intervals with conical tubercles ---------- **BICOSTATA**
   Fifth elytral interval never costate but may have series of disconnected elongate costules ---------- 2
2. Disc of pronotum gibbous ---------- 3
   Pronotum depressed, evenly convex from side to side ---------- 6
3. Elytral intervals strongly verrucose or cariniform; pronotum densely, granulately punctured, somewhat pruinose ---------- 4
   Elytra smooth or minutely granulate; pronotum finely, inconspicuously punctate ---------- 5
4. Sculpture of elytral intervals consisting of coarse, distinctly separated conical tubercles ---------- **VERRUCOSA VERRUCOSA**
   Sculpture of elytral intervals consisting of finer, more or less continuous carinae medially; laterally broken up into smaller, isolated, elongate carinules ---------- **VERRUCOSA CARINULATA**
5. Elytra with punctures simple, except laterally with an incomplete row of large conical or coarsely granulate tubercles; dorsal luster shining ---------- **LAEVIS LAEVIS**
   Elytra with punctures distinctly granulate, more coarsely so laterally; dorsal luster dull ---------- **LAEVIS PAPILLOSA**
6. Elytra with outer elytral intervals strongly tuberculate; all intervals convex ---------- **ANGULARIS**
   Elytra smooth and indistinctly striate; punctation diffuse; intervals flat ---------- 7
7. Elytral punctures simple ---------- **MEXICANA MEXICANA**
   Elytral punctures granulate or muricate ---------- **MEXICANA GRANULIFERA**

Phylogenetic Relationships

There are presumably two basic lines of evolution in the genus *Cryptoglossa,* both clearly delimited by the form of the prothorax. In the *mexicana* group, the pronotum is relatively flattened with the sides deplanate and the lateral margins clearly visible throughout their length in dorsal aspect. Further evolution has apparently taken place from the smooth and simply punctured *mexicana* Champion through a gradually more muricate or granulate type of puncture *(granulifera* Champion) to the strongly sculptured *angularis* Horn. Series of specimens may be arranged which illustrate this transition very nicely.

In the *laevis* group, the disc of the pronotum is always strongly gibbous with the sides abruptly arising from the lateral margin so that the marginal bead is somewhat concealed in dorsal aspect. Evolution in this group parallels that of the previous one in that there is a progression from a simple through a granular type of elytral punctation to a muricate type.

The presumed relationships are presented on Plate 2, Figure 1. The main branches 1 and 1′ indicate the relatively flattened versus the gibbous form of the pronotum. 2 and 2′ are the verrucose versus the smooth elytral sculpture. 3 and 3′ represent sulcate as opposed to flattened elytral intervals.

The remaining relationships indicated are not as sharply defined as those of the main branches. The use of the trinomials in three of the species does not necessarily reflect the same degree of relationship to the nominate subspecies in each case. In all probability, the three are but extreme forms of their respective species. In fact, the trend from simple to granulate punctation (*mexicana* to *granulifera* and *laevis* to *papillosa*) and tuberculate to carinate elytral intervals (*verrucosa* to *carinulata*) is gradual in all three and occasional specimens cannot be placed in either subspecies with certainty. Nevertheless, this variation appears to be geographic in nature and hence worthy of trinomial designation. It is interesting to note the repetition of the same pattern of variation in the two main lines of evolution.

The transition from *mexicana* through *granulifera* to *angularis* is not difficult to visualize. Perhaps with further collecting, the last will prove to be only a subspecies. At present, existing cabinet material indicates a distinct species.

Cryptoglossa bicostata Solier is omitted from this discussion and from the phylogenetic chart because of the uncertainty of its identity.

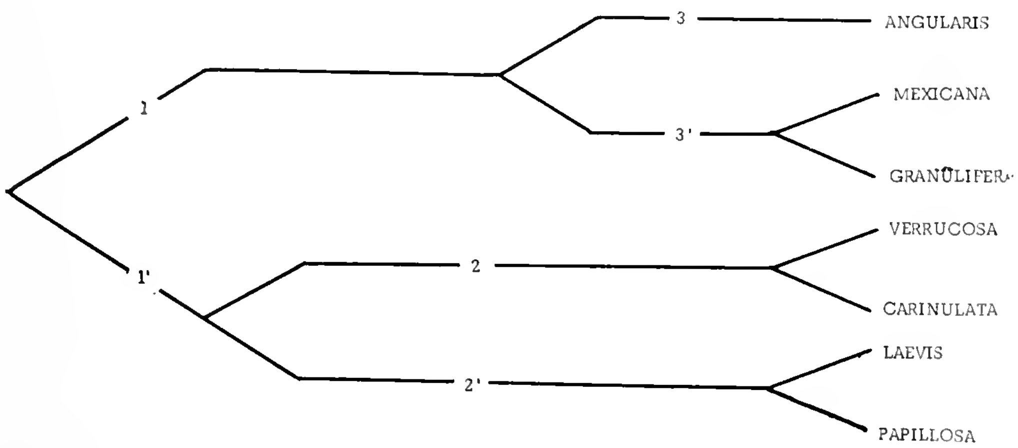


FIGURE 1—Probable evolution in *Cryptoglossa*.

DESCRIPTIONS AND DISTRIBUTIONS

Cryptoglossa bicostata Solier

This species was described from a single mutilated specimen from Mexico. As far as is known, no other specimen has been found so that the positive identification of the species, and, for that matter, the genus, is still in doubt. The antennae were missing from the type when the species was described; these structures are necessary to separate *Cryptoglossa* from the closely related genus *Centrioptera*. It is quite possible that the specimen described and figured by Solier belongs to *Centrioptera* but that problem will not be solved in this paper. His figure shows an insect strongly resembling *Centrioptera spiculifera* LeConte but which also looks like *Cryptoglossa angularis* Horn. The strongly carinate fifth elytral interval is unique however, and it seems best to defer any decisions at the generic level until such time as the identity of this species is established.

Cryptoglossa verrucosa verrucosa (LeConte)

(FIGS. 2, 7)

A common and moderately large, opaque and more or less pruinose species. The elytra have nine series of rather large and subacute tubercles (Blaisdell, 1943, p. 223). The greatest variation observable in this nominate subspecies is in the form of the conspicuous elytral tubercles. Typically, these are rather bluntly conical and distinctly separated from one another. In some specimens there is a tendency toward reduction in height and fusion at the base of these tubercles to form a series of acute costae, particularly pronounced in those nearest the elytral suture. Intensive collecting would perhaps demonstrate a gradient in the form of elytral sculpture from the typical "verrucose" to the "carinulate" type of the subspecies *carinulata* (see remarks below).

Blaisdell (1945, p. 24) records this subspecies from numerous localities in southern California, Arizona and Nevada. He did not list any records from Mexico in his 1945 paper but earlier (1943, p. 223) cited Horn's (1894, p. 348) record from San Jose del Cabo, Baja California. I have not seen any specimens from that far south and consequently this record does not appear on the distribution map.

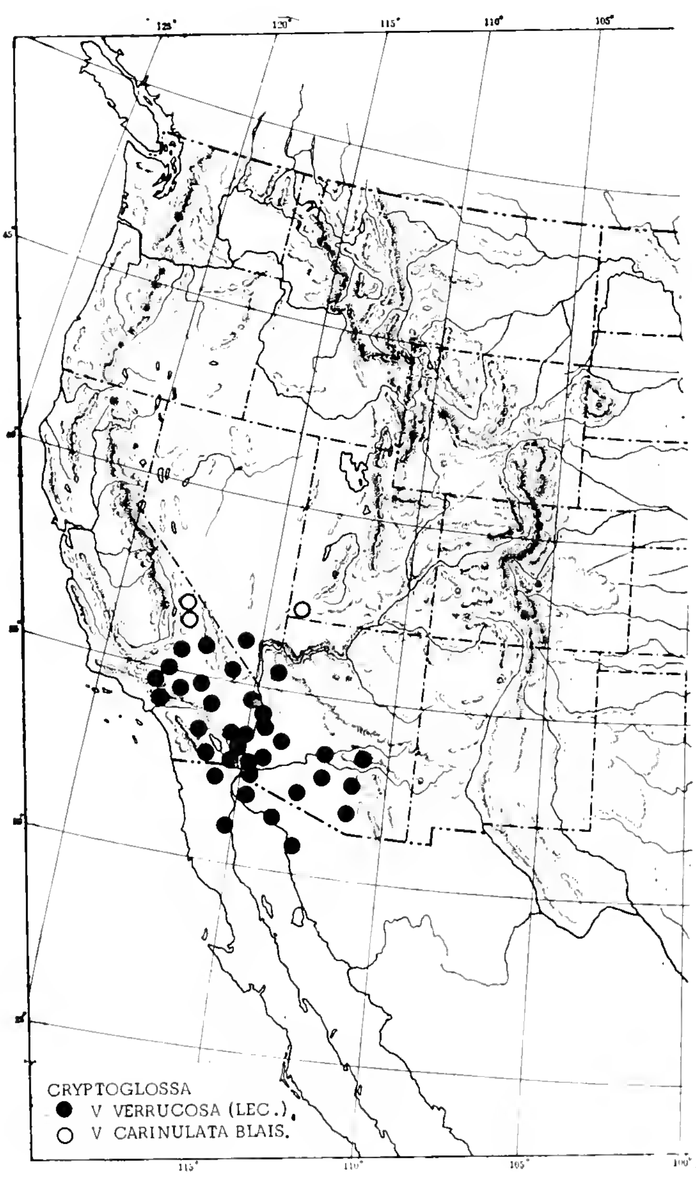


FIGURE 2—*Cryptoglossa* distribution.

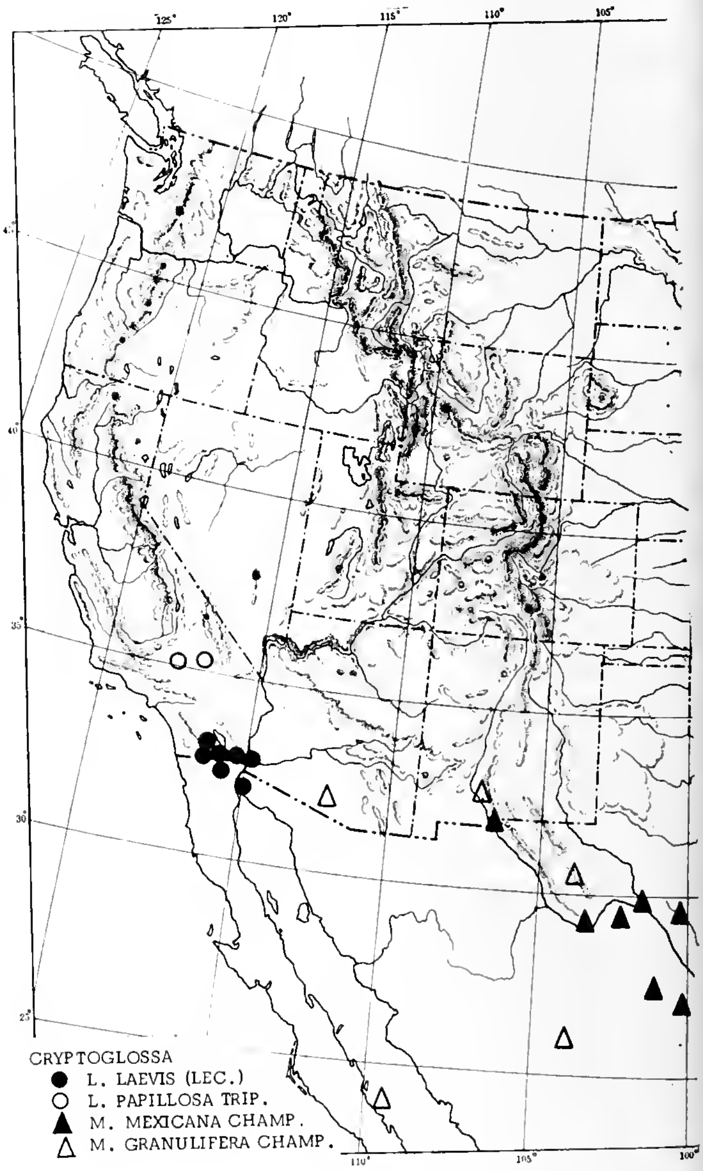


FIGURE 3—*Cryptoglossa* distribution.

From outside the range of this subspecies as listed by Blaisdell (1945, p. 24), I can add the following records: UNITED STATES: *Arizona:* (1) Globe, June 30, D. K. Duncan (CU); (1) Santa Rita Mts. (CU); *California:* (1) Inyo Co., Shoshone, April 5, 1928. T. Craig (CAS); (1) San Bernadino Co., Trona, May-June, 1925, MacDonald (CU); (1) Kern Co., Mojave, December 12, 1917, J. C. Bradley (CU); (1) San Diego Co., Painted Canyon, May 25, 1941, D. J. & J. N. Knull (OSU); MEXICO: *Sonora:* (90) Desemboque, July 17-September 10, 1953, B. Malkin (CAS); (3) Estero de Sargente, 25 km. south of Desemboque, August 11, 1953, B. Malkin (CAS); (6) Cholla Bay, February 5, 1960, E. Kirschbaum (CAS); (3) 25 mi. south of San Luis, June 4-5, 1949, J. R. Slevin (CAS); (1) Punta Peñasco, May 8, 1946, J. R. Slevin (CAS); *Baja California:* (1) 5 mi. northwest of Punta San Felipe, June 9, 1955, J. R. Slevin (CAS); (2) 3 mi. north of San Felipe, May 21, 1957, J. R. Slevin (CAS); (1) Laguna Salada, May 17, 1958, E. L. Sleeper (LBSC); (4) Mexicali, April 2 (CU).

Cryptoglossa verrucosa carinulata Blaisdell
(FIGS. 2, 8)

This appears to be a fairly well-defined and rather disjunctive geographic race, worthy of a name. Here the tubercles of the elytral intervals are fused and elongated to form more or less continuous low carinae on the disc of the elytra. Laterally the tubercles are distinctly separated but still retain the elongate, narrowly costate form.

In a large series of typical *verrucosa,* the tendency for the tubercles to fuse and form low costae is occasionally seen in scattered individuals from southern California. Those from Arizona and Mexico almost invariably have the subacute tubercles. The present subspecies is known from the area of Death Valley, Inyo County, California, and from St. George, in extreme southwestern Utah. Four specimens (CU) from the latter area uniformly correspond more closely to *carinulata* than to the nominate subspecies.

Cryptoglossa laevis laevis (LeConte)
(FIGS. 3, 9)

This is a moderately large, shining black, smooth species with at least a row of rather strongly muricate punctures just above the lateral margins at the base of the elytra. These punctures become progressively smaller and are not continued to the elytral apex. In form *laevis* resembles *verrucosa,* particularly in the shape and convexity of the pronotum. It occurs within the range of *verrucosa,* having been taken in extreme southern California (Imperial and San Diego Counties), at Yuma, Arizona, and in the adjacent portions of Mexico (Los Medanos and Laguna Salada in Baja California, and 25 miles south of San Luis in Sonora). Blaisdell (1945) failed to mention any Mexican records.

The subspecies *subsimilis* Casey (1924) is not worthy of separation. A series of 31 specimens taken at Los Medanos, [Baja] California, May 22-24, 1951 by J. R. Slevin (CAS) demonstrates that the characters mentioned by Casey are merely normal variations within the species. The relative length of legs and body proportions to which he alluded in his two specimens are apparently sexual. The legs are slightly longer and body narrower in the male but even these characters are subject to variation. As Blaisdell (1945, p. 27) points out, there is even some confusion as to which of the two forms Casey's description applies but he considered it "best to give Col. Casey the benefit of the doubt as it is merely a subspecies." There is actually no justification for this.

Occasional specimens are encountered in which the elytral punctures are granulate instead of simple. The tendency toward this type of puncture appears to begin at the flanks and progress toward the suture. If only a few granular punctures are present on a specimen, they are always lateral in position. A specimen from Grays Wells, Imperial County, California (OSU), has the elytral punctation almost entirely granular and appears to be intermediate between this and the following subspecies.

Cryptoglossa laevis papillosa NEW SUBSPECIES

(Fig. 3)

Similar in form to *C. laevis* but much duller in luster and with the elytral punctures all strongly granular and diffuse. Only three specimens, all from San Bernardino County, California, show this extreme modification. I regard this as but an extreme form of the nominate subspecies, but since it is geographically disjunctive, I provide it with a name to define relationships within the genus.

Without intermediate forms, this would undoubtedly have been described as a distinct species. Champion was perfectly justified in describing *granulifera* as distinct from *mexicana* with the material he had before him. The present situation is similar.

The three specimens studied are designated as follows: Holotype (male) and allotype (female), Barstow, California, May 17, E. S. Ross (CAS); 1 paratype (female), Kelso Dunes, California, May 25, 1958, E. L. Sleeper (LBSC).

Cryptoglossa mexicana mexicana Champion

(Figs. 3, 4)

This is a moderately large, broad species, dull to feebly shining in luster and with the dorsum much flatter than in *laevis* and *verrucosa*. Punctation of the elytra is variable. In specimens from the type locality (Monclova, Coahuila, Mexico) the punctures are simple except in the humeral region where they are minutely granular or muricate (J. Balfour-Browne, in litt.). I have observed this same type of punctation on specimens from Sierra de los Burros, Coahuila (CAS).

On August 15, 1962, Dr. Howard V. Weems, Jr., and I were collecting insects at night around an abandoned house at Oak Spring, in the Chisos

Mountains, Big Bend National Park, Brewster County, Texas. Thirteen specimens of *Cryptoglossa* were taken, most of them crawling up from under the floor of a screened back porch of the house. They are presumably nocturnal since previous collecting at the same site in daylight hours several days before was totally unproductive.

A careful study of the above mentioned series revealed a rather striking range of variation in the punctation of the elytra. In four specimens the punctures are simple with a slightly muricate tendency on the anterior margins. In five of them the punctures are distinctly muricate, and in the remaining four, the punctures are in the form of fine granules. It would seem, therefore, that the variation exhibited by this series ranges from the typical *mexicana* punctation through a gradient with its highest development exemplified by *granulifera.*

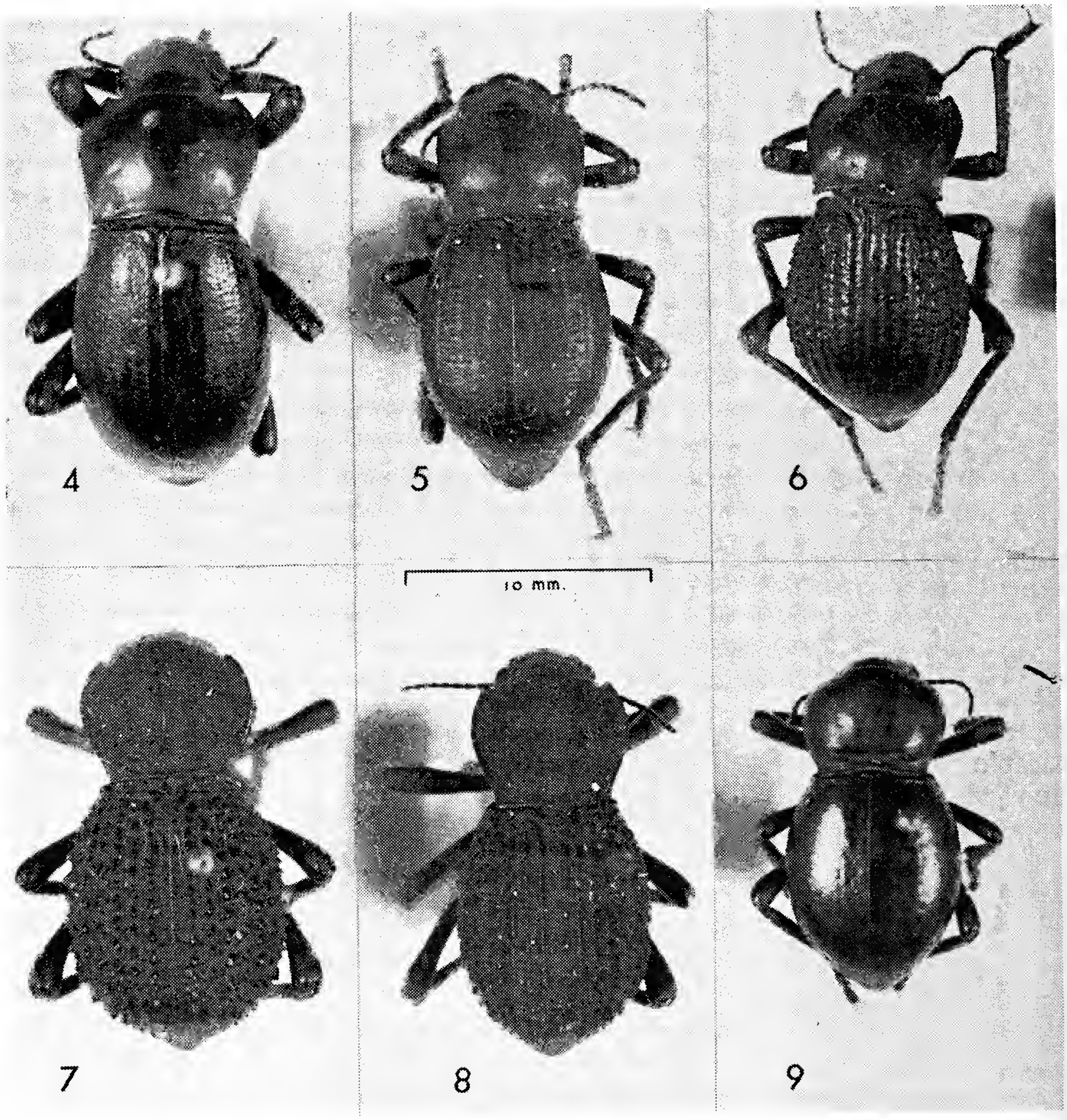
Specimens from this series which exhibited the above variation were submitted to Mr. J. Balfour-Browne who very kindly compared them with the Champion types in the British Museum of Natural History. He states that "they agree excellently with the four types of *mexicana,* all from Monclova, Coahuila." He also added that the elytral punctures of the types are more clearly punctiform and more distinctly serially arranged than those of the Texas specimens.

Blaisdell (1945) did not recognize *C. mexicana* as occurring north of the Rio Grande but referred all of his specimens of this complex to *granulifera* after commenting upon the range of variation in elytral punctation which they exhibited. Through the courtesy of Mr. Hugh B. Leech of the California Academy of Sciences, it has been possible to study the specimens Blaisdell had before him. Blaisdell's specimens from Coahuila and El Paso, Texas, are referrable to the present nominate subspecies and all of the others to subspecies *granulifera.* These two taxa are not sharply defined, one from the other. My initial impulse was to synonymize the name *granulifera* in the face of the bewildering variations encountered. On the other hand, I have never seen specimens from the United States with simple elytral punctures except from the Big Bend area and El Paso, Texas. In order to clarify the relationships within the genus it seems best to retain the name *granulifera.*

Specimens examined and assigned to the nominate subspecies are as follows: UNITED STATES: *Texas:* (13) Oak Spring, Chisos Mts., Big Bend National Park, August 15, 1962, C. A. Triplehorn and H. V. Weems, Jr. (OSU, FSCA), (1) Chisos Basin, Big Bend National Park, August 12, 1962, W. E. and C. A. Triplehorn (OSU), (1) Big Bend National Park, September 29, 1952, Peter Koch (OSU), (1) Chisos Mts., July 22, J. W. Green (OSU), (3) Black Gap, Big Bend National Park, July 10, 1960, R. A. Scheibner (MSU), (1) El Paso, June, 1884 (CAS), (1) El Paso, March 14, 1941 (USNM); (1) El Paso, May 18, 1957, J. W. Green (USNM); Sabinal, June, 1910, F. C. Pratt (USNM), (1) Val Verde Co., Pecos River Bridge on U.S. 90, October 8, 1958, H. V. Weems, Jr. (FSCA). MEXICO: *Coahuila:* (2) Sierra de los Burros, June 8 and 18, 1938, Rollin H. Baker (CAS); *Nuevo Leon:* Sabinas Hidalgo, June 15, 1939, Ralph Haag, cave in bat dung (MCZ).

Cryptoglossa mexicana granulifera Champion (Figs. 3, 5)

The status of this taxon has been summarized under the nominate subspecies. I have restricted this name to include only those specimens in which the granular type of elytral punctation prevails. This is a rather poorly defined geographic race, represented in collections which I have seen by but a few specimens as follows: UNITED STATES: *Arizona:* (1) Ajo Mts., October 16, 1934, Bryant (CAS); *New Mexico:* (5) Las Cruces



FIGURES 4-9, *Cryptoglossa* spp. All shown to same scale. 4—*C. mexicana mexicana* Champion; Chisos Mts., Texas. 5—*C. mexicana granulifera* Champion; Isla Partida, Gulf of California. 6—*C. angularis* (Horn); La Paz, Baja California. 7—*C. verrucosa verrucosa* (LeConte); near Desemboque, Sonora, Mexico. 8—*C. verrucosa carinulata* Blaisdell; Death Valley, California (PARATYPE). 9—*C. laevis laevis* (LeConte); Los Medanos, Baja California. (Photographs by Robert B. Welch, Department of Photography, The Ohio State University.)

(NMS), (1) Las Cruces, August 15, D. J. and J. N. Knull (OSU); (3) Las Cruces, May 1, 1917, T. E. Snyder (USNM); *Texas:* (1) Fort Davis, June 23, 1949, W. C. Stehr (Ohio University). MEXICO: *Baja California:* (1) Isla la Partida, June 26, 1921, Virgil Owen (CAS).

The specimens from which the original description was taken are from Villa Lerdo, Durango, Mexico. J. Balfour-Browne stated (in litt.) that the type series of *mexicana* and *granulifera* are "very uniform as to the elytral sculpture within each series." He concurs with my decision to regard the two forms as extremes of one species.

Cryptoglossa angularis (Horn)
(Fig. 6)

From all of the known species, *angularis* differs in having the hind angles of the pronotum distinctly everted and the lateral margins in front of them slightly reflexed (Blaisdell, 1945). The elytral intervals are subsulcate with coarse tubercles along their crests. These tubercles are more strongly developed laterally than on the disc.

The previous distribution given by Blaisdell (1945) was La Paz, Santiago, and Catavina, all in Baja California. I have seen only the La Paz specimen. In addition, I am assigning a specimen identified by Blaisdell as *C. granulifera,* and mentioned under that name in his 1945 synopsis, to the present species. The specimen is from Borrego Canyon, San Diego County, California, March 22, 1930, B. Templeton (CAS). It is actually somewhat intermediate in regard to elytral sculpture between the extreme forms of *mexicana (granulifera)* and the true *angularis* which I know only from the one specimen plus Horn's description and figure. Nevertheless, by Blaisdell's own brief diagnosis, this specimen from California is a perfectly good *angularis*. Until additional specimens become available from northern Baja California and southern California, it seems advisible to regard this as a distinct species. Further collecting will perhaps provide intermediate forms and prove *angularis* to be but a further extreme modification of the *mexicana-granulifera* line of evolution.

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BOOK REVIEW

MONOGRAPHIE DES "ANILLINI," BEMBIDIIDAE ENDOGÉS (COLEOPTERA TRECHIDAE). By René Jeannel. Mémoires du Muséum National d'Histoire Naturelle (Paris), n.s., Sér. A., Zoologie, t. 28, fasc. 2, pp. 33-204, 360 figs., 1963.

In the inimitable way in which he can view a world fauna and draw generalizations from it, Jeannel has monographed the tiny, soil-inhabiting carabids of the subtribe Anillina (Bembidiini). Although he published a major paper on the group in 1937 (*Rev. francais d'Ent.* 3:241-394, 245 figs.) and reviewed the African and Madagascan genera in 1957 (*Ann. Mus. Congo Belge,* Zool., 52, 68 pp., 91 figs.), the availability of much additional material prompted a complete revision. Anillines are very small (1-2 mm), testaceous, wingless, and usually eyeless. They occur almost exclusively in deep humus or soil in forests of the temperate zones or at high elevations in the tropics. Material is rare because most anillines are highly localized and because the special techniques of the soil zoologist are required to collect large series.

An earlier classification of the anillines into Anillina and Scotodipnina, based on the umbilicate (marginal) series of setiferous punctures of the elytra, has been abandoned. Although the umbilicate chaetotaxy is still important, Jeannel now believes that the presence (Aphaenodontes) or absence (Phanerodontes) of a tooth on the mentum provides a more natural basis for establishing a primary subdivision. As is his custom, Jeannel has grouped supposedly related genera into phyletic series, of which there are eleven for the anillines. Forty-two genera and 137 species are recognized. Twenty genera were previously proposed by Jeannel himself, and he establishes 9 more here. Generic boundaries seem well chosen, even though the average number of species per genus is low (15 genera are monobasic), and the geographic distributions of the genera are rather restricted. When more specimens have been collected, future revisions will certainly be necessary, but they will probably not result in any substantial reduction in the number of genera or species.

Both ecological and taxonomic evidence suggest a very low mobility for anillines. The pattern of generic distribution indicates appreciable antiquity with intermediate extinction for most of the lineages of the subtribe. Jeannel regards the anillines as relics of eyed, winged carabids inhabiting the humus of the Cretaceous forests. During the cooling, drying trend of the later Cenozoic they became adapted to an endogenous mode of life, losing eyes and wings and becoming stenohygrobic in the process.

The known anillines are most numerous and varied in Europe, Africa, and the Indo-Australian region. They are notably absent from glaciated regions of the Northern Hemisphere and from eastern Asia, and are rather poorly represented in the Americas. In the continental United States there are now 4 genera—*Anillinus* Casey (6 spp., southeast), *Anillodes* Jeannel (4 spp., Texas and California), *Anillaspis* Casey (2 spp., California), and *Micranillodes* Jeannel (1 sp., Texas).

This revision opens the way for a more intensive investigation of a difficult but potentially rewarding group of beetles. Although much shorter than Jeannel's classic, exhaustive "Monographie des Trechinae" (*L'Abeille,* 1928-30), it is fully comparable in depth, and will stand as the definitive work on the anillines for years to come.—THOMAS C. BARR, JR., University of Kentucky, Lexington, Kentucky.

A NOTE ON HEMIOSUS EXILIS LECONTE (COLEOPTERA: HYDROPHILIDAE)

By EILEEN R. VAN TASSELL[1, 2]

During a preliminary study of the genus *Berosus,* an interesting generic re-assignment was re-discovered.[3] Members of this genus show sexual dimorphism in the tarsal formula, the males having 4-5-5, the females, 5-5-5.

In 1851, LeConte described *Berosus exilis* from the Gila River in Arizona. His description made no reference to the dual punctation of the pronotum or to the 5-segmented tarsi of the male. In his 1855 revision of the family Hydrophilidae, he added to his original diagnosis only the observation that *B. exilis* was, "broader than the next species and by its small size very distinct from all the preceding."

In 1873, Horn revised the tribe Hydrobiini and noted the rather unique form of the mesosternal protuberance in the species: "the mesosternal mucro when seen on its tip apparently splits into two parts in the form of a V, the open portion being posteriorly." The difference in the tarsal formula of the males remained unknown.

A new genus, *Hemiosus,* was described by Sharp (1882) in the Biologia Centrali-Americana, based on 14 individuals of a single species, *Hemiosus maculatus,* from Guatemala. The characters he used for generic separation from *Berosus* were: short maxillary palpi, dense, silky ventral pubescence and the large mesosternal lamina, with "its lower face forming a narrow, rhomboidal process, which is dull and pubescent, like the rest of the under surface." His final comment was, "all the tarsi 5-jointed, but the basal joint excessively short."

Leech (1943) was the first to notice the similarity between *Berosus exilis* LeConte and *Hemiosus maculatus* Sharp, in the form of the mesosternal protuberance and male genitalia, and he logically placed *B. exilis* in *Hemiosus.* However, three years earlier, in 1940, A. d'Orchymont had pointed out the difference of sexual dimorphism in tarsal formulae between the two genera, as well as the differences listed by previous authors. With this information, Leech apparently assumed that his reference of *B. exilis* to *Hemiosus* was incorrect, since he did not notice the tarsi, and published a retraction in 1948. The same year, he recorded in a separate paper (1948b) the presence of a species very close to or the same as *H. maculatus* Sharp from Baja California, accompanied by an excellent description.

To add to the confusion, a recent examination of a series of small specimens sent by Mr. Leech showed that both sexes have a minute first tarsal

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[1] Department of Biology, The Catholic University of America, Washington 17, D.C.

[2] I would like to thank Mr. Hugh B. Leech, California Academy of Sciences, Dr. L. L. Pechumen, Cornell University, Department of Entomology and Dr. P. J. Spangler, United States National Museum, for the loan of material.

[3] This research was supported (in part) by a Public Health Service fellowship (number GPM-18,641) from the Division of General Medical Sciences, Public Health Service.

segment and four other segments of normal size (figs. 1, 2). This species was labeled *"exilis"* and bore the same locality data as that given by Leech in his (1943) paper. It now appears clear that Leech's original diagnosis was correct and that *Berosus exilis* LeConte is a member of the genus *Hemiosus.*

Examination of a single male paratype of *H. toxillus* d'Orchymont in the U. S. National Museum collection revealed a very close similarity with *H. exilis.* The paratype is smaller (2.5 mm.) in length, with the parameres more swollen basally in lateral view and with the projection of the basal piece more narrow and constricted. It seems reasonable that these differences could be part of the normal range of variation for a single species. This interpretation is supported by the fact that d'Orchymont did not know of *H. exilis,* or at least, did not refer to it in his paper (1940). However, having seen only a single specimen of *H. toxillus* from Sinaloa, Mexico, and only small series of *H. exilis* from Arizona (Phoenix and Gila Bend), it seems best to retain both names although separation may prove difficult.

The three North American species of *Hemiosus* may be separated by the following characteristics:

1. Pro-tarsus with second segment more thickened in male (fig. 1) than in female (fig. 2) and with a ventral pad of hairs longer than in the other segments; male genitalia with median lobe slender in lateral view (fig. 5); pronotum metallic black, with broad anterior and posterior yellow margins-------------------- 2

   Pro-tarsus with second segment not appreciably different in male than in female; male genitalia with median lobe broad in lateral view (fig. 4); pronotum entirely metallic black, without yellow borders; Peru; Guatemala; Panama; Mexico: Sinaloa, Colima, Baja California------------------------------**MACULATUS** Sharp

2. Male genitalia with parameres more swollen basally, in lateral view, basal piece with projection more constricted (fig. 5); size smaller, 2.5 mm.; Mexico: Mazatlan, Sinaloa --**TOXILLUS** d'Orchymont

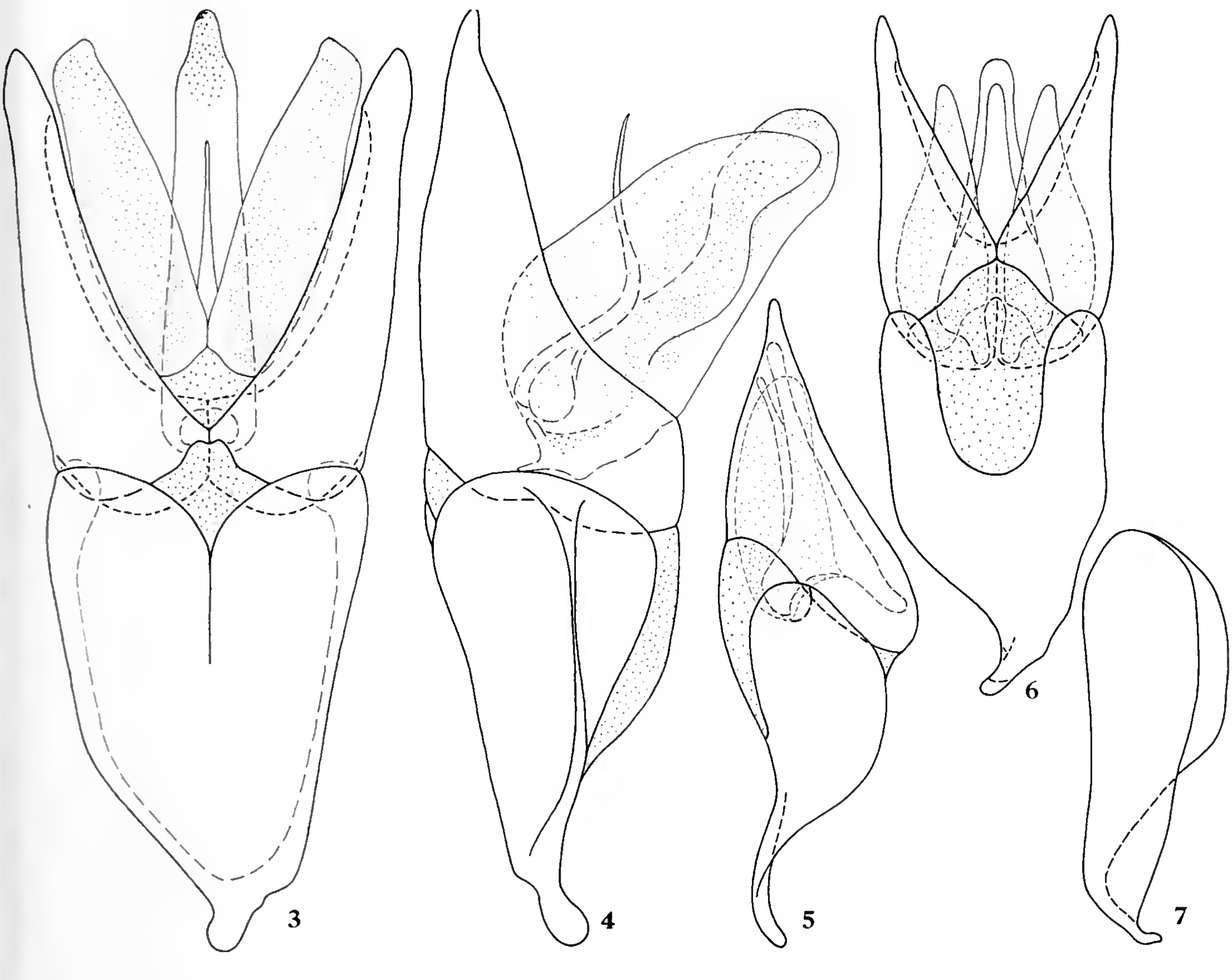
   Male genitalia with parameres narrower basally, in lateral view, basal piece barely constricted, especially in lateral view (fig. 7); size larger, 3.0-3.2 mm.; U.S.A.: Arizona: Gila Bend, and Phoenix--------------------------------**EXILIS** LeConte

1 2

FIGURES 1-2, *Hemiosus exilis* LeConte. 1—Protarsus of male. 2—Protarsus of female.

The male genitalia of *Hemiosus* species show some interesting complexities not found in any species of Nearctic *Berosus.* The most obvious of these is the presence of a pair of membranous, inflated lobes, which are situated in hollowed out cavities in the parameres in repose and unite ventrally beneath the median lobe. Another peculiarity is the structure of the median lobe. Situated along its ventral length is a spinous *(H. maculatus,* figs. 3, 4) or slender and flattened *(H. toxillus, H. exilis,* figs. 5-7) projection which is barely visible in repose, but which becomes displaced downward when the genitalia are inflated (fig. 4).

These structures cannot be seen unless they are inflated; this was accomplished by placing the genitalia in cold KOH for 15 minutes, then removing them to water for 15-30 minutes. Alcohol usually effected retraction of the membranous lobes, but glycerine did not. Further study is needed to reveal the exact nature and significance of these interesting features.



FIGURES 3-7, *Hemiosus* spp. 3—*H. maculatus* Sharp, male genitalia, ventral view, expanded. 4—Same, lateral view. 5—*H. toxillus* d'Orchymont, male genitalia of paratype, lateral view. 6—*H. exilis* LeConte, male genitalia, ventral view, slightly expanded. 7—Same, except basal piece only, lateral view.

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When tackling the problem offered by the geographical areas of plants, many authors have chosen to discuss peculiar or singular types having a distribution out of the common, in the hope that they will suddenly give a clue to the solution of the problem. This is merely appealing to the imagination, it is, so to speak, a romantic method of investigation. . . . It is surely more rational to start the investigation with the simplest types, those that show the least possible peculiarities. When they have been interpreted, the complicated and often strongly interrupted areas of the singular or peculiar types are likely to be better understood. This is a more prosaic, but probably also a safer method of procedure.—Eric Hultén, 1937, Outline of the History of Arctic and Boreal Biota during the Quarternary Period.

MANDA, A GENUS NEW TO THE NEARCTIC REGION (COLEOPTERA: STAPHYLINIDAE)

By IAN MOORE[1, 2]

The genus *Manda* Blackwelder has not previously been reported from the Western Hemisphere. It belongs to the tribe Coprophilini of the subfamily Oxytelinae. Members of the Oxytelinae can be distinguished from all other staphylinids by the presence of a complete second sternite (rarely rudimentary in some specimens of a few species of the Coprophilini). The Coprophilini are characterized by having five tarsal segments, whereas in the Oxytelinii a lesser number is present.

KEY TO THE NEARCTIC GENERA OF THE COPROPHILINI[3]

1.	Tibae spinose on outer edge	2
	Tibae not spinose on outer edge	3
2.	Gular sutures divergent before the middle; ungues strongly arcuate	ELONIUM
	Gular sutures united; ungues hardly arcuate	MANDA
3.	Gular sutures separate	RIMULINCOLA
	Gular sutures united	4
4.	Tenth antennomere transverse; head hardly narrowed behind the eyes	SYNTOMIUM
	Tenth antennomere elongate; head strongly narrowed behind the eyes	DELEASTER

Manda Blackwelder

Manda Blackwelder, 1952, Bull. 200 U. S. Nat. Mus., p. 230.

Acrognathus Erichson, 1938, Die Käfer der Mark Brandenberg, Berlin, p. 609 (not Agassiz, 1826).

Type-species of both generic names is *Ornalium mandibularis* Gyllenhal.

Form. Linear, subcylindrical, subparallel. *Head.* Subquadrate, not narrowed behind to form a neck, with a nuchal constriction across the head immediately behind the eyes. Antennae strongly incrassate, their fossae located under a prominence near the eyes above the bases of the mandibles. Eyes large, protruding, coarsely faceted. Mandibles long, slender, pointed, without internal teeth. Labrum transverse, apex broadly emarginate. Maxillary palpi four-segmented; first segment short; second and third segments subequal in length, about twice as long as wide, slightly arcuate; fourth a little narrower and longer than third, almost three times as long as wide, swollen at base, thence tapered and slightly sinuate to the pointed apex. Ligula deeply emarginate at apex. Gular sutures united. *Thorax.* Pronotum trapezoidal, widest at apex. Prosternum short, its process pointed. Lateral prosternal sutures distinct. Hypomera delimited by a carina. Trochantin slender. Prosternal epimera delimited by sutures. Mesosternum moderate, its process pointed. Metasternum large, its process short and pointed. Elytra quadrate, sutural stria fine. Scutellum small. Coxae large, exserted and contiguous. Tibiae strongly spinose. Tarsi slender, five-segmented, first four segments short and subaequal, last about as long as the first

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[1] Associate in Entomology, San Diego Natural History Museum.

[2] I am indebted to Hugh B. Leech of the California Academy of Sciences for four of these specimens, and to William C. Stehr of the Ohio University for the other two.

[3] *Zalobius* and *Asemobius* have been removed to the Piestinae by Moore, 1963, Coleop. Bull. 5:47-48.

four together. *Abdomen.* First four visible segments with paratergites. First four visible tergites impressed at base.

Distribution. The two previously described species are *mandibularis* (Gyllenhal), found throughout Europe and Siberia, and *africana* (Fairmaire) from Tunis.

Manda nearctica Moore, NEW SPECIES

Color. Pale rufo-testaceous, with the head and tip of abdomen a little darker and the legs testaceous. *Head* about as wide as long, surface irregularly convex in front of the transverse constriction, with a vague central tumidity on which are eight coarse punctures and a few almost imperceptible punctulae; otherwise highly polished. Beneath distinctly reticulate, impunctate. Eyes very prominent, longer than the tempora, coarsely faceted with a few small setae between the facets. Antennae a little longer than the head and pronotum, strongly incrassate; first antennomere thick, more than twice as long as wide; second narrower, less than half as long as first, more than twice as long as wide; third about as long and as wide as second; fourth to sixth about as long as wide, not wider than third; seventh to tenth progressively wider, tenth almost twice as wide as long; eleventh as wide as tenth, longer than wide, pointed. *Thorax.* Pronotum trapezoidal, widest at apex, apex and sides straight, base gently arcuate, angles narrowly rounded; surface convex, with a few large irregularly placed punctures except in a central longitudinal area; interspaces highly polished. Beneath impunctate. *Elytra* longer than wide, widest at apex; sides straight, angles rounded; with four moderately impressed series of coarse punctures; interspaces highly polished. *Abdomen* with a very few regularly placed small punctures, finely and feebly reticulate. Beneath sculptured as above, but with the punctures a little more evident. Apex of seventh visible sternite produced in a small central lobe.

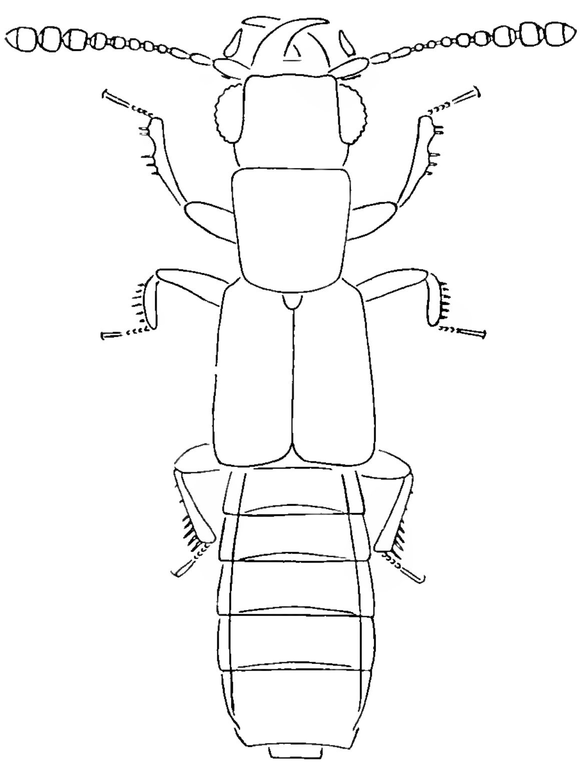

FIG. 1. *Manda nearctica.*

Holotype. Sex unknown. Archbold Biological Station, Lake Placid, Florida, IV-1-47, J. W. Green, collector. In California Academy of Sciences.

Paratypes. One, same data as holotype; two, Jacksonville, Florida, VIII-14-1942, R. C. Barnes, collector; two, Jacksonville, Florida, VIII-1942, G. S. Hensill, collector. In California Academy of Sciences and my own collection.

Notes. This species differs from *mandibularis* and *africana* in its much smaller size, paler integuments and particularly from the former in the highly polished foreparts, these parts being densely reticulate in that species.

KEY TO THE SPECIES OF MANDA

1.	Abdomen black	AFRICANA
	Abdomen brown or testaceous	2
2.	Head, pronotum and elytra densely reticulate	MANDIBULARIS
	Head, pronotum and elytra highly polished	NEARCTICA

DOES GEHRINGIA BELONG TO THE ISOCHAETA? (COLEOPTERA: CARABIDAE)

By Ross T. Bell[1, 2]

The minute and aberrant carabid *Gehringia olympica* Darlington has been difficult to put into the classification of the family. Darlington (1933), following the system used in the Leng Catalogue (1920), placed it in the subfamily Carabinae.

Jeannel (1941) proposed a new classification of the Carabidae (which he raised to the rank of superfamily), in which the primary division was into a Series Isochaeta and a Series Anisochaeta. (For a general discussion of this and other proposed classifications of the Carabidae, see Ball, 1960.) In the Series Isochaeta, Jeannel grouped those carabids in which both spurs of the anterior tibia are terminal in position, the posterior one not being displaced proximally by the antenna cleaner. The latter is a well-developed emargination lying entirely proximad to the spurs. The Series Anisochaeta included those carabids in which the posterior spur is displaced more or less proximally, and the antenna cleaner, if well developed, lies between the spurs. He placed *Gehringia* in the Isochaeta. Lindroth (1960) and Ball (1960) regard the Isochaeta as an artificial assemblage, and split it into several subfamilies. Nevertheless, they use the isochaetous type of anterior tibia as one of several characters justifying the inclusion of *Gehringia* with *Trachypachus* in a subfamily Trachypachidinae (spelled Trachypachinae by Lindroth).

Recently, while investigating the mouth parts of *Gehringia,* I had the opportunity of examining and drawing the leg of a cleared specimen (Fig. 1). I noted that, although there appeared to be two spurs, they are not arranged as in other Isochaeta. The larger spur lies on the inner margin of the tibia. A line of stiff hairs leads from it to the antenna-cleaner. It is, therefore, evidently homologous to the anterior tibial spur of other Carabidae. The other spur, which is considerably smaller, does not lie on the inner face posterior to the anterior spur, as would be expected in Isochaeta, but is instead located on the outer margin, slightly proximad to the apex of the tibia. The margin of the latter is oblique for a short distance between the outer "spur" and the base of the tarsus. Proximad to it, a row of very fine but rather long setae extends up the outer face of the tibia. It seems probable that the supposed second spur is really a spinose hair, representing the lowest one on the series on the outer face of the tibia. This theory is rendered more plausible by the presence of a much larger spur-like structure on the ventral margin of the femur, in a location where most carabids have a tactile seta.

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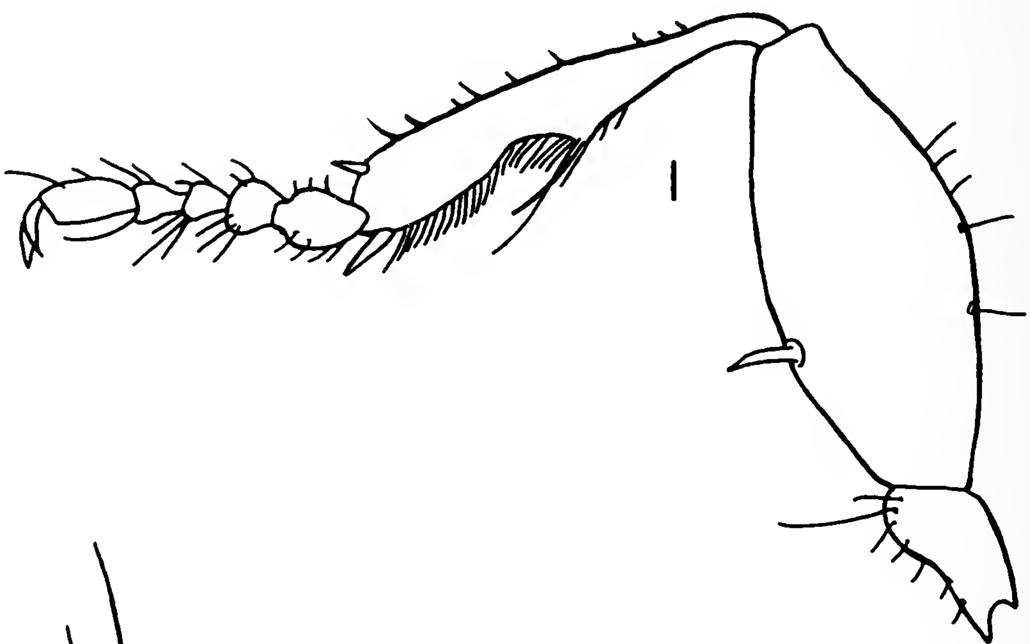
[1] Department of Zoology, University of Vermont, Burlington, Vermont.

[2] I am indebted to Philip J. Darlington, Jr., and to George Ball for the specimens used in this study; and to my wife, Joyce R. Bell, for the dissections and drawings.

In *Tachys* (Tribe Bembidiini), a spinose hair forms a false spur in exactly the same position as in *Gehringia.* In *Tachys,* however, there is a well-developed spur associated with the antenna-cleaner, so that the front tibia appears to have three spurs. If a species of *Tachys* were to lose the proximal (originally the posterior) spur above the antenna-cleaner, it would then have an anterior tibia almost identical to that of *Gehringia.* Since the posterior tibial spur has completely disappeared, it can not be used in deciding whether *Gehringia* belongs with the Isochaeta or the Anisochaeta.

However, a feature of the mouth parts suggests that *Gehringia* should be excluded from the Isochaeta. With the exception of *Gehringia,* all of the Isochaeta which I have been able to study have shown a characteristic reduplication of the tactile setae of the labrum. In *Gehringia* (Fig. 2), there are only the six setae found in almost all Carabidae. In *Trachypachus* (Fig. 4), *Metrius,* and in the two genera of Ozaenini available to me, *Tropopsis* and *Mysteropomus* (Fig. 3), there are approximately twelve tactile setae on the labrum, although the number seems to vary slightly. This character seems to imply that the Isochaeta are a natural group and that *Gehringia* should be excluded from it.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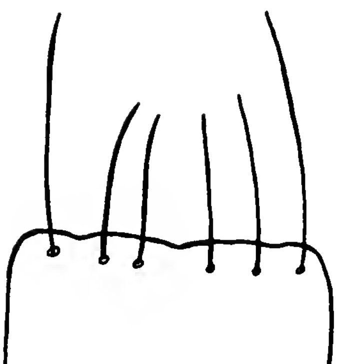
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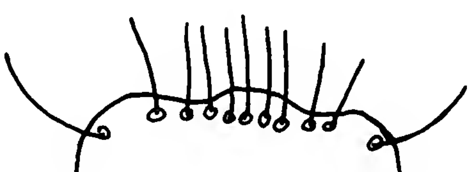
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FIGURE 1—*Gehringia olympica* Darlington, anterior view of anterior leg. FIGURE 2—*Gehringia olympica* Darlington, labrum, dorsal view. FIGURE 3—*Mysteropomus regularis* Bänninger, labrum, dorsal view. FIGURE 4—*Trachypachus gibbsi,* LeConte, labrum, dorsal view.

If it is desired to modify the classification of Ball, *Gehringia* should be transferred to the Subfamily Carabinae, of which it may form a Tribe, Gehringiini. (The Subfamily Carabinae of Ball is approximately equivalent to the Anisochaeta of Jeannel.) The removal of *Gehringia* would leave the Isochaeta as a relatively homogeneous group, with the structure of the tibial spurs, antenna-cleaner, and the chaetotaxy of the labrum as common characters. I believe that these characters imply a real relationship, and that the Subfamilies Paussinae, Metriinae, and Trachypachydinae (excluding Gehringiini) of Ball should be united to form a Subfamily Paussinae, approximately equivalent to Jeannel's Isochaeta.

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CEUTORHYNCHUS ASSIMILIS (PAYK.), NEW TO EASTERN NORTH AMERICA (COLEOPTERA: CURCULIONIDAE).

The finding of *C. assimilis* (Payk.) May 16, 1960, on turnips, in Henderson Co., North Carolina, represents the first record of this species in eastern North America. A serious pest of Cruciferae, the species was previously found only in the Pacific Northwest, in Washington, Oregon, British Columbia, and northern California.—Rose Ella Warner, *Ent. Res. Div., A.R.S., U. S. Department of Agriculture, Washington, D. C.*

BOOK REVIEW

MONOGRAPHIE DER SCARABAEIDAE UND APHODIIDAE DER PALAEARKTISCHEN UND ORIENTALISCHEN REGION, COLEOPTERA: LAMELLICORNIA, VOLS. 1 & 2. By Vladimir Balthasar. Verlag der Tschechoslowakischen Akademie der Wissenschaften, Prague; Vol. 1, 391 pages, 137 figures, 24 plates; Vol. 2, 627 pages, 226 figures, 16 plates. 1963.

The appearance of Dr. Balthasar's *magnum opus* has been eagerly awaited for some time. The manuscript for it seems to have been completed in 1959 or earlier. In that year, several American colleagues received a mimeographed circular from the Publishing House of the Czech Academy requesting their participation in a "promotion campaign" for the monograph, apparently for the purpose of gauging its sales potential. In May of the same year this reviewer also received a letter from the Czech Academy explaining that there would be a delay in publication because of the high costs, and that "it is therefore a question of reducing the expected financial loss to an amount which will make it bearable and enable us to fulfill our duties to other authors as well." This hesitation, puzzling at the time, becomes a little more understandable now that we see the lavishness of the final product. The two volumes are printed on high-quality paper and profusely illustrated with line drawings, maps, and photographs. There appear to be few typographical errors and the books are finely bound in hard, gold-embossed covers provided with colorful jackets. The Publishing House of the Czech Academy is to be congratulated on a superb presentation. The delay of at least five years in publication, however, means that the reader must allow for the omission of recent data on the groups covered.

With these two volumes (and a third on Aphodiinae soon to appear) Dr. Balthasar crowns 35 years of experience with the Scarabaeinae and Aphodiinae of the world, during which he has published about 125 papers and books on these groups. As he says in the introduction, "hundreds of thousands of specimens have passed through my hands . . . the greater part of the Scarabaeoid material of all large European museums is known to me . . . and the material from most of the entomological expeditions of the last decades has been entrusted to me." He has described many new species during this time, mostly in the Aphodiinae and New World Scarabaeinae. Evidently Dr. Balthasar's qualifications for undertaking a work of this scope are not to be doubted.

Volumes 1 and 2 deal with what is commonly known as the Scarabaeinae or Coprinae. The first volume begins with general remarks on the "Superfamily Scarabaeoidea" (Family Scarabaeidae of most workers) and a conspectus of the families, subfamilies, and tribes. This is followed by brief introductions to morphological features, internal anatomy, larval morphology, brood care, feeding ecology, ecological distribution, parasites, phylogeny (including fossils), and geographical distribution. The subsequent systematic part, which occupies seven eighths of the work, begins with a key to the laparostict families and subfamilies of the Palaearctic and Oriental regions, and continues with a detailed account of all taxa down to species of the "Family Scarabaeidae"; this is continued into the second volume.

The introductory portion, while occupying only an eighth of the work, is the one non-specialists are likely to read and is the most disappointing. It begins with a conspectus of higher categories, departing radically from that which has become generally accepted by scarabaeidists. For instance, the Passalidae and Lucanidae are placed together in a "Superfamily Lucanoidea," implying that the degree of similarity between them is of the same order as, say, the similarity between "Aphodiidae" and "Aegialidae" (the latter considered a subtribe of Aphodiinae by Landin). On the other hand, acanthocerids, shown by Crowson to be sharply different from other scarabs, are considered to be a subfamily of Trogidae. Throughout, groups are elevated at least one rank above what they are considered to be by other specialists. One consequence of this is that the subtribes of Scarabaeinae (Coprina, Pinotina, etc.), originally proposed by Peringuey in 1901 and perpetuated by Gillet and Janssens, are now elevated to "tribes" of "Scarabaeidae." Since there is serious doubt about the validity of some of these subtribes, it is indeed unfortunate that their status should now be elevated. It is not that changes in the classification are unjustified, but simply that when a radical departure from custom is adopted, it should be accompanied by a thorough explanation. No explanation at all is given for these changes; this is all the more puzzling since in Dr. Balthasar's previous monograph (Fauna CSR, Vol. 8, 1958) he adhered to the accepted classification of Janssens.

The morphological section is but a slightly expanded version of the same section in the Fauna CSR, with examples drawn mostly from the Geotrupinae, Melolonthinae, Cetoniinae, etc.—groups covered in the Fauna CSR but not covered in the present monograph. The extremely modified mouthparts of adult Scarabaeinae, which are of great interest and pertinence to the present work, are not illustrated. Such data as are presented on both external and internal morphology are sketchy and inadequate for any conceivable purpose. In the larval section, which is largely based on Medvedev's survey, there is no mention of Böving's studies on epipharyngeal chaetotaxy, on which larval classification is often based in the English-language literature. Quite astonishing is the total omission of any reference to Gardner's very significant studies on Indian scarab larvae; this is particularly surprising because these fall directly within the geographical scope of the work.

The section on brood care is compiled largely from von Lengerken's book and is therefore reasonably reliable. However, there are a few original remarks which are seriously misleading. For instance, on p. 42, immediately after mentioning the size of the ball in *Heliocopris,* the author proceeds in the next sentence to talk about the fights that ensue when balls are rolled over the surface, implying to the unwary reader that *Heliocopris* rolls balls. On the other hand, Dr. Balthasar is undoubtedly on firm ground when he insists that the behavioral adaptations of "Scarabaeidae" are responses to steppe conditions.

In the section on food ecology, Dr. Balthasar repeatedly resorts to curious lines of reasoning in insisting that coprophagy must largely be limited to ungulate dung. His conclusion that saprophagy was the original type of feeding in "Scarabaeidae" (a reasonable assumption) is based on the reasoning that when the group first arose, ungulates were not yet evolved. Marsupials, for instance, could "scarcely" have provided the necessary food for coprophages. The "strict bond" between dung beetles and ungulates must have posed "great impediments" to the former's early dispersal. This reviewer would like to know why the dung of marsupials, or even herbivorous reptiles, could not have served just as well. It is possible that the association we see today between dung beetles and ungulates (by no means exclusive) is due to the fact that ungulates are more abundant now than kangaroos or dinosaurs. Dr. Balthasar refuses to admit that the guests of the Florida land tortoise, for instance, could feed on tortoise dung; he says that they must feed on rabbit or owl pellets in the burrows. Literature records of dung beetles feeding on bird excrement are categorically rejected. Similar assertive statements are made regarding myrmecophily. He says that cetoniines such as *Potosia* must be accidental in ants' nests since they are not modified morphologically for myrmecophily. Actually, mounting evidence indicates that many groups of Cetoniinae are associated with ants, at least in the larval stages. Finally, numerous but very incomplete data taken from modern Latin American workers are cited without indication of their source anywhere in the book.

Tables listing myrmecophilous species, parasites and their hosts, and Tertiary fossils will prove useful to other workers.

It is very unfortunate that Dr. Balthasar saw fit to detract from the great overall value of this monograph by including introductory remarks which are gravely deficient in most respects, and furthermore presenting these with the implication that they are complete, authoritative, and applicable to the world as whole. It would have been far better to restrict these to only what is necessary to introduce the main taxonomic portion.

The taxonomic portion, making up the greater bulk of the work, begins after a brief but interesting zoogeographical survey. In bringing together a vast amount of data on the Palaearctic and Oriental members of the Scarabaeinae, Dr. Balthasar has done present and future workers enormous service. Descriptions of rare genera and species, previously scattered in many works, will prove extremely useful. The key to species are very complete, presenting a wide choice of characters for use in identification; in this respect the keys are far superior to those of Arrow in the Fauna of British India. Particularly herculean was the task of constructing a key to the species of *Onthophagus* (555 of them). The key to species of the Subgenus *Onthophagus* alone comprises 868 couplets. Seven new subgenera and two new species of *Onthophagus* are described, these being the only new taxa in the monograph. For each species throughout the work, a brief description, an indication of geographical and altitude distribution, and some ecological information, if known, are given. For each genus or subgenus there is a description and some ecological remarks, plus a world distribution map. Original habitus drawings are scattered profusely throughout and, although a little sketchy, they will aid greatly in identification and contribute much to the attractiveness of the work, as do the many habitus photographs at the end of each volume.

American workers will find some special objections throughout the work. Aside from omitting all references to Americans, while at the same time using some of their data (as previously mentioned), Dr. Balthasar rejects the current American usage of the names *Dichotomius* and *Ateuchus* for what used to be *Pinotus* and *Choeridium* (with what justification this reviewer is not prepared to say). He presents a table of world canthonine genera on p. 257 which, in addition to being out of place in a work of this geographic scope, is also hopelessly incomplete at present, as it was bound to be since the American canthonine studies were just beginning when Dr. Balthasar was writing. On almost every distribution map presented, the American portions of the distributions are erroneous. For instance, on p. 137 the map purports to show the distribution of Scarabaeini (the Subtribe Scarabaeina of other workers) and has this group occupying most of the Western Hemisphere! This group, of course, is absent from the Western Hemisphere. On p. 234 *Sisyphus* is shown to occur in Mexico, but not in Nicaragua, whence it has been known since Belt's time. On p. 318 the genus *Copris* is shown to occur on the Galapagos Islands (known to be an erroneous or at least highly dubious citation for many years) and in Baja California (!), but not in Colombia or Ecuador, where it does occur.

In spite of the numerous errors committed whenever the author departed from the strict limits of the taxonomy of Palaearctic and Oriental species, the present monograph is of very great importance because it is the first attempt to cover such a vast area. Workers in Oriental Scarabaeinae will find it supersedes Arrow's Fauna of British India (Lamellicornia, Vol. 3) and Paulian's Faune de l'Empire Français (Vol. 3). In the Palaearctic, it partly fills the lacuna left by the omission of the laparosticts from Medvedev's Fauna SSSR (Vol. 10). The appearance of Dr. Balthasar's work will give great impetus to the further study of this extremely interesting group of beetles.—Eric G. Matthews, *University of Puerto Rico, Rio Piedras, Puerto Rico.*

All the woods hushed—save for a dripping rose,
All the woods dim—save where a glow-worm glows.
Masefield, The Watch in the Wood

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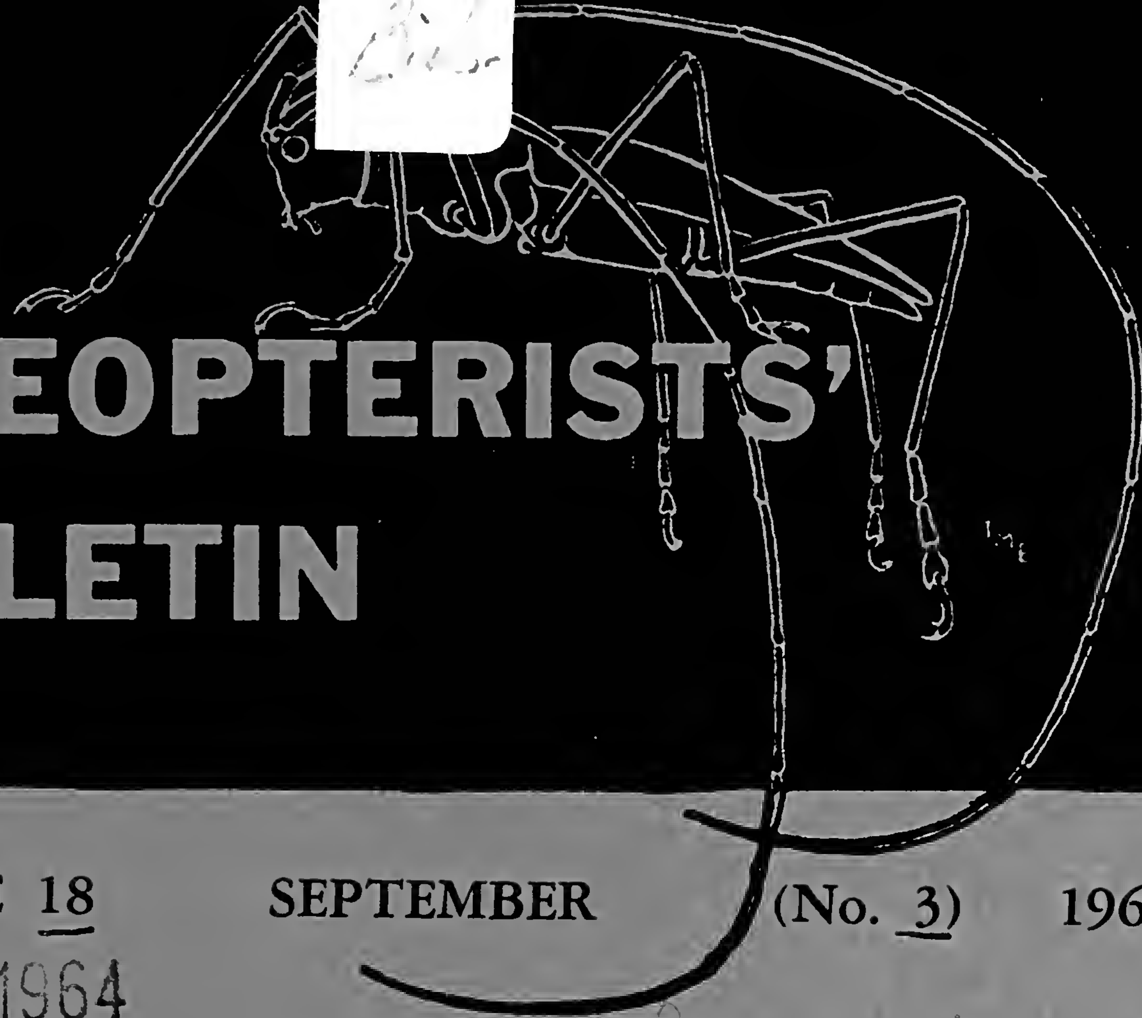

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THE COLEOPTERISTS' BULLETIN

Founded 1947 by Ross H. Arnett, Jr.

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A QUARTERLY PUBLICATION DEVOTED TO THE STUDY OF BEETLES

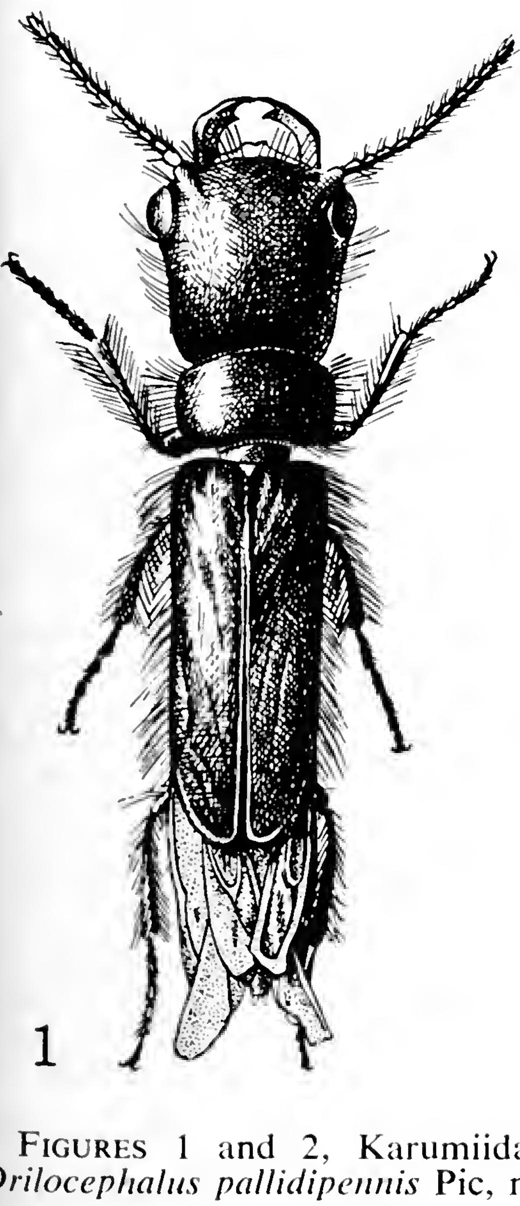
The Coleopterists' Bulletin

Volume 18 September (No. 3) 1964

NOTES ON KARUMIIDAE (COLEOPTERA)

By ROSS H. ARNETT, JR.[1]

The family Karumiidae is a very small and interesting one placed near the Drilidae and Lycidae in the Cantharoidea. The presence of a complete, unmodified tenth abdominal tergum (fig. 5) seems to be evidence of a very primitive condition. All other beetles have the tenth tergum, if present at all, modified as a part of the copulatory apparatus. It is because of this structure that I believe that this family is perhaps one of the most primitive groups of beetles.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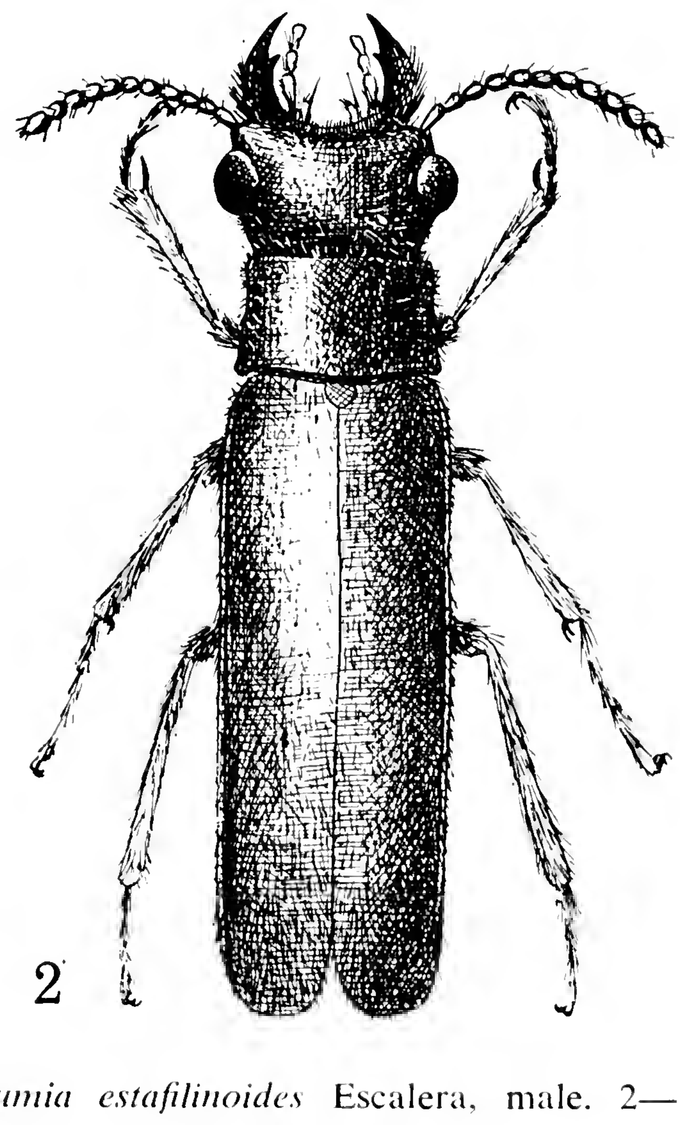
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FIGURES 1 and 2, Karumiidae. 1—*Karumia estafilinoides* Escalera, male. 2—*Drilocephalus pallidipennis* Pic, male.

[1] Department of Biology, The Catholic University of America, Washington, D. C.

Eight specimens of *Karumia estafilinoides* Escalera were identified by me in a lot of termites sent to T. E. Snyder. This material was collected in Afghanistan by the third Danish Expedition to Central Asia at Pirzada (30°, 37′ N by 65°, 4′ E) June 1948 (N. Haarløv, coll.). The specimens are deposited in the United States National Museum collection. The type locality of this species is Iran: Kamenográ, Karun (sic) River, Zagros Mountains. Two of the other five members of the family are also Iranian. The other three species were described from Argentina and Costa Rica. The specimens from Afghanistan constitute a new locality record for the family and indicate that the Karumiidae may have or may have had a wider distribution than previously supposed.

Because of the fact that these beetles are so rare, this opportunity is taken to describe and illustrate the family.

KARUMIIDAE

The very fuzzy appearance and rather short elytra (entire in *Drilocephalus*), large, termite-like head and jaws, and very short pronotum characterize the members of this family (figs. 1 and 2).

Description—Elongate, subdepressed; size 7-10 mm. in length; color pale with darker head, termite-like in coloration; vestiture moderate in density, but very long and erect.

Head from base of mandibles to thorax twice length of pronotum in some species to about equal in length in others; depressed; prognathous; surface sparsely, shallowly punctate. Antennae eleven-segmented, moniliform, inserted above the base of the mandibles, between and anterior to the eyes. Clypeus hidden beneath the frontal ridge; labrum distinct, short and broad; mandibles very large, nearly as long as head, curved, apices acute with a large subapical tooth, or entire; maxillae small, with very long, slender maxillary palpi, palpus four-segmented, last segment only slightly expanded apically; labium very broad and short at base; gula present; labial palpus four-segmented, very long, filiform. Eyes lateral, small, somewhat bulging, oval.

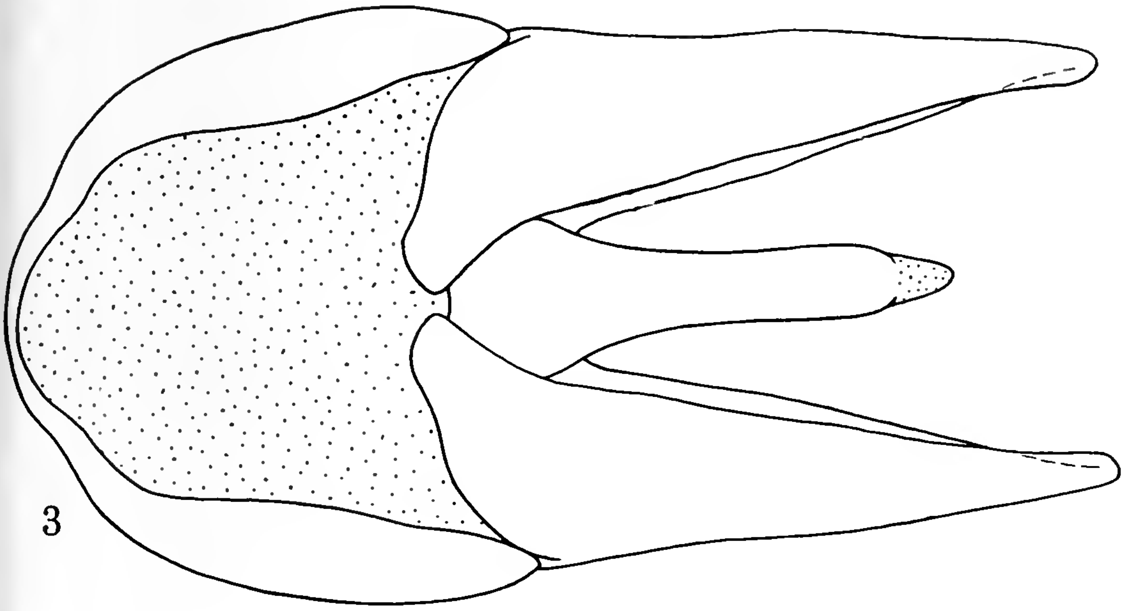
Pronotum very short and broad, anterior margin sinuate, lateral margins curved, somewhat narrower posteriorly in some, as broad as anterior margin in others; posterior margin arcuate to straight, surface nearly smooth to finely punctate. Prosternum short and broad, subarcuate posteriorly, not separating coxae; procoxal cavities open behind; mesosternum very short; mesocoxal cavities open behind, metasternum long and broad. Legs moderate in length; tarsal formula 5-5-5, or 5-5-4, first segment elongate; claws moderate; apical tibial spurs long, prominent; numerous shorter spurs on the tibia in addition to long hairs; scutellum moderate, trapezoidal or shield-shaped; elytra short or entire, somewhat narrowed behind, striae absent; slight epipleural fold present; wing venation and folding pattern undescribed. The wings are folded length-wise only and are not folded cross-wise.

Abdomen with eight visible sterna, sutures distinct, surface smooth; ten visible terga (fig. 5), the tenth tergum entire, not a part of the copulatory mechanism.

Male genitalia of the trilobed type (figs. 3 and 4) with a large basal piece and articulated parameres; penis large, compressed.

Females and immature stages unknown.

Ecology.—Known to inhabit termite nests.



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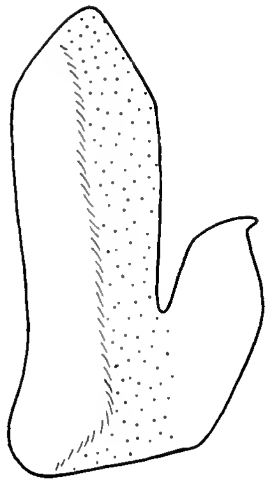

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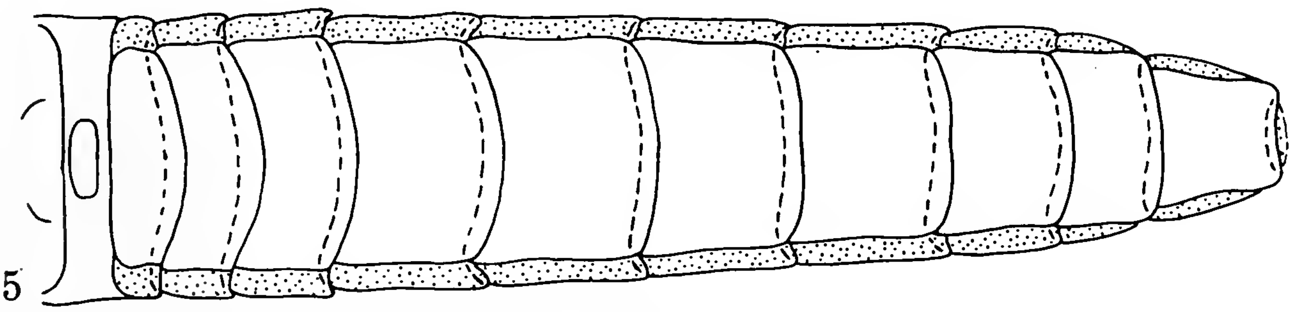

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FIGURES 3-5, *Karumia estafilinoides* Escalera. 3—Male genitalia, ventral view. 4—Penis lateral view, dorsal surface to the right. 5—Abdominal terga showing the ten terga. The dotted line at the extreme right indicates the membranous area in which the anus is located.

KEY TO THE SPECIES

1. Mandibles entire ---------------------------ESCALERINA MICROCEPHALA (Escalera)
   Mandibles with subapical tooth-- 2
2. Elytra much shorter than apex of abdomen------------------------------------- 3
   Elytra as long as abdomen--- 4
3. Head very large, longer than broad, more than twice length of pronotum-------- 5
   Head moderate, about as long as pronotum (?, specimens not seen)------------
   --PSEUDOKARUMIA ANGUSTATA Pic
4. Piceous; eyes small, length of head behind eyes about three times width of eye--
   -- DRILOCEPHALUS ILIARENSIS Bruch
   Testaceous; eyes large, length of head behind eyes subequal to width of eyes----
   ---DRILOCEPHALUS PALLIDIPENNIS Pic
5. Elytra long, reaching to about one-half length of abdomen -----------------
   ---KARUMIA ESTAFILINOIDES Escalera
   Elytra short, hardly extending beyond base of abdominal sternum -------------
   --------------------------------KARUMIA STAPHYLINUS Semenov and Martynov

CLASSIFICATION

Karumiidae Escalera, 1913. Bol. Soc. Esp. Hist. Nat. 13:320.
Zarudniolidae Semenov and Martynov, 1925. Rev. Russe d'Ent. 19:74.

Escalerina Bolivar

Escalerina Bolivar, 1926. Eos, 2:196, 199.

Karumia microcephala Escalera, 1913. Bol. Soc. Esp. Hist. Nat. 13:322 (Iran). (Placed in *Escalerina* by Bolivar, 1926, Eos 2:199.)

Karumia Escalera

Karumia Escalera, 1913. Bol. Soc. Esp. Hist. Nat. 13:320.

Zarudniola Semenov and Martynov, 1925. Rev. Russe d'Ent. 19:74, 77. (Placed in synonymy by Bolivar, 1926, Eos 2:196.)

Karumia estafilinoides Escalera, 1913. Bol. Soc. Esp. Hist. Nat. 13:320 (Iran and Afghanistan).

Karumia staphylinus Semenov and Martynov, 1925. Rev. Russe d'Ent. 19:74, 77, fig. 1 (Iran).

Drilocephalus Pic

Drilocephalus Pic, 1918. Mél. Exot.-Ent. 28:3.

Drilocephalus pallidipennis Pic, 1918. Mél. Exot.-Ent. 28:3 (Argentina).

Drilocephalus iliarensis Bruch, 1930. Rev. Soc. Ent. Argentina 3:35 (Argentina).

Pseudokarumia Pic

Pseudokarumia Pic, 1931. Malcoderma exotiques, Échange, 47, no. 443, hors-texte: 95-96.

Pseudokarumia angustata Pic, 1931. Malcoderma exotiques, Échange, 47, no. 443, hors-texte: 96 (Costa Rica).

LITERATURE NOTICE

PALEOZOISKIE NASEKOMYE KUZNETSKOGO BASSEINA. by B. B. Rohdendorf, E. E. Becker-Migdisova, O. M. Martynova, and A. G. Sharov. Trudy Paleontologischeskogo Instituta, Akademia Nauk SSSR, Vol. 85, pp. 1-705, illus. 1961.—This work on the paleozoic insects of the Kuznetsk coal fields of the USSR contains many new taxa. Keys to all taxa are presented, and each species is illustrated; at least, the elytron of each beetle is illustrated. Rohdendorf, author of the beetle section, describes the following new beetle families: Asiocoleidae, Kaltanocoleidae, Taldycupidae, Rhombocoleidae, and Schizocoleidae. In addition, the previously described families Cupidae and Permosynidae are included. These 7 families contain 37 genera (34 new) and 74 species (all new).

NOTES ON ENOCHRUS AND CYMBIODYTA FROM THE PACIFIC NORTHWEST (COLEOPTERA: HYDROPHILIDAE)[1]

By David C. Miller[2]

The following information is presented in order to make the names of the new species and the synonymy for certain older species available for use in the section on the Hydrophilidae in the forthcoming Part V of Dr. M. H. Hatch's *Beetles of the Pacific Northwest.*

Thanks are due to the following individuals for the loan of material of the new species for study. The abbreviations in parentheses are those used after the locality listings to indicate the site of deposition of the type material. This is generally equivalent to the original source from which it was borrowed. The author's collection is referred to as (DM). Mr. H. S. Dybas, Chicago Natural History Museum (CNHM); Mr. J. J. Davis, Hanford, Washington (JJD); Mr. Joe Schuh, Klamath Falls, Oregon (JS); Mr. Joseph Capizzi, Oregon Department of Agriculture (ODA); Mr. Jack Lattin, Oregon State University (OSU); Mr. S. G. Jewett, Portland, Oregon (SGJ); Dr. M. H. Hatch, University of Washington (UW).

Dr. P. J. Darlington of the Museum of Comparative Zoology, Harvard University, Mr. J. A. G. Rehn of the Philadelphia Academy of Sciences, and Mr. W. J. Brown of the Canadian National Collection have been most kind in allowing me to examine types. Mr. Ralph W. Gundersen of the University of Minnesota, and Mr. Hugh B. Leech of the California Academy of Sciences have read the manuscript. Dr. M. H. Hatch has aided in many ways with the portions of the work completed while I was at the University of Washington. The drawings are by Mrs. Helen Houk, of the University of Washington.

The Genus Enochrus

Enochrus (Enochrus) carinatus (LeConte)

Philhydrus carinatus LeConte 1855:370.

P. fucatus Horn 1873:127; 1890:242-243. [NEW SYNONYMY.]

Enochrus fucatus: Winters 1927:19. Leech and Chandler 1956:345.

For some time, *Enochrus carinatus* (LeC.) and *E. fucatus* (Horn) have been thought to be separable by the coloration of the pronotum and elytra. Winters (1927) stated that *carinatus* is uniformly dark dorsally, except for the front angles of the pronotum, while *fucatus* has the pronotum and elytra decidedly paler than the head. Leech and Chandler

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[1] The majority of this work was included in a dissertation submitted to the University of Washington in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

[2] Department of Biology, City College of New York, New York, N. Y.

(1956) repeated this distinction. However, I have examined the two cotypes of *carinatus* LeC. in the Museum of Comparative Zoology, Harvard, the type of *fucatus* Horn in the same institution, and the type of *fucatus* in the Philadelphia Academy of Sciences; all four of these specimens have the elytra and pronotum decidedly paler than the head. The elytra and pronotum vary from light reddish brown to nearly yellow in these four specimens, but all appear to me to belong to one species. Thus *fucatus* Horn is a synonym of *carinatus* LeC. The types of *carinatus* LeC. were collected in California and those of *fucatus* Horn were collected in Utah.

This leaves the form which Winters called *carinatus* LeC. without a name, and it is given the name *piceus* Miller, new species, below. The problem, however, goes further. It is difficult to decide whether some specimens are *carinatus* LeC. or *piceus* Miller, new species. This is particularly true of some material which I have seen from Oregon, where both forms are present. It is possible that they are variants of a single species, though the presence of *piceus* throughout most of the range of *carinatus* argues against considering the forms to be subspecies. On the other hand, the very small amount of material of *carinatus* that I have seen from the southwestern United States is quite variable in color, punctation, and the form of the prosternal carina, so that it is possible that more than one species is represented in that area. More study, particularly of these southern forms, is needed.

Enochrus (Enochrus) piceus Miller, NEW SPECIES

Philhydrus carinatus: Horn 1873:126-127; 1890:242-244 (*nec* LeConte).

Enochrus carinatus: Winters (*nec* LeConte) 1927:19. Leech and Chandler 1956:345.

This is the darker of the two forms discussed above; the dorsal surface is nearly uniformly dark and the front angles of the pronotum are pale. As the synonymy above leaves this form without a name it is given one here, and type material is designated.

HOLOTYPE: Male, Wilbur, Washington, Aug. 24, 1932 (UW).

ALLOTYPE: Female, same data as holotype (UW).

PARATYPES: WASHINGTON: *Benton Co.:* 1, Hanford (JJD). *Douglas Co.:* 2, Grand Coulee (Dry Falls) (UW). *King Co.:* 1, Snoqualmie (UW). *Kittitas Co.:* 1, Cle Elum (UW); 1 Kittitas (UW). *Lincoln Co.:* 10, Wilbur (8 UW, 2 DM). *Pacific Co.:* 1, Nasel River (UW). *Spokane Co.:* 1, Spokane (UW). *Walla Walla Co.:* 1, Wallula (UW). IDAHO: *Franklin Co.:* 1, Bear River Canyon (UW). *Canyon Co.:* 4, Lowell Lake (UW). OREGON: *Baker Co.:* 2, Durkee (Powell Creek) (UW); 2, Snake River (Farewell Bend) (UW). *Benton Co.:* 1, Alsea Mountain (OSU); 1, Corvallis (OSU). *Clackamas Co.:* 14, Austin Hot Springs (10 SGJ, 2 UW, 2 DM). *Coos Co.:* 1, Myrtlewood Camp (Myrtle Creek) (OSU). *Curry Co.:* 6, Brookings (Myrtle Grove, Chetco River) (3 OSU, 2 UW, 1 DM); 23, Pistol River (9 CNHM, 11 UW, 2 DM, 1 OSU); 3, Port Orford (2 CNHM, 1 UW). *Deschutes Co.:* 1, Sisters (OSU). *Douglas Co.:* 3, Roseburg (UW). *Jackson Co.:* 2, Dead Indian Springs (JS). *Jefferson Co.:* 1, Spring Creek (OSU). *Josephine Co.:* 2, Wolf Creek (UW). *Linn Co.:* 1, Santiam River (Lebanon) (SGJ). *Umatilla Co.:* 2, Echo (UW); 1, Freewater (OSU). *Wallowa Co.:* 1, Wallowa River (UW). CALIFORNIA: *Los Angeles Co.:* 2, Taipa Park (Santa Monica Mountains) (DM). *San Diego Co.:* 2, Vista (DM). *Santa Cruz Co.:* 4, Ben Lomond (DM). *Siskiyou Co.:* 1, Hilts (Cottonwood Creek) (SGJ).

Enochrus (Lumetus) collinus Brown

Enochrus collinus Brown 1931:118.

This species is not common and is very similar to *E. conjunctus* (Fall) and related species. The material that I have seen from British Columbia (Copper Mt. and Quesnel) and Idaho (Malad City, Little Malad River) agrees with the type, in the Canadian National Collection. *Collinus* is generally somewhat darker than *conjunctus,* and males of the two species can be separated on the structural characters given in the key to follow.

Enochrus (Lumetus) conjunctus (Fall)

Philhydrus conjunctus Fall 1901:217.

Enochrus conjunctus: Brues 1932:267. Leech and Chandler 1956:345. Malkin 1958:34.

The only difference between *conjunctus, horni* Leech, and a form labeled in some collections *"lividus* Walker" is in color. The male genitalia and all other structural characters are identical in all three forms. Since intergrades exist, it is entirely possible that all three are color variants of a single species. In any case the name *lividus* Walker is not usable because it is based on a misidentification. Walker (1866:310-319) wrongly identified material from British Columbia as *Philhydrus lividus* Forster, a European species. The latter is now the type of the genus *Helochares* Mulsant.

An extensive study of material from the entire range of the complex should be undertaken to determine how many species are involved. Here, I will tentatively consider that there are two. *Conjunctus* Fall should include those specimens which are primarily dark dorsally with the sides of the head and the pronotum variably paler; *horni* Leech should include those specimens which are primarily yellowish dorsally with the base of the head and the pronotal disc generally dark, but sometimes pale. Walker's identification of *lividus* was probably based on material of this latter group in which the pronotum was entirely pale.

Enochrus (Lumetus) diffusus (LeConte)

Philhydrus diffusus LeConte 1855:371 (in part).

Enochrus diffusus: Leech 1948:450; 1950:254-256. Leech and Chandler 1956:345.

Leech (1950:254-256) was the first to point out the distinguishing characters of the metafemora and clypeus of this species. The male genitalia are also distinctive, having an elongate supporting strut for the median lobe as noted in the key below. This strut is shorter in the *conjunctus-horni* group. The Museum of Comparative Zoology, Harvard, contains a series of four cotypes of *diffusus* LeC. Only the fourth of these agrees with *diffusus* as now recognized, while the other three belong to an unknown species, perhaps the "livid" form of *horni* Leech as recognized here (see discussion under *E. (L.) conjunctus* (Fall)). For this reason I have designated cotype #4 as the lectotype for the species *diffusus* LeC.

Enochrus (Methydrus) lacustris (LeConte)

Philhydrus lacustris LeConte 1855:369. Fall 1924:87.

The material which I have tentatively referred to this species is from bog lakes near Seattle, Washington, particularly from Chase Lake. There does not appear to be any appreciable difference between this material and LeConte's type (in the Museum of Comparative Zoology, Harvard), but *lacustris* is a member of a difficult complex which is in need of additional study before identifications can be made with certainty.

Key to the Enochrus of the Pacific Coast

From Leech and Chandler (1956:345) with additions and alterations. This key includes all known species of *Enochrus* from California, Oregon, Idaho, Washington, and British Columbia.

1. Fifth abdominal sternite with a small apical emargination, from which projects a differentiated fringe of golden cilia -- 2
   Fifth abdominal sternite entire apically, not emarginate, without differentiated fringe of flat cilia (subgenus Lumetus Zaitz.) ---------------------------------- 9
2. Last two segments of maxillary palpi of equal length, or last longer than penultimate (subgenus **Enochrus** s. str.) -- 3
   Last segment of maxillary palpi shorter than penultimate (subgenus **Methydrus** Rey) 5
3. Head luteous in front of eyes, elsewhere black; prosternum not carinate; smaller species, 3.5-4 mm. long; pronotum black, sides and parts of anterior and posterior margins luteous; California to Oregon ------------------------ **CUSPIDATUS** (LeC.)
   Head entirely black, or vaguely narrowly rufopiceous in front of eyes; prosternum with a low poorly defined median longitudinal carina; larger species, 4-5 mm. long 4
4. Dorsal surface black to dark reddish brown, front angles of pronotum usually paler; southwestern U. S. to Washington, Idaho -------------------------- **PICEUS** Miller
   Head black dorsally, pronotum and elytra reddish brown to yellow; Oregon and southwestern Idaho to southwest U. S. ------------------------ **CARINATUS** (LeC.)
5. Prosternum not carinate -- 6
   Prosternum carinate; smaller species, 2.75-3.75 mm. long; mesosternal protuberance laminiform, acutely prominent anteriorly, not at all obscured by vestiture ------- 7
6. Smaller species, 3.0-3.7 mm. long, mesosternal protuberance quite low, lamelliform, glabrous, not toothed; emargination of fifth abdominal sternite small, acute; western Washington, bog lakes ------------------------------ ? **LACUSTRIS** (LeC.)
   Larger species, 4.5-5.8 mm. long; mesosternal carina higher, hairy, bearing low, rounded teeth obscured by the pubescence; emargination of fifth abdominal sternite fairly large, rounded; California to British Columbia ---------- **CALIFORNICUS** (Horn)
7. Pronotum piceous on disc -- 8
   Pronotum entirely testaceous; elytra polished, minutely punctate, except for several more or less evident longitudinal series of coarser punctures; southwestern U. S. -- **PECTORALIS** (LeC.)

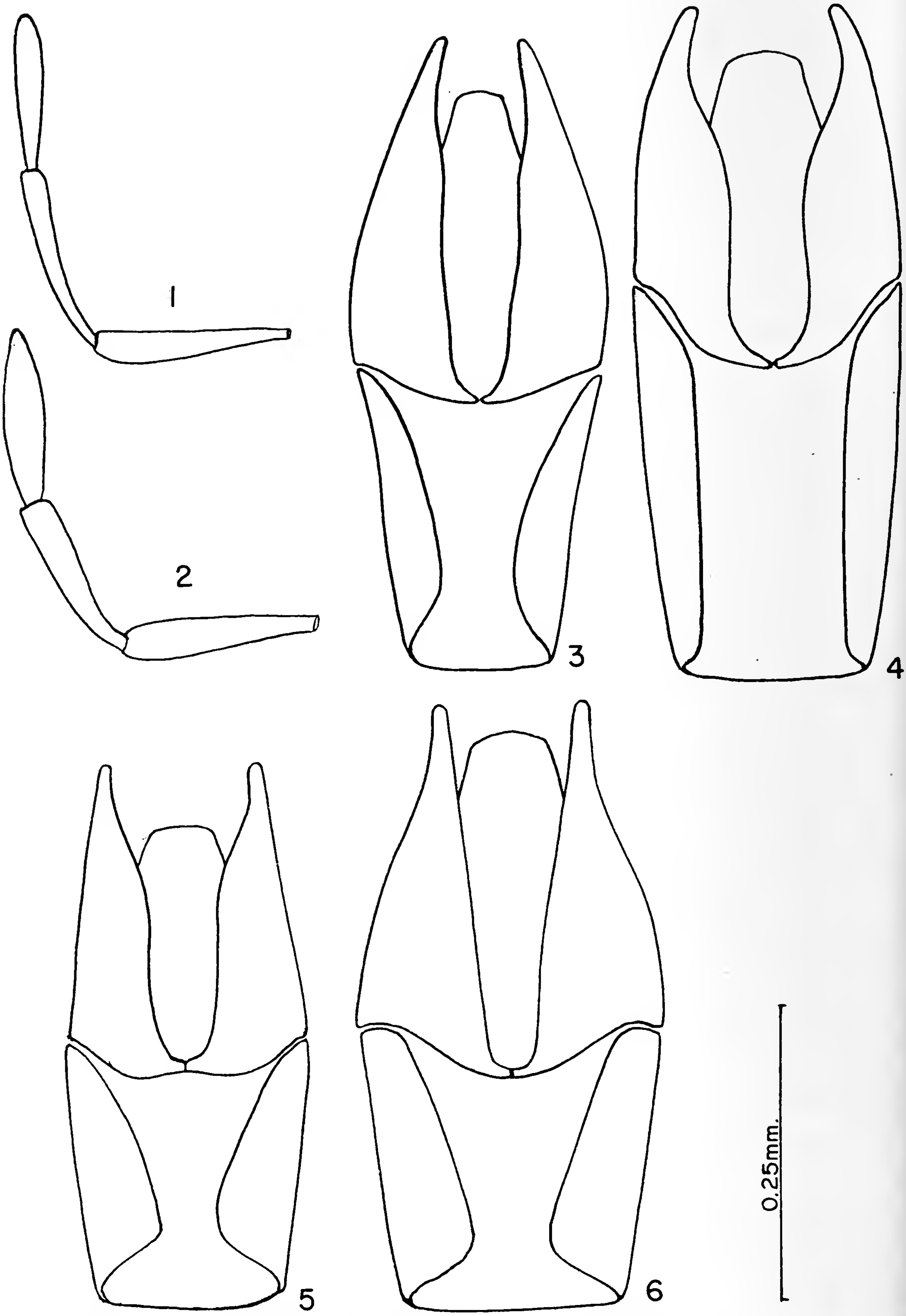
8. Elytra extremely finely, sparsely punctate, except for serial punctures which stand out contrastingly; pronotum usually broadly piceous, elytra tinged with piceous; narrower species; San Diego County, Calif.---------------------- CRISTATUS (LeC.)
Elytra rather densely, moderately coarsely punctate, serial punctures not conspicuous; pronotum usually piceous only at middle of disc, elytra not tinged with piceous; broader species; California to Oregon to Utah-------- OBTUSIUSCULUS (Mots.)
9. Dorsal surface dark reddish brown to black, elytra and pronotal disc usually equally dark, head before the eyes and edges of pronotum often paler-------------- 10
Dorsal surface yellow to dark brown except for black areas on head and sometimes on pronotal disc -- 11
10. Dorsal surface usually black, pronotum at most narrowly and indistinctly paler at sides, head not pale before eyes; hind angles of pronotum sharp, nearly rectangular; males with tooth of outer protarsal claw large but not so strongly everted, extending only about half way to tip of claw; external supporting strut of median lobe of aedeagus in ventral view extending beyond apex of median lobe a distance at least equal to width of median lobe; British Columbia, Idaho -- COLLINUS Brown
Dorsal surface dark reddish brown, head often pale before eyes and pronotum narrowly to broadly pale at sides; hind angles of pronotum more broadly rounded; males with tooth of outer protarsal claw larger and fairly strongly everted, reaching about two-thirds of the way to tip of claw; external supporting strut of median lobe of aedeagus extending only slightly if at all beyond apex of median lobe; California to British Columbia------------------------- CONJUNCTUS (Fall)
11. Front margin of clypeus evenly arcuate-emarginate, without trace of a secondary emargination at middle; species occurring in brackish or saline water along seacoast, near lower Colorado River, and in Death Valley, Calif.----------------- 12
Emargination of front of clypeus with a secondary emargination at middle, exposing a preclypeus --- 13
12. Elytra more coarsely punctate; salt marsh and saline pools, coast of California and up estuary of Colorado River--------------------- HAMILTONI PACIFICUS Leech
Elytra more finely punctate; saline waters, Death Valley, Calif. HAMILTONI PYRETUS Leech
13. Smaller species, 3.5-4.5 mm. long; hind edge of hind femora simple; Central Valley of California --------------------------------------? LATIUSCULUS (Mots.)
Larger species, 4.4-6.5 mm. long-- 14
14. Secondary emargination at front of clypeus arcuate, exposing a preclypeus; hind edge of hind femora simple; dorsal surface pale to dark brown, base of head black and pronotal disc completely pale to strongly black; external supporting strut of median lobe of aedeagus extending little if at all beyond apex of median lobe; southern British Columbia to Oregon, Idaho---------------------------------- HORNI Leech
Secondary emargination at front of clypeus truncate, exposing a preclypeus; hind edge of hind femora of male with a slightly raised and pronounced area at middle; dorsal surface yellow to pale brown, at most slightly darkened (never black) on pronotal disc and base of head; external supporting strut of median lobe of aedeagus extending beyond apex of median lobe a distance equal to nearly twice width of median lobe in ventral view; southern British Columbia to California, east of Cascade Range --- DIFFUSUS (LeC.)

The Genus Cymbiodyta

Cymbiodyta acuminata Fall
(Figs. 1, 3)

Cymbiodyta acuminata Fall 1924:87.

The type of this species is missing from the Fall Collection in the Museum of Comparative Zoology, Harvard, but material from British Columbia (Agassiz; Copper Mt.; Vernon; and Wynndel) and Washington (Dry Falls, Grand Coulee; Millersylvania State Pk.) agrees with topotypical specimens in that collection.



FIGURES 1, 3, *Cymbiodyta acuminata* Fall. 1—Maxillary palpus. 3—Aedeagus, dorsal view. FIGURES 2, 4, *Cymbiodyta leechi* n. sp. 2—Maxillary palpus. 4—Aedeagus, dorsal view. FIGURE 5, *Cymbiodyta vindicata* Fall, Aedeagus, dorsal view. FIGURE 6, *Cymbiodyta hatchi* n. sp., Aedeagus, dorsal view.

Cymbiodyta leechi Miller, NEW SPECIES
(FIGS. 2, 4)

MALE: Length 4.5-5.1 mm.; form elongate oval; dorsal surface entirely finely and very thickly punctate, about evenly so on all areas, and shining black except the anterior margin of the labrum, the anterior (very narrowly) and lateral margins of the pronotum, and the elytral margins and apex which are dark yellowish brown; pronotum with a very irregular row of larger punctures extending inward from the margin on each side and a more regular row posterior to this on each side, and the elytra with a very few larger punctures in very inexact longitudinal rows; side margins of the pronotum slightly bowed outwards, the front corners very broadly and evenly rounded, the hind corners more sharply rounded, forming an obtuse angle; venter black, except the meso-and metacoxae and trochanters, all the legs from the tips of the femora apically, and the antennal club, which are dark yellowish brown, the palpi and the remainder of the antennae lighter and more yellowish; aedeagus in dorsal view with parameres broad, their tips bent toward each other (i.e. outer margin of each paramere a smooth curve, but inner margins bending sharply towards each other near apex); mesosternal ridge bearing a large median tooth as in *C. acuminata* Fall.

FEMALE: Externally identical to male.

HOLOTYPE: Male, Chase Lake, Snohomish Co., Washington, May 5, 1949, M. H. Hatch (UW).

ALLOTYPE: Female, same data as holotype (UW).

PARATYPES: WASHINGTON: *King Co.:* 1, Echo Lake (UW); 17, Juanita (15 UW, 2 DM); 2, Lake Marie (UW); 1 Renton (Cedar River) (UW); 4, Seattle (UW); 1, Seattle (Green Lake) (UW); 3, Seattle (Lake Washington) (UW). *Snohomish Co.:* 64, Chase Lake (60 UW, 4 DM); 6, Scribner Lake (5 UW, 1 DM). *Thurston Co.:* 1, Lost Lake (UW); 2, Tumwater (UW). OREGON: *Jackson Co.:* 1, Dead Indian Soda Springs (ODA). *Klamath Co.:* 3, Mare's Egg Spring (2 JS, 1 DM). *Yamhill Co.:* 1, Dayton (UW).

This species is quite close to *C. acuminata* Fall, which is the only other North American *Cymbiodyta* with a strongly developed tooth on the mesosternum. *Leechi* differs from *acuminata* in the following ways: hind angles of pronotum more obtuse and sides of pronotum more arcuate; maxillary palpi more robust and usually more yellowish; mesosternal tooth slightly shorter; parameres convergent at the tips.

It gives me great pleasure to name this species in honor of Mr. Hugh B. Leech, of the California Academy of Sciences. Mr. Leech's many publications on the Hydrophilidae have added greatly to our knowledge of the family, and he has been of great help to me in my work on the northwestern species.

Cymbiodyta vindicata Fall
(FIG. 5)

Cymbiodyta vindicata Fall 1924:86-87.

As with *C. acuminata* Fall, the type of this species is missing from the Fall Collection in the Museum of Comparative Zoology, Harvard. Topotypical specimens in that collection agree with material from British Columbia (several localities) and Washington (Lake Thomas, Snohomish Co.)

Cymbiodyta hatchi Miller, NEW SPECIES
(FIG. 6)

MALE: Length 5.1 mm., form oval; head black; pronotum and elytra dark brown, with the pronotum narrowly paler laterally and the elytra narrowly paler laterally and much more broadly and diffusely paler apically; entire dorsum finely and thickly punctate; in addition to the fine punctation with two rows of coarser punctures on each side of the pronotum, slanting posterio-laterally and very irregular and incomplete, and occasional coarser punctures on the elytra, especially laterally where they are very irregular in arrangement, the few coarse punctures of the disc arranged in longitudinal series but so far apart that the series are not evident; venter largely black, the legs apical to the femoral pubescence brown, the palpi very dark brown; mesosternal ridge transverse, not toothed; aedeagus in dorsal view with the inner margin of each paramere straight, the outer margin curving gradually inward from the base to near the apex and then bent outward to nearly parallel the inner margin so that the tip is elongate along its inner margin, the extreme apex of the paramere bluntly rounded.

FEMALE: Unknown.

HOLOTYPE: Male, 13 mi. N.E. Bly, edge Deming Cr., Klamath Co., Oregon, Sept. 16, 1960, Joe Schuh (JS).

The holotype is the only known specimen. This species is named in honor of Dr. M. H. Hatch, of the University of Washington, who originally stimulated my interest in the Hydrophilidae and who has aided me immeasurably during the course of my work with the northwestern species. *Hatchi* is very close to *C. vindicata* Fall and the eastern *C. fimbriata* (Melsh.), but can be distinguished from either by its prolonged apex of the parameres. The dark brown palpi of the holotype may also prove to be diagnostic when other specimens are known.

KEY TO THE CYMBIODYTA OF THE PACIFIC COAST

From Leech and Chandler (1956:345) with additions and alterations. This key includes all known species of *Cymbiodyta* from California, Oregon, Idaho, Washington, and British Columbia.

1. Elytra with striae or serial large punctures evident in at least the apical quarter; mesosternal protuberance entirely transverse, never with a tooth -------------- 2
   Elytra with no striae (except the sutural ones) or evident rows of coarse punctures; pronotum and elytra black to dark reddish brown discally, pale marginally------ 5
2. Elytra with sutural striae at least in apical half, but elsewhere at most with serial punctures not impressed as striae; head entirely black--------------------- 3
   Elytra with distinct striae in addition to sutural; head pale before eyes; form broad; all rows of punctures entire, including scutellar row; California ------- -- PUNCTATOSTRIATUS (Horn)
3. Metafemora pubescent in slightly less than basal two-thirds; maxillary palpi short and stout, yellow; dorsal surface black to dark reddish brown, the margins paler; elytra with serial punctures forming at least three nearly complete rows laterally, the discal rows complete only in about the apical quarter; California to British Columbia --- DORSALIS (Mots.)
   Metafemora pubescent in basal three-quarters; maxillary palpi longer and more slender; elytra with lateral series of punctures usually traceable to near base, but discal series traceable only near apex---------------------------------- 4
4. Pronotum and elytra usually reddish brown to black, the margins paler; elytra with serial punctures more confused, not traceable as striae as far anteriorly as in the following species, the discal striae especially usually visible only at apex; maxillary palpi usually brownish; California to British Columbia------ PACIFICA Leech

Pronotum and elytra usually yellowish brown to dark brown, disc of pronotum black; elytra with serial punctures somewhat more evident and less confused with larger punctures of intervals; maxillary palpi usually yellowish; California to Oregon -- -- IMBELLIS (LeC.)

5. Mesosternal protuberance bearing a large median tooth------------------------ 6

Mesosternal protuberance without a large median tooth------------------------ 7

6. Hind angles of pronotum nearly rectangular; sides of pronotum nearly straight in posterior three-quarters, bending in gradually in anterior quarter; maxillary palpi more slender, yellowish brown (fig. 1); mesosternal tooth longer; aedeagus with parameres nearly triangular in shape, not converging at tip, inner margin nearly straight (fig. 3); form slightly less robust; Washington, S. British Columbia - ---ACUMINATA Fall

Hind angles of pronotum more obtuse, sides of pronotum more broadly arcuate; maxillary palpi more robust, yellow (fig. 2); mesosternal tooth slightly shorter; aedeagus with parameres bent slightly towards each other at tips, inner margin of each paramere strongly sinuate (fig. 4); form slightly more robust; Washington, Oregon --LEECHI Miller

7. Smaller species, more parallel sided, length 3.4-4.0 mm.; palpi yellow, slender; aedeagus with outer margin of each paramere curving inward to about 2/7 of the distance from tip, then bent outward to parallel inner margin, so that parameres diverge from that point apically; British Columbia, Washington, Idaho - ---MINIMA Notman

Larger species, length over 4.4 mm.------------------------------------ 8

8. Aedeagus with inner margin of each paramere sinuate but parameres not convergent at tips, outer margin straight to tip (fig. 5); mesosternal ridge lower; palpi yellow; British Columbia, Washington----------------------------VINDICATA Fall

Aedeagus with inner margin of each paramere straight, outer margin bent slightly outward near tip so that tip is slightly elongate (fig. 6); mesosternal ridge slightly higher; palpi brown; E. Oregon (Deming Cr.)------------------------HATCHI Miller

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NOTICE

Methods of citing authors' names in species synonymies and in text have been quite variable. The International Code of Zoological Nomenclature, 1961, provides us with a rule for such citations. The Bulletin will adhere to that rule. Article 51(b)(i) says, "The name of a subsequent user of a scientific name, if cited, is to be separated from it in some distinctive manner, other than by a comma. Example.—Reference to *Cancer pagurus* Linnaeus as used by Latreille may be cited as *Cancer pagurus* Linnaeus sensu Latreille, [or] *Cancer pagurus:* Latreille, or in some other distinctive manner, but not as *Cancer pagurus* Latreille, nor as *Cancer pagurus,* Latreille." Bulletin authors, please take note.

A NEW SPECIES OF AGABUS FROM THE DEATH VALLEY REGION OF CALIFORNIA (COLEOPTERA: DYTISCIDAE)

By HUGH B. LEECH[1]

Agabus rumppi Leech, NEW SPECIES

A species resembling large, dark examples of *A. lutosus* LeConte, but more elongate. Males can be traced to couplet 21 in Fall's key (1922), where they will not fit either choice since the protarsus is broad, but the anterior claw is not dentate in the sense of *A. lutosus*. Females trace to couplet 13, where there is a multiple choice based on male tarsal characters.

HOLOTYPE.—Male, from "2.7 mi. E. of Death Valley Junction (Inyo co.), Calif., el. 2200', V-18-1958. c-3110. Collection of N. L. Rumpp." In the California Academy of Sciences, Entomology.

Length 8.6 mm., width 4.6 mm. Form elongate oval, elytra widest at middle of length. Head piceous, clypeus yellowish-brown, labrum rufescent as are two occipital spots, one on each side of median line. Pronotum piceous, narrowly rufescent along all four margins, with overall faint aeneous luster as on head. Elytra brown, yellowish-brown laterally and apically (the elytra of the holotype are discolored in part, perhaps because of an injury during the pupal stage; the right elytron has a large irregular yellowish area from the middle at base to the suture discally, while the left has two small elongate yellowish marks). Undersurface piceous; antennae, palpi, tarsi and tibiae pale yellowish-brown, outer segments of palpi and femora posteriorly rufopiceous; epipleura brown medially, pale along each side; abdominal sternites pale to dark rufopiceous. *Note:* the holotype is slightly teneral.

Head with meshes of surface reticulation small, of irregular sizes and shapes, most with one or more minute punctures. *Pronotum* with reticulation as on head but more lightly impressed, meshes at sides smaller; lateral marginal bead narrow (about as wide as base of eleventh antennal segment), of even width throughout; line of coarse punctures paralleling front margin continuous, punctures largest and most irregularly spaced near middle; basal line of punctures interrupted, no punctures discally in front of scutellum. *Elytra* with a sutural, a discal and three lateral lines of coarse punctures; surface sculpture consisting of lightly impressed tiny, nearly round meshes, which become uneven in sizes and shapes discally; many have each a small central puncture. *Protarsi* broad (fig. 2); anterior claw with small blunt tooth at base (fig. 3), widest just before middle, curving to a fine point apically; posterior claw regularly narrowing to apex, only three-quarters as long as anterior claw. Mesotarsi two-thirds as broadly dilated as anterior tarsi, fifth segment very long (fig. 1). First three segments of pro- and mesotarsi with hairs (except marginal ones) dilated apically into rather large rounded palettes, as in *A. lutosus* and *A. griseipennis* LeConte; fourth segment of mesotarsi with pad of short stiff setae only. Hind tibiae without row of punctures along inner margin. *Prosternal process* narrow, as wide as a mesotrochanter, finely margined almost to the acuminate apex, arcuately convex in cross section. Least distance between middle coxae and metacoxal plates less than half length of latter, measured along same line. *Aedeagus* of genitalia bifid apically in lateral view, parameres densely hairy on inner side (figs. 4, 6).

ALLOTYPE, female, same data as for holotype, but with Mr. Rumpp's collecting number c-3110 a. In the California Academy of Sciences, Entomology.

Length 7.9 mm., width 4.7 mm. Head and pronotum colored as in holotype; elytra brown, yellowish-white at sides in anterior half, yellowish-brown across base. Undersurface colored as in holotype but paler (probably because the specimen is more teneral), femora not tinged with rufopiceous. Elytra with reticulation coarse

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[1] Associate Curator of Insects, California Academy of Sciences, San Francisco.

and deep, the meshes strongly longitudinal baso-medially, more nearly rounded in apical half and laterally, much more lightly impressed apically and in apical half near lateral margin.

PARATYPES, 1 male, 2 females with same data as holotype except as follows: male, collection no. c-3110 b, females c-3110 d, c-3110 e. All in the California Academy of Sciences, except for one female deposited in the U. S. National Museum, Washington, D. C.

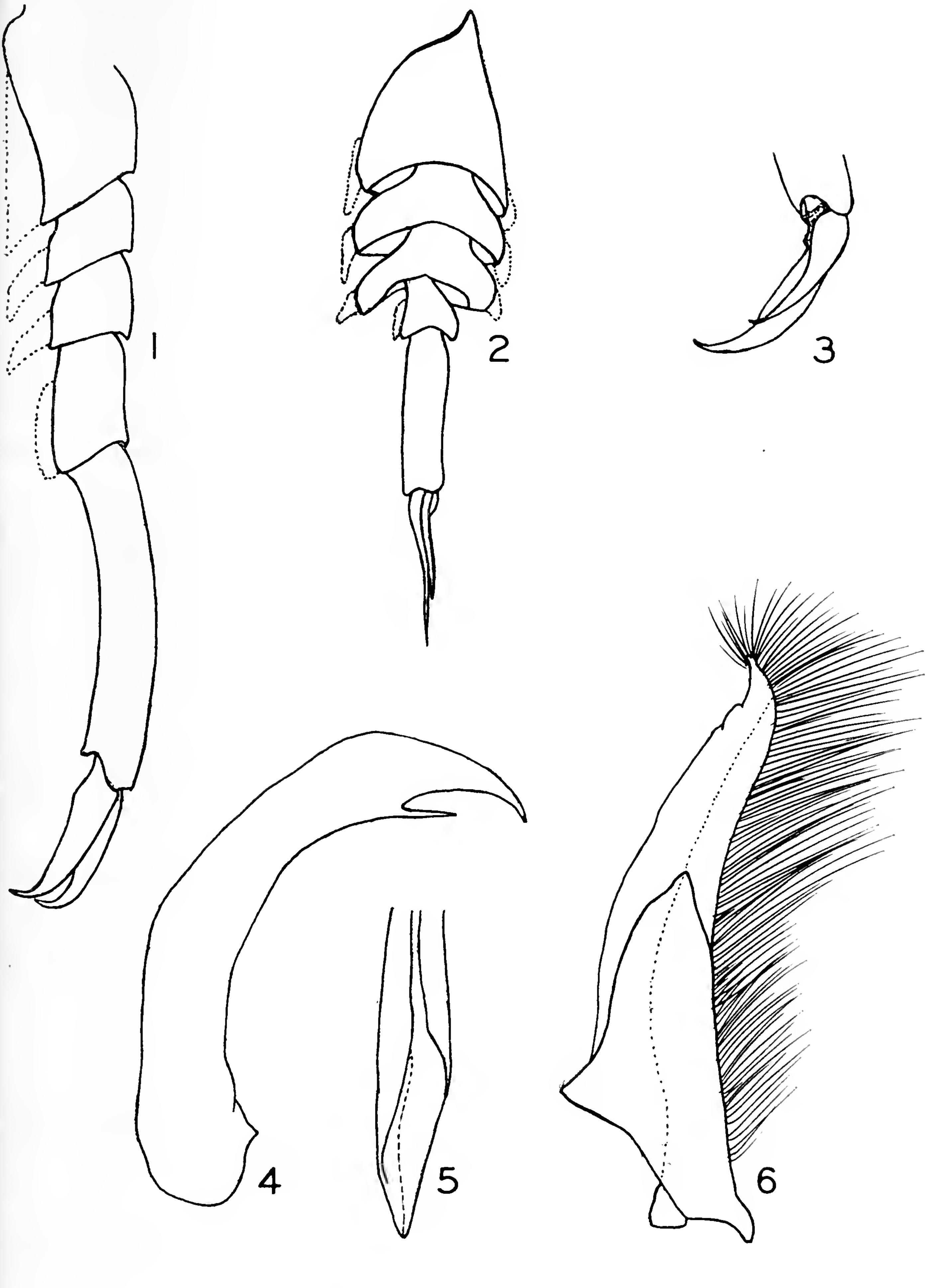
Additional specimen. 1 female, same data as types, number c-3110 c.

Variation. There is some variation in coloration, especially of the ventral surface, because all five specimens in the type series are teneral, the holotype the least so. The allotype is the only female to show a well defined pale area across the elytral bases. The non-paratypic female is fully matured and colored. It has the hind margins of the femora tinged with piceous as in the type, but the elytra are pale reddish-brown, palest laterally; it is also larger and proportionately narrower than the other specimens, i.e. length 9.4 mm., width 4.9 mm.

Discussion. In all characters other than size, and the protarsal claws of the male, *A. rumppi* is most similar to *A. lutosus* and *A. griseipennis;* all three have the aedeagus of the male bifid apically in profile. Judging by the non-paratypic female, color will not distinguish it from LeConte's species, and it is probable that a larger series would show small examples of a size comparable with large *A. lutosus.* Since all but the above female were teneral when taken in May, the latter may be an overwintered specimen.

In my key to the California species of *Agabus* (in Leech and Chandler, 1956) both sexes of *A. rumppi* will trace to couplet 17; the front tarsi of the male are very broadly dilated, as in *A. lutosus* and *A. griseipennis,* but the anterior (inner) tarsal claw is not toothed medially or apically. In Fall's key (1922) the male will trace either to couplet 21 or to couplet 29, depending on one's interpretation of couplet 20, where the choice is "Meshes of elytral reticulation more or less irregular and unequal, at least baso-medially . . . 21" as against "Meshes of elytral reticulation very minute, more rounded, and everywhere nearly equal . . . 29." As a matter of fact this is not an easy choice. As I have stated earlier, in the male of *A. griseipennis* the meshes are usually small, rounded and equal throughout, or of slightly irregular and uneven shapes near the suture at the bases of the elytra. In the male of *A. lutosus lutosus* ". . . the meshes are small, and either rounded and nearly equal except basally near the suture, or of unequal shapes and sizes almost throughout (type), or intermediate between these conditions. In a series of over 300 males . . . about seventy-five per cent have the meshes equal. . . ." (Leech, 1942, p. 132.) Yet Fall ran both species to couplet 21. If *A. rumppi* is taken to 21 it agrees with the first choice in its very widely dilated front tarsi with the basal segment scarcely as wide as the second, but differs in that the anterior claw is not toothed except minutely at the base (fig. 3). The female cannot be traced beyond the second half of couplet 13 of Fall's key, since the next choices are based on male tarsal characters.

In the male of *A. rumppi* the anterior protarsal claw is a little longer than the fifth protarsal segment, simple, with a tiny tooth-like protuberance at the extreme base (fig. 3). In *A. lutosus* and *A. griseipennis* it is only three-fifths as long as the fifth protarsal segment, has a rather similar basal



FIGURES 1-6. Structures of the male of *Agabus rumppi*, new species. 1—Profile of mesotarsus, extent of hairy pads and setae shown by dotted lines. 2—Dorsal view of left anterior tarsus. 3—Claws of right anterior tarsus, outer view, with anterior claw below. 4—Aedeagus in profile. 5—Apical third of the aedeagus, view of the dorsal side, i.e., the convex, top part of Figure 4. 6—Outer side of left paramere.

protuberance, but is strongly toothed at the mid-point or beyond (Leech, 1942, Pl. X, Figs. 11, 12; Leech and Chandler, 1956, Fig. 13:17 *d* and *e*).

A. rumppi shows an interesting chaetotaxy of the fourth mesotarsal segment in the male. From a longitudinally differentiated area on the bottom of the fourth segment there are several rows of short, stiff, thick setae arising from the inner (posterior) side, and a single row along the outer side. The setae of the inner rows are slanted across the segment, and to a lesser degree toward the apex, so that their tips, if extended a little, would touch those of the nearly vertical single row on the outer side.

An exactly comparable structure is found in males of *A. lutosus, A. griseipennis, A. erythropterus* (Say) and *A. ajax* Fall, species which, except for the first two, are not closely associated on the basis of other characters. A chaetotaxy of a similar but less developed type (a single row of setae on each side) occurs in the males of *A. arcticus* (Paykull), *A. anthracinus* Mannerheim, *A. browni* Leech and *A. austini* Sharp; in a rudimentary form it may be seen in *A. strigulosus* LeConte, *A. ambiguus* (Say) and *A. audeni* Wallis.

Mr. Rumpp has given to me the following information about the type locality, from his field notes. "The beetles were gotten from a small stream, either at the edge of it or well into it. This stream is a continuation of Carson Slough which goes south through, and drains, Ash Meadows. The actual location was inside California, but the source of the slough is a number of springs further north in the Nevada region of Ash Meadows. The elevation at this spot is only a few feet above 2200′. This stream is intermittent, by this time of the year it is usually dry. . . . On this basis it may be assumed that the *Agabus* is native of the stream in Ash Meadows, and its distribution therefore may include a portion of Nye Co., Nevada as well as Inyo Co., California."

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A NEW KEY TO THE SUBFAMILIES OF THE NEARCTIC STAPHYLINIDAE AND NOTES ON THEIR CLASSIFICATION

By IAN MOORE[1]

American coleopterists often express the view that the Staphylinidae is a difficult family to study. Although the average small size and the numerous species contribute to the problems of identification, a more formidable obstacle is the present state of the classification.

The family has been divided into a number of subfamilies which are intended to reflect the phylogenetic relationships of their members. Some of these subfamilies cannot be defined on the basis of one or several distinctive characters. This has resulted in keys to the subfamilies which are unusable. However, some of the subfamilies have been divided into tribes which are easy to define.

At the present stage of the knowledge of the family, the most pressing problem is that of identification. With this fact in mind, with a view toward simplification, I have treated some of the groups usually considered tribes as subfamilies. Having done this, I have found it possible to construct what I consider to be a usable key to the subfamilies of the Nearctic Staphylinidae based on characters which are generally visible in ordinary museum specimens.

Some of the characters in the new key have not been previously employed. The most important of these is that given in couplet eighteen, which separates the subfamilies near Staphilininae from those near Tachyporinae by the presence or absence of a distinct neck. The only case where application of this character might be considered doubtful is in Platyprosopinae. Although in members of that subfamily the head is only slightly narrowed behind the eyes, there usually is a distinct nuchal constriction across the dorsal surface with the sides of the head continuing behind the constriction, more or less parallel to each other. Thus, a true but broad neck does occur.

KEY TO THE SUBFAMILIES OF THE NEARCTIC STAPHYLINIDAE

1. Antennae inserted on surface of head between anterior margins of eyes; last segment of maxillary palpus subulate (fig. 1) ---------- 2
   Antennae inserted at front or side margins of head (fig. 2) ---------- 3
2. Posterior coxae small, separated ---------- STENINAE
   Posterior coxae large, contiguous ---------- ALEOCHARINAE
3. Antennae 9-segmented; posterior coxae separated ---------- MICROPEPLINAE
   Antennae 10- or 11-segmented; posterior coxae contiguous ---------- 4
4. Last segment of labial palpus large, semilunar (fig. 3) ---------- OXYPORINAE
   Last segment of labial palpus not semilunar ---------- 5
5. Head with a pair of frontal calluses ("ocelli")[2] between the posterior margins of the eyes (fig. 4) ---------- 6
   Head without frontal calluses ---------- 7

[1] Associate in Entomology, San Diego Natural History Museum, San Diego, California.

6. Tarsi 5-segmented -- **OMALIINAE**
   Tarsi 2- or 3-segmented-- **LEPTOTYPHLINAE**

7. Abdomen with complete second sternite[3] (seven sternites can be counted) (fig. 5)-- -- **OXYTELINAE**
   Second abdominal sternite absent or rudimentary (six complete sternites can be counted) -- 8

8. Anterior margin of labrum with two long processes which are setose within (fig. 6) -- **MEGALOPSIDIINAE**
   Labrum without such processes--- 9

9. Antennae 10-segmented --- **HYPOCYPHTINAE**
   Antennae 11-segmented --- 10

10. Last segment of maxillary palpus longer than penultimate, slightly arcuate, with an oblique, elongated, concave truncation of distinctive texture at apex (fig. 7) -- **PINOPHILINAE**
    Last segment of maxillary palpus not so formed------------------------------ 11

11. Metasternum with expanded plates covering part of femora---------- **TRICHOPSENIINAE**
    Metasternum without such plates; femora exposed------------------------- 12

12. Anterior tarsi 4-segmented (in the Nearctic species)---------------- **EUAESTHETINAE**
    Anterior tarsi 5-segmented-- 13

13. Abdomen without paratergites (without double margin) (fig. 8)---------------- 14
    Abdomen with paratergites (with prominent double lateral margin) (fig. 10)------ 15

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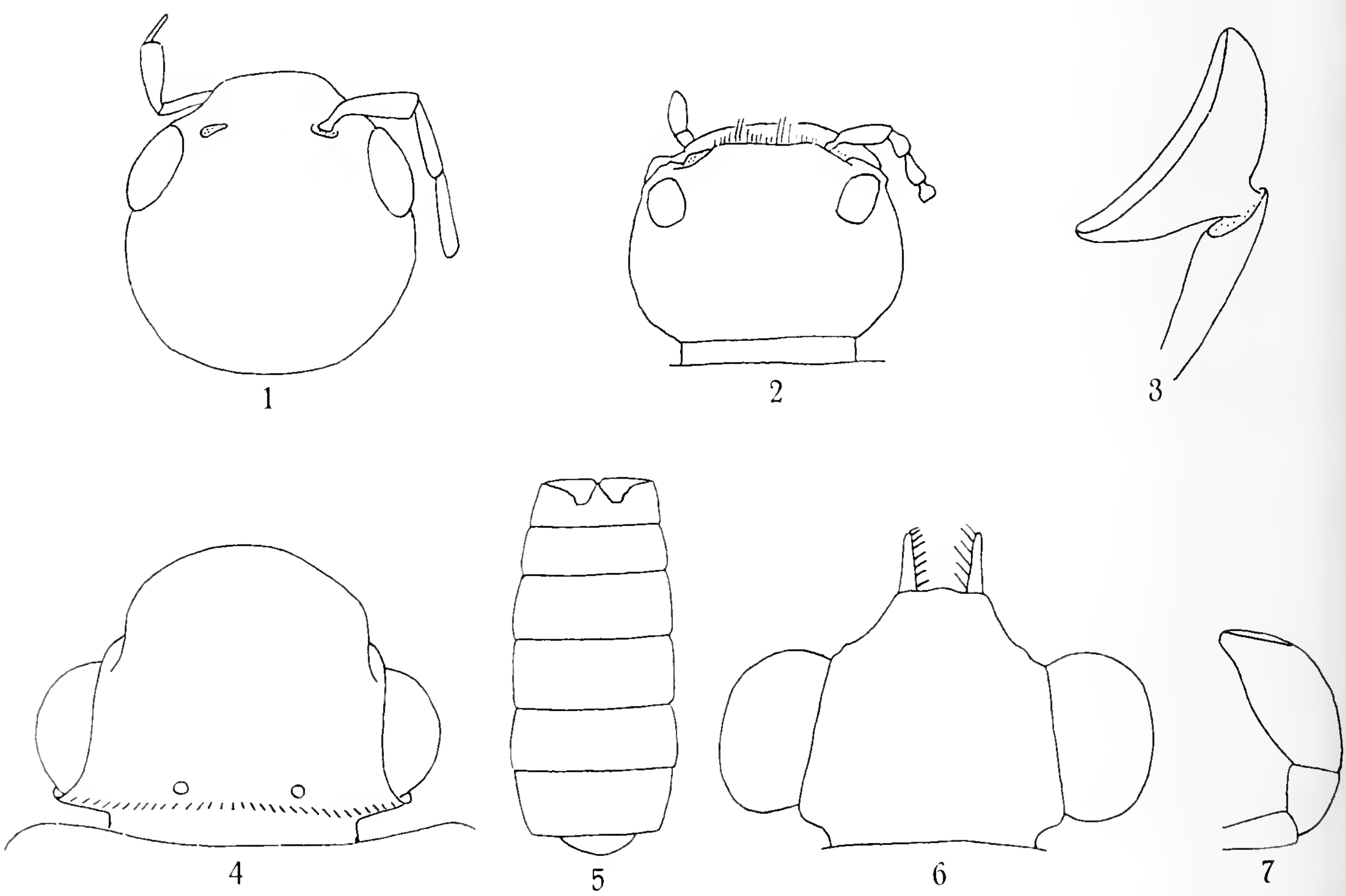
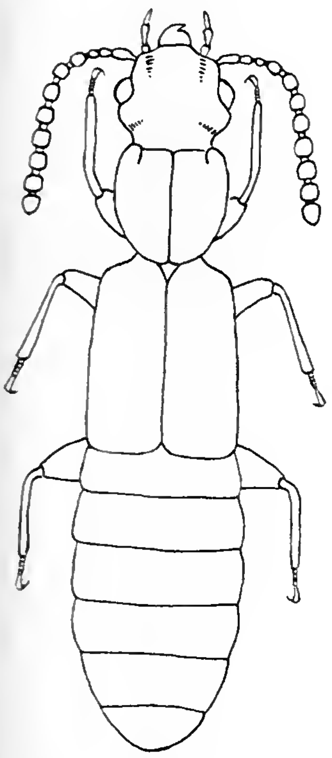
[2] Except *Vellica longipennis* Casey, which will go to Pteroniinae in this key. *Vellica longipennis*, a member of the Omaliinae, can be distinguished from members of the Pteroniinae by the presence of a strong fovea at each side of the pronotum.

[3] In some specimens of certain species of the Coprophilini (particularly in *Syntomium spp.*) the second abdominal sternite is rudimentary. I have been unable to find a satisfactory substitute for this character.



FIGURES 1-7. 1—*Falagria laeviuscula* LeConte, head, dorsal view. 2—*Hadrotes crassus* LeConte, head, dorsal view. 3—*Oxyporus vittatus* Gravenhorst, apex of labial palpus. 4—*Acidota subcarinata* Erichson, head, dorsal view. 5—*Bledius fenyesi* Bernhauer and Schubert, abdomen, ventral view. 6—*Megalopinus sp.*, head, dorsal view. 7—*Pinophilus testaceus* Erichson, apex of maxillary palpus.

14. Anterior coxae small, globular, without a transverse or diagonal sulcus on anterior face -- LISPININAE
Anterior coxae large, elongate, with a transverse or diagonal sulcus on anterior face -- OSORIINAE
15. Anterior coxae small, globular -- PIESTINAE
Anterior coxae large, elongate -- 16
16. Elytra long, completely covering first tergite (fig. 9) ------------------ PTERONIINAE
Elytra not completely covering first tergite ------------------------------ 17
17. Each basal abdominal tergite with a diagonal impressed line from near the middle front margin to each apical angle; pronotum and elytra costate (fig. 10) --- PSEUDOPSIDIINAE
Abdomen without such lines -- 18
18. Head constricted behind eyes to form a distinct neck that is clearly visible from above 19
Sides of head converging uninterruptedly to base, not constricted to form a neck that is clearly visible from above ------------------------------------ 25



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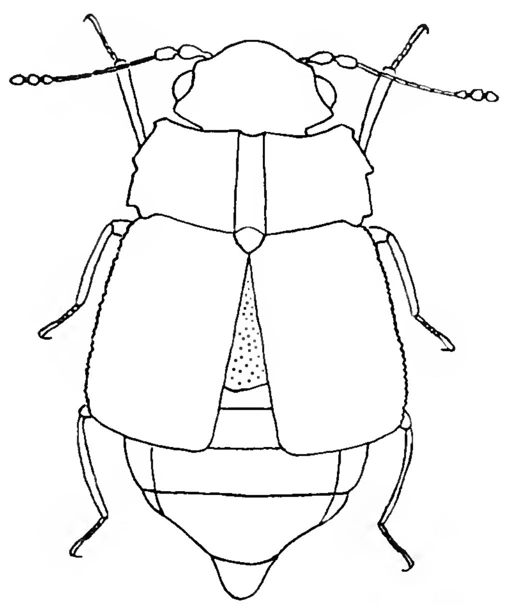

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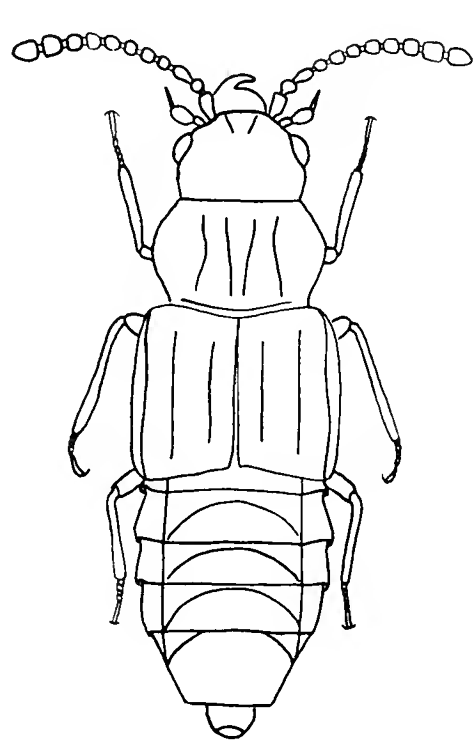

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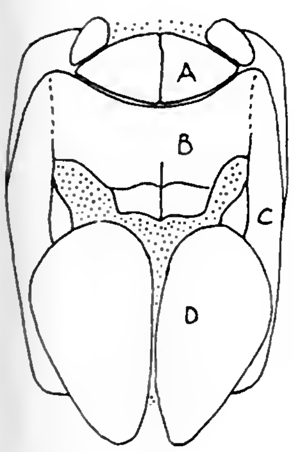

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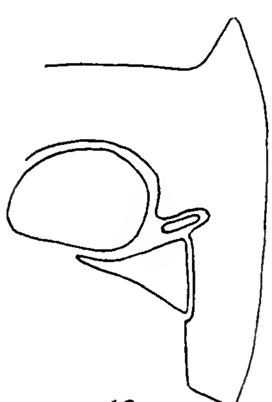

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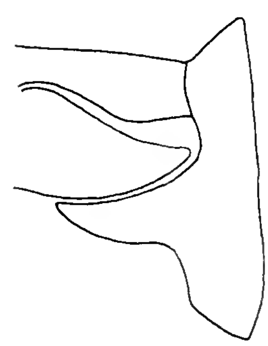

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FIGURES 8-13. 8—*Eumalus nigrellus* (LeConte), dorsal view. 9—*Megarthrus pictus* Motschoulsky, dorsal view. 10—*Pseudopsis obliterata* LeConte, dorsal view. 11—*Hyponygrus emmesus* (Gravenhorst), prothorax, ventral view, A. neck plate, B. prosternum, C. hypomeron, D. coxa. 12—*Olisthaerus substriatus* Gyllenhal, half of prothorax, ventral view. 13—*Tachinus fimbriatus* Gravenhorst, half of prothorax, ventral view.

19. Small sclerite (neck plate) present at anterior margin of prosternum (fig. 11)---- --XANTHOLININAE
Neck plate absent -- 20
20. Last segment of maxillary palpus less than one-half as long as penultimate, usually little longer than width of penultimate, usually subulate or papiliform---------- 21
Last segment of maxillary palpus at least one-half as long as penultimate, subulate only in Heterothops-- 22
21. Antennal fossae closer to mandibular fossae than to each other-----------PAEDERINAE
Antennal fossae about as close to each other as to mandibular fossae--------DIOCHINAE
22. Anterior angles of pronotum produced anteriorly beyond anterior lateral angles of prosternum; margin of pronotum apparently single, hypomera not or incompletely margined along inner side---QUEDIINAE
Anterior angles of pronotum not so produced; margin of pronotum double, hypomera completely margined along inner side--------------------------------- 23
23. Lateral marginal lines of pronotum separate throughout--------------XANTHOPYGINAE
Lateral marginal lines of pronotum united behind anterior angles--------------- 24
24. Antennal fossae closer to eyes than to each other------------------STAPHYLININAE
Antennal fossae closer to each other than to eyes----------------PLATYPROSOPINAE
25. Antennae with third through eleventh segments filamentous-------------------- 26
Antennae not filamentous-- 27
26. Anterior tarsi very slender-------------------------------------HABROCERINAE
Anterior tarsi broadly dilated------------------------------------TRICHOPHYINAE
27. Elytral epipleura delimited by a carina---------------------------------- 28
Elytral epipleura not delimited by a carina-----------------------PHLOEOCHARINAE
28. Prosternal epimera delimited by a distinct suture (fig. 12)------------OLISTHAERINAE
Prosternal epimera fused to hypomera without a suture (fig. 13)--------TACHYPORINAE

Discussion of Subfamilies

Although keys are very useful tools for identification, because of their structure they cannot always indicate that certain characters are unique within a group. For this reason and because many of the subfamilies in the above key have a status different from recent usage, a short discussion of each subfamily follows.

Steninae. Two genera, one very large, are included in this subfamily. The species, rather monotonously similar in appearance, are easily recognized by the large eyes and rough sculpture.

Aleocharinae. This subfamily contains at least two-fifths of all the species in the family. This group, much in need of study, is very difficult. There are a large number of poorly defined genera, some of which contain hundreds of described species. The character of placement of the antennal fossae, as stated in couplet one, used to separate this subfamily and Steninae from the other staphylinids, is not entirely satisfactory. In many forms the fossae are situated fairly near the front margin, but are usually removed by at least the diameter of the fossae. The subulate fourth segment of the maxillary palpi, although not unique in the family, will aid in recognition of members of this group.

Micropeplinae. Members of the Micropeplinae can be distinguished from all other staphylinids by their nine-segmented antennae and by the fact that the undersurface of the head and pronotum is grooved for the reception of these organs. The posterior coxae are well separated, a character shared only with the Steninae. There are two genera with few species.

This group has at various times been ranked as a separate family. Its members, however, appear to be more closely allied to the Staphylinidae than to any other family. This is particularly evident in their strongly chitinized abdominal tergites. Unless it can be demonstrated that their nearest relatives are other than the staphylinids, it seems better to retain them as a subfamily than to create a separate family merely because of their somewhat aberrant nature.

Oxyporinae. The large, semilunar segment of the labial palpi is unique in the family. The few species of the single Nearctic genus are found on fungus.

Omaliinae. Members of the Omaliinae and those of the Leptotyphlinae are the only staphylinids with a pair of pale mounds on the surface of the head. These mounds have generally been called *ocelli.* Coiffait, 1959, demonstrated that these structures are not true ocelli and proposed the name *frontal calluses* for them. The subfamily is large, with many genera requiring close observation for their identification.

Leptotyphlinae. These minute, slender, pale insects are found in the soil. Many species are known from Europe, but it was not until 1959 that Coiffait described *Neoleptotyphlus californicus* from the redwood forest of the California coast. Several other species are now being studied by him.

Oxytelinae. This, one of the larger subfamilies, is unique in the presence of a complete second sternite. In a few species this sternite is sometimes rudimentary.

Megalopsidiinae. This is a small subfamily whose members can easily be recognized by their enormous eyes and shining integuments. The processes of the labrum readily separate them from other staphylinids.

Hypocyphtinae. There are only two genera with a total of five known species in North America. These were formerly placed with the Tachyporinae because of their fusiform bodies, but have been removed on account of their ten-segmented antennae, a character found elsewhere in this family only in a few of the aleocharinds.

Pinophilinae. This group has usually been treated as a tribe of the Paederinae, which subfamily, as so constituted, was impossible to define. The Pinophilinae is a fairly large, homogeneous group. The character used in the key concerning the shape of the last segment of the maxillary palpi, although consistent, is not always pronounced. Only a few species of this predominantly tropical group enter the Nearctic region.

Lispininae. Because of their small anterior coxae and often depressed form, members of this subfamily have usually been associated with the Piestinae. Blackwelder, 1942, treated them as a tribe of the Osoriinae because of their unmargined abdomens. The above characters are partly adaptive and seem in this case to be adaptations to a subcortical habitat. The unmargined abdomen has evolved in varying degrees in many staphylinids as a modification useful in a number of different environments. Because the Lispininae and Osoriinae seem not to be closely allied, I have treated each as a separate subfamily. Members of the Lispininae are easily known by the combination of their small anterior coxae and unmargined abdomens. There are only six known Nearctic genera, with relatively few species included in each.

Osoriinae. Members of this subfamily are easily recognized by their large, exserted anterior coxae and unmargined abdomens. They are usually cylindrical in form. Only a few Nearctic species are known from the three genera represented in this region.

Piestinae. Most students have included in this group all staphylinids with small anterior coxae. Blackwelder, 1942, reduced the size of the subfamily by removing those species in which the abdomen lacks paratergites. Moore, 1963, added *Zalobius* and *Asemobius,* and presented a new key to the Nearctic genera. Like the Lispininae and Osoriinae, this is largely a tropical group with few Nearctic species.

Trichopseniinae. The large plate which covers part of the femur is unique in this subfamily. The two Nearctic genera have only seven species assigned to them.

Pteroniinae, NEW NAME. This is the subfamily previously called Proteininae. Blackwelder, 1952, stated that "the removal of the name *Proteinus* to the Nitidulidae because of hitherto unrecognized type fixation leaves the genus formerly known as *Proteinus* without a name." He gave it the name *Pteronius*. If this name is to be accepted, the subfamily name must be Pteroniinae. Blackwelder's usage has not been followed by all subsequent students, some of whom continue to use Proteininae. As I am unable to find any statement of the reasons for rejecting the name *Pteronius,* I am retaining it.

The few species of the two genera included in this subfamily resemble some of the Omaliinae, but can be distinguished by the lack of frontal calluses and by their very transverse anterior coxae.

Euaesthetinae. As in the preceding subfamily, these small insects possess no single character for their easy recognition. The tarsi are four-segmented in the few Nearctic species, and the eyes are at the base of the head.

Pseudopsinae. This subfamily contains the single genus *Pseudopsis*. The four Nearctic species are very generalized in form, having few morphological characters to distinguish them. However, the combination of the strong diagonal impressions of the tergites and the longitudinally carinate pronotum and elytra will readily separate them from other Nearctic staphylinids.

Xantholininae. This group has usually been treated as a tribe of the Staphylininae, adding greatly to the heterogeneity of that subfamily. As constituted here, it contains only those species with the distinctive neck plates anterior to the prosternum. No other staphylinid has this sclerite. In members of this group, the antennae are always inserted close together at the front margin of the head. The body is long, slender, loosely articulated, and the elytra usually overlapping at the suture. From this group, I have removed *Diochus* and *Ophioomma* to the new subfamily Diochinae and *Platyprosopus* to the new subfamily Platyprosopinae.

Paederinae. This is one of the larger subfamilies, with numerous well-characterized genera. All the species have the terminal segment of the maxillary palpi less than one-half as long as the penultimate segment and usually either subulate or papillose.

Diochinae Moore, NEW SUBFAMILY. This subfamily is based on the genus *Diochus*. It has usually been placed in the Xanthtolininae because of the rather approximate antennae and because the area ahead of the prosternum shows some chitinization. However, the chitinization of the neck region in no way resembles the sclerite called the neck plate, which is so characteristic of the Xantholininae. Some authors have placed this genus in the Staphylininae, where it seems to be equally out of place. It destroys the homogeneity of either of these groups. The terminal segment of the maxillary palpi is subulate. The single Nearctic species is small and slender, resembling certain species of *Philonthus* in facies.

Judging from the rather inadequate description of *Ophioomma,* it belongs here.

Quediinae. This is a large group which has usually been considered a tribe of the Staphylininae. The pronotal disc is usually impunctate, except for a group of three punctures arranged in a small triangle on each side of the center line in front.

Xanthopyginae. Usually considered a tribe of the Staphylininae, this group can easily be recognized by the character given in the key. There are six Nearctic genera, each with a single species.

Staphylininae. This is the group which has usually been treated as the tribe Staphylinini. There are few Nearctic genera but many species. The group is relatively well known.

Platyprosopinae Moore, NEW SUBFAMILY. Several authors, commenting on the genus *Platysprosopus,* have mentioned that it seemed out of place in the Xantholinini. The only important character which members of this genus have in common with those of the Xantholininae is the approximate antennal fossae. A single species is known from Texas in this tropical genus, the only genus in the subfamily.

Habrocerinae. Members of the single genus *Habrocerus* resemble tachyporinids in facies, but differ as indicated in the key. There are few known species.

Trichophyinae. The few species are similar to *Habrocerus* in facies.

Phloeocharinae. The only known Nearctic representative of this subfamily is a single species of *Ecbletus* which has been found in California (in press). *Olisthaerus* has sometimes been included here, but in no way resembles members of this subfamily except that the species are equally generalized in structure.

Olisthaerinae. Two circumpolar species of *Olisthaerus* constitute this subfamily.

Tachyporinae. This is one of the larger subfamilies. The species are usually fusiform in shape, compact in build and are without a neck, the small head being often only partly visible from above.

NOTES OF PHYLOGENY

The above key is meant to be strictly an aid to identification. Some of its primary subdivisions appear to have little relation to phylogeny. Knowledge of the family has not yet reached a point where definite conclusions regarding phylogeny can be stated. However, some speculation is not out of place at present.

Renaud Paulian, 1941, suggested a major change in the classification of the Staphilinoidea, the result of a detailed study of the larvae of a large number of species. His suggestions have not been followed by subsequent students. Paulian split the group into two major subdivisions which he called the Staphylinomorphs and the Aleocharinomorphs. He called attention to the primitive nature of the Staphylinomorphs. Paulian presented the following key to the larvae of the two groups.

Galea of the maxilla present, movable, with the aspect of a segment; lacina reduced at the maximum to some localized bristles in the apical region of the stipes; cephalization accentuated, neck present, epicranial suture extremely long; chitinization of the prosternum well developed; gular sutures very long; ocelli assembled in a group at the base of the antennae; nasale present. Anal vesicles provided with numerous small terminal curved spines; maxillary palpi of four segments------ --STAPHYLINOMORPHS

Galea of maxilla absent or represented by a simple lobe bearing a fringe, single or double or triple, located in the apical region of the lacina which is always well developed; cephalization generally very feeble, neck absent, epicranial suture variably long; prosternal chitinization usually reduced; gular sutures almost always absent; ocelli of variable distribution. Anal vesicles generally without small curved spines, sometimes with four large curved spines. Maxillary palpi variable, of three or four segments. Labrum present or united to epicranium in a nasale-- --ALEOCHARINOMORPHS

I believe that, as applied to the Staphylinidae, this is a very important division and have so arranged the subfamilies. As the Staphylinomorphs are considered more primitive, they are placed first. Although this distinction appears to indicate very satisfactorily the relation of the Staphylinomorphs to other members of the family, it leaves in the Aleocharinomorphs a group of subfamilies which is diverse, the relationships between them not being expressed. Much more information is needed before these can be adequately grouped.

Suggested arrangement of the subfamilies

STAPHYLINOMORPHS

1. Staphylininae
2. Xanthopyginae
3. Quediinae
4. Diochinae
5. Platyprosopinae
6. Xantholininae
7. Paederinae
8. Pinophilinae

ALEOCHARINOMORPHS

9. Micropeplinae
10. Pseudopsinae
11. Piestinae
12. Lispininae
13. Osoriinae
14. Pteroniinae
15. Omaliinae
16. Oxytelinae
17. Oxyporinae
18. Megalopsidiinae
19. Euaesthetinae
20. Leptotyphlinae
21. Phloeocharinae
22. Olisthaerinae
23. Tachyporinae
24. Habrocerinae
25. Trichophyinae
26. Trichopseniinae
27. Hypocyphtinae
28. Steninae
29. Aleocharinae

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SOME LEAF-MINING CHRYSOMELIDS OF LANTANA (COLEOPTERA)

By N. L. H. KRAUSS[1]

The following observations were made on several species of the genera *Octotoma* and *Uroplata* (Uroplatini) mining leaves of *Lantana* species of the *camara* type during the past several years. The attractive West Indian shrub *Lantana camara* var. *aculeata* (L.) Moldenke is an important pest of ranch lands in Hawaii and other tropical countries. Several species of the miners were sent to Hawaii for release, and two of these, *Octotoma scabripennis* Guérin and *Uroplata girardi* Pic, are now established.

It seems likely that other species of Uroplatini will be found on *Lantana* spp. in tropical America.

Determinations of the insects discussed were made by specialists of the Entomology Research Division, U. S. Department of Agriculture. Propagation, testing and release in Hawaii were carried on by Q. C. Chock, C. J. Davis and other members of the staff of the Entomology Branch, State Department of Agriculture (formerly Board of Agriculture and Forestry).

Octotoma gundlachi Suffrian

A few adults were seen on *Lantana* leaves at the Bosque de Habana, Havana, Cuba, in April and May 1952, and larvae were observed mining the leaves in May. The adults feed on the leaves. The chalcid *Spilochalcis odontotae* Howard was reared from pupae (Krauss, 1953). In April 1953, 87 of the adult beetles were sent to Honolulu. In June 1956 several adults found on *Lantana* leaves at San Vicente, Viñales Valley, Cuba, were collected and forwarded to Honolulu. None of these were released. Patricia Vaurie (Vaurie, 1956) has published observations made in Cuba on this insect.

Octotoma sp. probably *plicatula* (Fabricius)

Adults of this species were seen on *Lantana* at Zamorano, Honduras, altitude about 2,400 ft., in September 1953. Fifty-seven were sent to Honolulu and three were released at Hookena, island of Hawaii, on May 10, 1954. It is not known to be established. Adults were seen on *Lantana* at Turrialba, Costa Rica, in September 1953, at Cartago, Costa Rica, in November 1953, at Veracruz, Mexico, in June 1955, and at Cordoba, Veracruz, Mexico, in September 1955. Larvae were observed in mines in *Lantana* leaves at Guatemala City, Guatemala, in August 1953 and at Chilpancingo, Guerrero, Mexico, in August 1955.

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[1] Entomological Branch, State Department of Agriculture, Honolulu, Hawaii.

Octotoma scabripennis Guérin

Most of my observations on this species were made at Cuernavaca, Morelos, Mexico, elevation 5,000 ft. The adults were numerous on *Lantana glandulosissima* Hayek leaves from June to September, larvae from July to August, and pupae in August and September. The flattened adults are about 7 mm. long, rugose and black in color, with a brownish tinge to the upper surface of the thorax. Larvae are flattened and whitish or yellowish in color, and the pupae in the mines are yellowish. There are sometimes two or three mines in a single leaf. The adults feed on the upper surfaces of the leaves, leaving characteristic scars. This insect was also found on *Lantana* at Veracruz and Cordoba in the State of Veracruz, at Revolcadero in Guerrero, and at Oaxaca and Mitla in Oaxaca. *Octotoma* sp., probably *scabripennis,* was observed at San Salvador, Santa Tecla, and Santa Ana, El Salvador on the same plant. In August 1955 I found larvae, pupae and adults on *Lippia umbellata* Cav. (Verbenaceae) at Cuernavaca, Mexico. The parasites *Spilochalcis* sp. (Chalcidae) and *Calliephialtes* sp. (Ichneumonidae) were reared from larvae in Mexico in 1955.

The first shipment of *Octotoma scabripennis* (adults and larvae) were sent to Honolulu from Cuernavaca, Mexico, by John Mann, Entomologist of the Queensland, Australia, Department of Public Lands, and the writer in July and August 1953, and Mann sent additional material in September. The writer sent further shipments from Cordoba, Mexico, in May and June 1955, and from Cuernavaca in July 1955, August and September 1955 (many larvae, pupae and adults), June and July 1959 (many adults), and August 1959 (many larvae, pupae and a few adults). The first release was made at Kunia, Oahu, in November 1953 and further releases were made on Oahu, Hawaii, Kauai, and Molokai later. The insect was not found established until August 1963, when it was observed at White Sands, Kona, island of Hawaii. It has not yet been found on the other islands.

Uroplata fulvopustulata (Baly)

Larvae in leaf mines on *Lantana* and adults on the leaves were collected at Summit, Panama Canal Zone, in June and July 1953. The braconid *Bracon* sp. was reared from larvae in July. In December 1953 larvae, pupae, and adults were found at Gamboa, Summit, and Pedro Miguel in the Canal Zone, and at Nata and Pedregal in the Republic of Panama. Many were found in a small plant growing in partial shade at Gamboa. Adults were noted on plants at Summit, C.Z., in November 1961, a larva in a mine at São Paulo, Brazil, in March 1954, and a number of adults on *Lantana* leaves at Revolcadero, Guerrero, Mexico, in July 1959. Larvae and adults of *Uroplata* sp., probably *fulvopustulata,* were seen on plants at São Paulo, Brazil in April 1961. Adults, larvae, and pupae were sent to Honolulu from the Canal Zone and Panama in December 1953; adults from Revolcadero, Mexico, in July 1959; and larvae, pupae and adults (of *U.* sp. probably *fulvopustulata*) from São Paulo in April 1961; but none of these shipments was released. This species is known from Mexico, Guatemala, Costa Rica, Panama, Venezuela, and Brazil.

Uroplata girardi Pic

This is a species recorded from Brazil, Paraguay, and Argentina. I found it at Vitoria, Espirito Santo, Brazil, in July 1961. Larvae and pupae in mines in the leaves and adults on the leaves of *Lantana* were found mostly on plants in shaded areas. The eulophid parasite *Dicladocerus* sp. was reared from larvae. One lot of adults and immature stages of the beetle was sent to Honolulu. Releases were made in Lawai Valley and Grove Farm, Kauai, beginning in December 1961. The beetle is well established now in Lawai Valley. A larva was found in a mine at Recife, Pernambuco, Brazil, in October 1961. *Uroplata* sp., probably *girardi,* was observed at Asuncion, Paraguay, in July 1961; there were larvae and pupae in mines and adults on the leaves.

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LITERATURE NOTICE

THE GENUS BARIS GERMAR IN CALIFORNIA (COLEOPTERA, CURCULIONIDAE). By Edward E. Gilbert. Univ. Calif. Publ. Ent. 34:1-153, illus. 1964.—This treatment of the stem borers has sections on morphology, biology, distribution, and systematics. Host preferences are discussed at length. Thirteen California species are described, illustrated, and keyed in the adult, pupal, and larval stages when available.

B-P-HYDROXYPHENYLETHYLAMINE - HYDROCHLORIDE ON TROX SP. (COLEOPTERA: SCARABAEIDAE)

By Ross H. Arnett, Jr.[1]

The enzyme, Tyrosinase, has been implicated in the darkening and hardening of the insect cuticle (Pryor, 1940). This enzyme is known to catalyze the oxidation of the amino-acid Tyrosine to 3, 4-dihydroxyphenylalanine. Pryor, Russell, and Todd (1946) reported upon the occurrence of Protacatechine 3, 4-diphydroxyphenylacetic and 3, 4-dihydroxyphenyllactic acids in insects. The substances are derivable from 3, 4-dihydroxyphenylalanine, as is also Melanin.

Another pathway of 3, 4-dihydroxyphenylalanine metabolism is catalyzed by the enzyme 3, 4-dihydroxyphenylalanine decarboxylase, which has hitherto been reported only in animal tissues (Holtz and Credner, 1952). This leads to the formation of 3, 4-dihydroxyphenlethylamine or Hydroxytyrosine. This latter reaction could conceivably take place in the insects, if the 3, 4-dihydroxyphenylalanine decarboxylase were found to be present.

During the course of some studies on beetles associated with carrion, it was noted that a number of these beetles had small hexagonal white crystals firmly imbedded in the rough sculpturing of the elytra. They were particularly noticeable on the elytra of several specimens of *Trox* sp. These beetles feed on the dried skin of decayed animals, and because of their habits they are normally covered with sand, mud, and particles of organic material dried onto their bodies. Upon washing in hot water, a practice often necessary before identification, these specimens did not lose the crystals from their elytra. When examined more closely under a binocular microscope it was observed that the crystals were imbedded in the surface of the elytra. The only explanation of their presence is that they must have appeared there while the elytra were still soft.

Several other collections of beetles of this genus were examined and similar but fewer crystals were observed on their elytra. Of the 20 specimens collected, 14 had crystals imbedded in their elytra, from 10 to 20 crystals per beetle.

A few simple biochemical tests were performed, using a hot stage microscope, and the crystals were identified as B-p-hydroxyphenylethylamine-hydrochloride. The difficulty of working with such a small quantity and the lack of any of this substance in pure form to try a mixed melting point test introduces several possibilities of error. However, considering the tests run and the physical properties of the crystals, and also the fact that this substance is known to be an animal product (generally associated with decay, however), it seems reasonable to conclude that these crystals were correctly identified.

[1] Department of Biology, The Catholic University of America, Washington, D. C.

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1952. Arch Expl. Path. Pharmakol 199: 145.

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UNUSUAL HOST RECORDS FOR GYMNAETRON PASCUORUM, HEXARTHRUM ULKEI, CHALCODERMUS AENEUS, AND HYPERA NIGRIROSTRIS (COLEOPTERA: CURCULIONIDAE).

Adults of *Gymnaetron pascuorum* (Gyllenhal) were found on the bark of *Picea pungens,* at Portland, Oregon, in 1960, by R. Witt, and adults were reared from the spikes of *Plantago lanceolata,* at 3 miles east of Aumsville, Oregon, in 1963, by E. A. Dickason. *G. pascuorum* is a European species introduced into the United States and is most commonly found in the eastern states breeding in *Plantago lanceolata.* I have also identified this weevil from tunnels of the "dogwood borer," *Thamnosphecia scitula* (Harris) (Lepidoptera: Aegeriidae), from McMinn Co., Tennessee, in 1962. *G. pascuorum* was previously reported as being associated with *Tenodera* sp. eggs (Orthoptera: Mantidae) by Gurney (1959, Proc. Ent. Soc. Washington 61:24).

Many larvae of *Chalcodermus aeneus* Boheman were found feeding in carrot tubers, and adults were found in a field adjacent to a field of carrots in Weslaco, Texas, in March 1961. *C. aeneus,* known as the 'cowpea curculio,' breeds in the pods of cowpeas and related legumes. The specimens were received from the Campbell Soup Research Farm, Riverton, New Jersey.

Hypera nigrirostris (F.), commonly known as the 'lesser clover leaf weevil,' was collected in Addison Co., Vermont, on birds-foot trefoil. Birds-foot trefoil, a legume belonging to the genus *Lotus,* is being grown in the New England states as a forage crop. The beetles were sent by the University of Vermont, and the accompanying letter stated that a 25-acre field was destroyed.

Hexarthrum ulkei Horn was found feeding in laminated shelves in a shoe store in Ahoskie, North Carolina, on Sept. 4, 1959. *H. ulkei* is usually found in old dry flooring, timbers, and beams. The specimens were received from D. L. Wray, Raleigh, North Carolina.—ROSE ELLA WARNER, *Ent. Res. Div., A.R.S., U. S. Department of Agriculture, Washington, D. C.*

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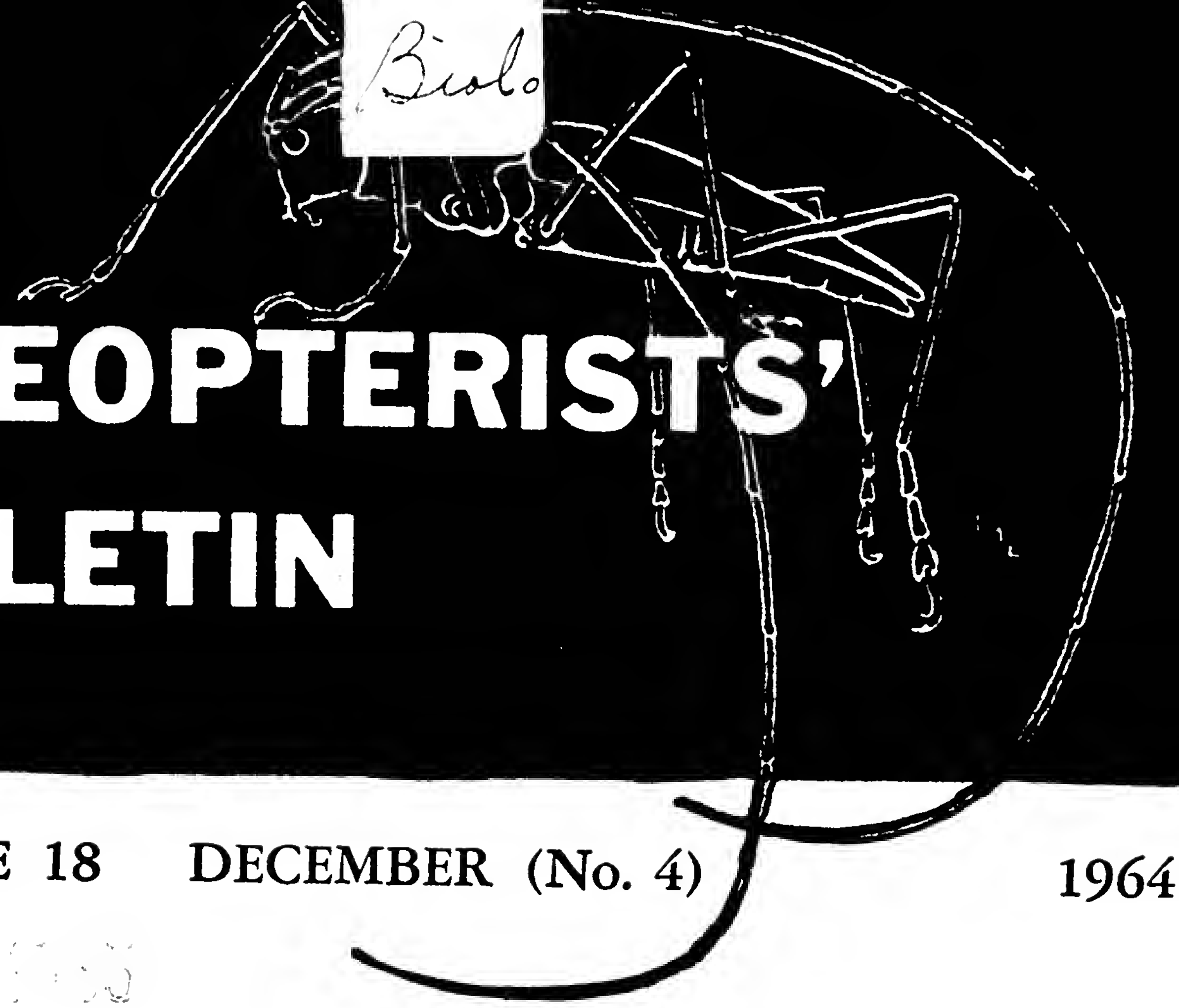

VOLUME 18 DECEMBER (No. 4) 1964

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A Quarterly Publication Devoted to the Study of Beetles

THE COLEOPTERISTS' BULLETIN

Founded 1947 by Ross H. Arnett, Jr.

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A QUARTERLY PUBLICATION DEVOTED TO THE STUDY OF BEETLES

The Coleopterists' Bulletin

Volume 18 December (No. 4) 1964

TWO NEW SPECIES OF BEROSUS FROM THE SOUTHEASTERN UNITED STATES (COLEOPTERA: HYDROPHILIDAE)

By DAVID P. WOOLDRIDGE[1]

The two species of *Berosus* described in this paper are from the collection of Dr. Frank N. Young of the Indiana University Department of Zoology. The specimens had been in his possession for some time, and he was gracious enough to give me all of his undetermined material when he learned of my interest in *Berosus*. Therefore, it is with pleasure that I name the first species below in his honor.

Berosus youngi Wooldridge, NEW SPECIES (FIGS. 1-3)

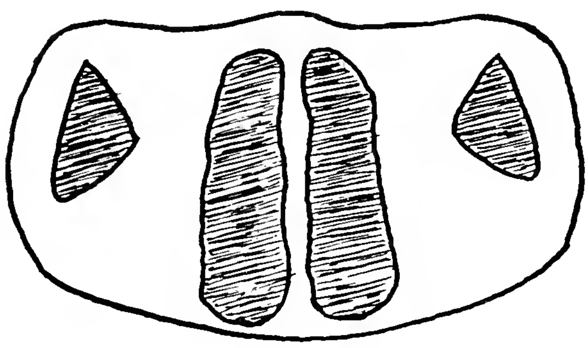
The presence of a more or less triangular black spot on each side of the pronotum, about two-thirds of the distance from the midline toward the margin, will readily separate this species from all other *Berosus* found in the Eastern United States.

HOLOTYPE: Florida, Broward County, canal near Davie, Frank N. Young, ix.9.1950. To be deposited in the University of Michigan Museum of Zoology.

DESCRIPTION OF HOLOTYPE—Male. Length 4.0 mm.; width 2.1 mm. *Head:* Shiny black, with a faint metallic blue luster, bronzed slightly around the eyes; moderately closely, but evenly, punctate, except much more coarsely so around the eyes. Labrum shiny black, except testaceous at the center of the anterior margin; punctation of labrum very variable in size and almost confluent, each puncture with a short golden hair, the very fine hairs most noticeable along the anterior margin. Antennae and palpi yellowish. *Pronotum:* Dark yellowish-brown with black markings as follows: An elongate longitudinal vitta on each side of the middle, leaving a narrow, pale region between; a triangular black spot 2/3 of the distance from the midline toward the margin on each side, situated with the base of the triangle parallel to the margin and with the apex pointing toward the disk (figure 1). Moderately coarsely punctate, the punctures not particularly close; less coarsely punctate than the head except for several series of very coarse punctures. The disk faintly alutaceous, more so toward the side margins. *Scutellum:* Black, shining; middle closely, coarsely punctate with margins alutaceous. *Elytra:* Dark yellowish-brown with striae and punctures piceous; strial punctures close and deep on the disk, separated by about the diameter of a puncture, striae slightly impressed between punctures on the disk, becoming more deeply impressed on the declivity; lateral striae becoming less impressed. Intervals

[1] Department of Zoology, Southern Illinois University, Alton, Illinois.

coarsely punctate, punctures arranged more or less in rows, but somewhat irregular. Elytral maculations piceous, located as follows. Three in a diagonal series from the humerus to just before the middle: one on the humerus, one on the 5th interval, and a somewhat geminate spot on the 2nd and 3rd interval with the spot on the 2nd being very weak. A transverse series of faint spots just behind the middle: one at the margin, one on the 4th and 5th interval with a faint streak on the 6th, and one on the 2nd interval, the last being a little farther back than the other two. A geminate spot about half-way between these three and the apex, followed by another spot just before the apex, these last two spots on the 4th and 5th intervals. Each elytron is also piceous at the apex. *Ventral surface:* Piceous. Legs yellowish; basal half of profemora granular on both sides, granulation extending about 2/3 of the way from base to apex; meso- and metafemora with granulation somewhat more extended ventrally, but dorsally mostly smooth except for narrow bands crossing each diagonally. Basal segments of protarsi only moderately dilated, the first with a dense brush of hairs on the distal 2/3, 2nd and 3rd segments each with a few hairs. First abdominal sternite with a median carina extending 1/3 to 1/2 way across its width. Emargination of the 5th abdominal sternite with two small, fine, close teeth which are somewhat concealed by a low crest projecting under them. *Aedeagus:* Seen dorsally, the parameres are individually rather pointed, but together, the points come together to form a somewhat rounded tip. The sides of the parameres are sinuate and slightly flared before the extremity; the penis is rather broad and abruptly pointed (figure 2). In side view, the parameres slope smoothly and gently to the tips (figure 3).



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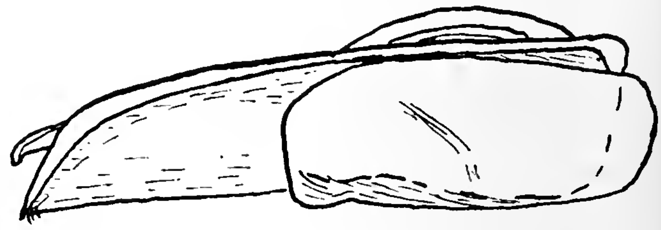

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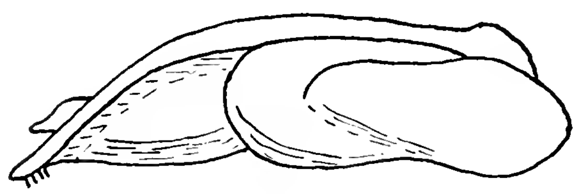

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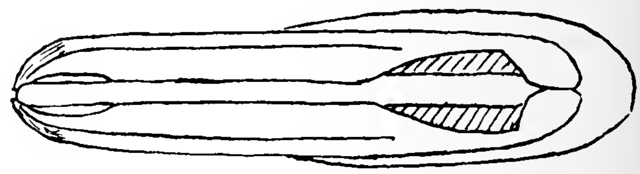

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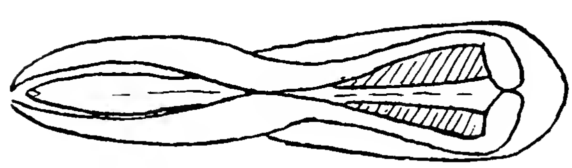

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FIGURES 1-3, *Berosus youngi,* new species. 1—pronotum. 2—aedeagus, lateral view. 3—aedeagus, dorsal view.

FIGURES 4-5, *Berosus corrini,* new species. 4-aedeagus, lateral view. 5—aedeagus, dorsal view.

ALLOTYPE: Same locality data as holotype. Female. Length 3.9 mm.; width 2.1 mm. Similar to male except as follows. Head, pronotum and scutellum more strongly alutaceous. Protarsi simple; granulation on legs more nearly reaching apex of femora than on male, at least on the ventral surface. Teeth in the emargination of the 5th sternite more widely separated and more distinct; no crest below them.

PARATYPES: 4 ♂, 9 ♀, same data as holotype and allotype. Additional paratypes are designated as follows. FLORIDA. 3 ♂, 8 ♀, Alachua Co., Lake Lochloosa (pond), ii.3.1937, F. N. Young; 1 ♀, Alachua Co., flatwoods near Lake Lochloosa, ii.3.1937, C. J. Goin and F. N. Young; 1 ♂, Franklin Co., roadside ditch near St. Teresa, vi.5.1938, F. N. Young; 1 ♂, Glades Co., roadside ditch near Palmdale, v.25.1946, F. N. Young; 1 ♂, Levy Co., cypress pond near Lennon, iv.9.1937, F. N. Young; GEORGIA. 1 ♂, 1 ♀, Clinch Co., ditch 2 mi. W. of Homerville, x.28.1938, F. N. Young and H. H. Hobbs.

VARIATION: Length 3.6-4.1 mm. The degree of metallic lustre on the head varies greatly from one specimen to another. The maculations of the elytra and pronotum vary in darkness and extent. The pronotal maculations, particularly the lateral ones, are occasionally piceous rather than black. All punctation is exceeding variable in coarseness, as is the degree and extent of the alutaceous sculpture in both sexes.

LARVA: Unknown.

DISTRIBUTION: Known only from Florida and Southern Georgia.

Berosus corrini Wooldridge, NEW SPECIES (Figs. 4-5)

The highly polished male pronotum, the polished elytra of both sexes, the barely impressed discal striae, and the light general punctation will usually separate this species from closely related forms. The shape of the male genitalia is also distinctive.

HOLOTYPE. GEORGIA, Clinch County, near Homersville, H. H. Hobbs and F. N. Young, x.28.1938. To be deposited in the University of Michigan Museum of Zoology.

Description of Holotype. Male. Length 5.0 mm., width 2.4 mm. *Head:* Shiny black, very faintly bronzed. Moderately coarsely punctate, punctures distinct, except around eyes much more coarse and nearly confluent. Labrum shiny black with slight bronzing, covered with a vestiture of readily visible but very fine hairs. Antennae and palpi yellowish, last segment of palpi darker at tip. *Pronotum:* Testaceous, except for a narrow longitudinal black vitta on each side of the middle, the two vittae separated by a nearly impunctate region. The remainder of the pronotum punctate, the punctures shallow and well separated on the disk, becoming deeper and closer toward the lateral edges; nearly confluent at margins. *Scutellum:* Shiny black; closely, coarsely punctate in middle with fairly wide, impunctate margins. *Elytra:* Dark testaceous with striae and punctures faintly piceous to undifferentiated in color. Discal striae, especially the incomplete 2nd stria, composed of a series of well separated but slightly elongate punctures; punctures becoming closer on declivity. Striae impressed laterally and past declivity, but barely or not at all on the disk. Most lateral punctures not elongate; well separated, frequently by more than the diameter of a puncture. Interstrial punctures less deeply impressed and more widely separated. Elytral maculations piceous but very faint, consisting of obscure streaks of indefinite size; only the humeral spot, the marginal spot just past the middle, and the spot on intervals 4 and 5 at the level of the marginal spot are distinct. *Ventral surface:* Piceous. Legs yellowish; femora granular ventrally as follows: Profemora, from basal 1/5 of front margin to middle of hind margin; mesofemora, entire basal half; metafemora, basal 5/8. Dorsal granulation of femora reduced to narrow transverse bands on meso- and metafemora. Protarsi with basal segments moderately dilated and with a ventral pad of hairs on the 1st and 2nd segments; 3rd segment with only a few hairs. First visible abdominal sternite with a median carina extending across half its width. Last abdominal sternite with a median emargination in the center of which are two small teeth which are well separated. Projecting below the teeth is a small low crest which only partially conceals them. *Aedeagus:* Seen dorsally, the parameres together are evenly rounded at the apex, and more or less parallel-sides along their entire length (figure 4). In side view, the apex of the paramere barely projects beyond the tip (figure 5). The penis is slender and somewhat sinuate.

ALLOTYPE: Same locality data as holotype. Female. Length 5.2 mm., width 2.5 mm. Similar to male, but with the pronotum faintly alutaceous, especially at sides. Head also alutaceous. Emargination of 5th abdominal sternite without a projecting median ridge. Granulation of femora on all legs reaching farther distally than in a male, especially on the dorsal surfaces.

PARATYPES: All collected by F. N. Young, except as noted. FLORIDA: 17 ♂, 10 ♀, Alachua Co., Lake Lochloosa, ii.3.1937; 1 ♂, Alachua Co., west of Gainesville, ii.14.1949; 2 ♂, Baker Co., Osceola Nat. Forest, v.12.1937; 1 ♂, 1 ♀, Broward Co., canal near Davie, xii.29.1938; 6 ♂, 9 ♀, Columbia Co., near Lulu, xii.30.1947; 2 ♂, 1 ♀, Dade Co., Miami, S. N. Brown and F. N. Young; 1 ♂, Jefferson Co., south of Lamont, iii.18.1939; 1 ♂, Liberty Co., south of Telogia, v.2.1941; 2 ♂, Union Co., near Dukes, xii.30.1947. GEORGIA: 14 ♂, 9 ♀, same data as holotype; 12 ♂, 4 ♀, Clinch Co., near Dupont, x.28.1938; 1 ♂, 2 ♀, Cook Co., 3 miles north of county line on U. S. 41, x.28.1938; 1 ♂, Lowndes Co., west of Naylor, x.28.1938; 2 ♂, Toombs Co., Altomaha River, viii.24.1959.

VARIATION: Length 4.4-5.6 mm. The major variations are in the elytral color and maculations. A few specimens show a light background with distinct maculations, while most are dark with obscure markings. In a few specimens the discal striae are more definitely impressed, but all specimens show places where the strial punctures are separated by flat surfaces.

LARVA: Unknown.

DISTRIBUTION: Known only from Florida and Southern Georgia.

The only readily available key for the *Berosus* of the Southeastern United States is that of Young (1954, pp. 197-198). The two species described here can be included in that key by substituting the following for couplet 6.

6(5). Pronotum with no markings other than a central dark spot or pair of dark spots-- 7

6. Pronotum with a triangular dark spot on each of the central spot or pair of spots; length 3.6-4.1 mm.--**YOUNGI** Wooldridge

7(6). Eytra and pronotum of female and pronotum of male distinctly microreticulate (alutaceous), not strongly shining; elytral striae not very deeply impressed on the disk; length variable, about 3.7 to 6.0 mm.------------------------**INFUSCATUS**

7. Elytra and pronotum of male and elytra of female without evident microreticulation, appearing very smooth and shining between the coarser punctures--------- 8

8(7). Elytral striae rather deeply impressed, especially on disk; length about 4.0 to 5.5 mm. ---**STRIATUS COMPLEX**

8. Elytral striae barely or not at all impressed on the disk, although strial punctures are often strong but always well separated; length 4.4 to 5.6 mm. **CORRINI** Wooldridge

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1954. The water beetles of Florida. Univ. Florida Stud., Biol. Sci. Ser., vol. 5, no. 1, pp. i-ix, 1-238, figs. 1-31.

LECTOTYPE DESIGNATIONS AND NEW SYNONYMY IN THE GENUS ATAENIUS (COLEOPTERA: SCARABAEIDAE)

By OSCAR L. CARTWRIGHT[1, 2]

Recently, through the courtesy and cooperation of Drs. E. B. Britton and A. M. Villiers, I had the privilege of studying type series of many species of *Ataenius* in the British Museum (Natural History), London, England, and in the Museum National d'Histoire Naturelle in Paris, France. In the course of this study I designated and labeled specimens of various species as lectotypes.

In the British Museum the following were chosen and labeled as lectotypes; all labels were printed except as noted; my notations are given in brackets:

Ataenius strigicauda Bates, 1887: 96. 6 labels: Type [orange circle]/Sp. figured/Cordova/Mexico. Salle Coll/Ataenius strigicauda [hand written]/B.C.A. Col.II.(2). Ataenius strigicauda, Bates/.

Ataenius jalapensis Bates, 1887: 100. 5 labels: Jalapa Mexico. Hoege/ jalapensis [hand written]/B.C.A. Col.II(2). Ataenius polyglyptus Bates/Type [red circle]/Ataenius abditus C.L.38 Horn/.

Ataenius polyglyptus Bates, 1887: 99. 4 labels: Type [orange circle]/ Dueñas, Guatemala. C. Champion/polyglyptus Bates [hand written]/ B.C.A. Coll.II(2). Ataenius polyglyptus, Bates/.

Ataenius intermedius Bates, 1887: 100. 4 labels: Type [orange circle]/ V. de Chiriqui, 25-4000 ft. Champion/ polyglyptus v. intermedius Bates [hand written]/B.C.A., Coll.II(2). Ataenius polyglyptus Bates/.

Ataenius hieronymi Bates, 1887: 100. 4 labels: Type [orange circle]/ S. Geronimo, Guatemala. Champion/ Ataenius hieronymi Bates [hand written]/B.A.C., Col.II(2). Ataenius polyglyptus, Bates/.

Ataenius mariarum Bates, 1887: 102. 4 labels: Type [orange circle]/ Tres Marias Is., W. Mexico, Forrer/Ataenius mariarium Bates [hand written]/B.C.A., Col.II(2). Ataenius [blank space]/.

Ataenius scalptifrons Bates, 1887: 100. 6 labels: Type [orange circle]/ sp. figured/Cordova/Mexico. Salle Coll./Ataenius scalptifrons Bates [hand written]/B.C.A. Col.II(2). Ataenius [blank space]/.

Ataenius euglyptus Bates, 1887: 97. 4 labels: Type [orange circle]/Las Vigas, Mexico. Hoege/Ataenius euglyptus Bates [hand written]/ B.C.A., Coll.II(2). Ataenius [blank space]/.

Ataenius limbatus Bates, 1887: 98. 4 labels: Type [orange circle]/Presidio, Mexico, Forrer./Ataenius limbatus Bates [hand written]/B.C.A., Col. II(2). Ataenius [blank space]/.

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[1] Smithsonian Institution, Washington, D. C.

[2] Financial assistance was provided by National Science Foundation. Grant No. GB-1434.

Ataenius cribrithorax Bates, 1887: 95. 6 labels: Type [red circle]/Cordova/Salle Coll./Ataenius cribrithorax Bates [hand written]/Ataenius cribrithorax keys apond Salle [hand written]/B.C.A., Col.II(2). Ataenius cribrithorax Bates./.

Ataenius setiger Bates, 1887: 98. 4 labels: Type [orange circle]/Chilpancingo, Guerrero, Hoege./Ataenius setiger Bates [hand written]/B.C.A., Col.II(2). Ataenius [blank space]/.

Ataenius liogaster Bates, 1887: 94. 2 labels: Paso Antonio, 400 ft. Champion/B.C.A., Col.II(2). Ataenius liogaster Bates/.

Aphodius pacificus Sharp, 1879: 90. 3 labels, including data on card bearing 2 specimens [left hand specimen chosen as the lectotype]: Aphodius pacificus Sharp. Types D.S. Honolulu, Blackburn/Type [orange-red circle]/Sharp Coll. 1905-313/.

In the Paris Museum the following were chosen and labeled as lectotypes:

Ataenius castaniellus Bates, 1887: 95. 2 labels: Zapote, Guatemala, C. Champion/Ataenius castaneellus Bates [hand written—the spelling appears to be "ee" or "ae," no "i" with a dot]/.

Oxyomus striatocrenatus Fairmaire, 1889: 14. 4 labels: Museum Paris, Mou-pin, A. David 1870/980 [folded yellow circle]/ Ataenius striatocrenat Fairm. [hand written]/Oxyomus striatocrenatus Frm. [hand written]/.

A. Schmidt, 1922: 431, placed *striatocrenatus* Fairmaire in the genus *Ataenius;* however, because the mandibles are visible beyond the clypeus, this very large species from the interior of China should be placed in *Aegialia* or a genus near it. It is not an *Ataenius.*

Psammodius alleonis Fairmaire, 1875: 193. 3 labels: Euria Alleon [hand written—abbreviated or illegible—type locality given in original description is "environs de Constantinople"]/Museum Paris, 1906, Coll. Leon Fairmaire/Psammodius Alleonis Fairm. n.sp. Ann. 1875 [hand written]/.

I had hoped also to designate lectotypes for the Harold species of *Ataenius* in the Paris Museum but found only part of his species and many of these were without locality labels. Apparently M. Oberthur had broken up the Harold collection and distributed the specimens in various places in his own collection. Those that I found were scattered among other *Ataenius* species in three places in his collection: among his own Aphodiinae, among the Bates *Ataenius* there, and a few in a box of Melolonthinae. The other Harold specimens probably are elsewhere in the Oberthur collection but I failed to find them.

The specimens identifiable as Harold specimens usually carry a small line-bordered printed label—"Ex Musaeo E. Harold." I consider those specimens bearing Harold's handwritten determination labels as true representatives of his species. Even though some of these have no locality labels, I believe we can do no better than to accept them with the status of lectotypes. With a single exception, the following Harold species of *Ataenius* were identified by Harold determination labels: *simulator, capitosus, opatrinus, intiger, opacus, picinus, scutellaris, laborator, punctipenis, arenosus, crenatus, attenuator, complicatus, columbicus, sculptor, horni, sordidus,* and *figurator*. The last named does not bear a determination label but it is from Musaeo E. Harold and is labeled "Louisiana," the type locality of *figurator*.

In my study of types of *Ataenius* I found the following interesting synonymy for two species of unusually wide distribution.

Ataenius simulator Harold, 1868: 85.
Psammodius schwarzi Linell, 1896: 721. (NEW SYNONYMY.)

Diagnostic characters: very distinct, coarse transverse granules covering the clypeus; a few very coarse punctures near posterior angle and base of pronotum; middle and hind femora without posterior marginal lines.

Ataenius simulator Harold was described from Mendoza, Argentina, and *schwarzi* (Linell) from Jacksonville, Florida. I have seen North American specimens from the states of Virginia, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, and Louisiana. South American specimens were examined from Argentina, Chile, Uruguay, Bolivia, and Brazil. A small series from Windsor, New South Wales, Australia was seen.

Ataenius simulator Harold is rarely if ever a dung feeder and though the adults are exceedingly common at times, the larvae are rarely found. They are sometimes attracted to lights in such numbers as to bring complaints and requests for control. An irate citizen once sent me a cupful of specimens taken in a country church near Anderson, South Carolina, with the statement thtat they had entered the church through open windows and simply rained down over the congregation. I received a similar lot from Goldsboro, North Carolina. At Blackville, South Carolina, June 4, 1938, more than 275,000 were collected in a trap light during one night. The estimate was made by weighing the entire lot, then weighing and counting a smaller part of the catch. The species is apparently spreading westward and northward from southeastern United States.

Ataenius picinus Harold, 1867:281.
Ataenius duplopunctatus Lea, 1923:6. (NEW SYNONYMY)
Ataenius salutator Fall, 1930:99. (NEW SYNONYMY)
Ataenius queirosii Paulian, 1934:219. (NEW SYNONYMY)
Ataenius darlingtoni Hinton, 1937:179. (NEW SYNONYMY)
Ataenius boucomontii Paulian, 1937:41. (NEW SYNONYMY)

Diagnostic characters: crenate fimbriate lateral pronotal margins; finely densely punctate ninth elytral intervals; posterior tibial fringe invariably a group of four fimbriae.

I have examined holotype or cotype of all of the synonyms listed. *Ataenius picinus* Harold was described from Chile, *A. duplopunctatus* Lea from western Australia, *A. salutator* Fall from Florida, *A. queirosii* Paulian from New Hebrides, *A. darlingtoni* Hinton from Puerto Rico, and *A. boucomonti* Paulian from Australia.

I have seen specimens of *picinus* Harold from the United States from South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. It occurs in the West Indies, in Cuba, Jamaica, Hispaniola, Puerto Rico, Virgin Islands, Antigua, Guadaloupe, and Grenada. South American specimens from Brazil, Bolivia, Paraguay, Uruguay, Argentina, and Chile have been examined. I have seen it also from Australia, New Zealand, Fiji, New Caledonia, and New Hebrides.

Ataenius picinus Harold is a dung feeder. I have collected it in large numbers in suitable areas in fresh to day-old cow dung.

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THE GENUS NELTUMIUS (COLEOPTERA: BRUCHIDAE)

By JOHN M. KINGSOLVER[1]

The genus *Neltumius* was erected by Bridwell in 1946 for the species *Bruchus arizonensis* Schaeffer. Bridwell did not present a formal description of the genus and it is necessary to rely upon the characters used in the key to genera included in the paper. Bradley, also in 1946, transferred two more species, *Bruchus gibbothorax* Schaeffer and *Bruchus texanus* Schaeffer, to *Neltumius* and included a short generic description. No other species are known which can be referred to this genus. None of the included species have been illustrated heretofore.

Neltumius Bridwell

Neltumius Bridwell, 1946, Jour. Wash. Acad. Sci. 36(2):54; Bradley, 1946, Psyche 53:35.

Ground color black; vestiture of black, white, gray, and ochreous hairlike scales arranged in distinctive patterns. Head carinate, sparsely covered with hairs, punctation fine; eyes black or brown, deeply emarginate; antennae serrate, reaching base of elytra, similar in the two sexes. Prothorax strongly convex, gibbous; depressed antescutellar area marked with white; apex rounded; pleura concave, without lateral carina or margin, base markedly lobed in middle third, laterad of lobe sinuate; posterior angles acute. Elytra together slightly longer than wide; apices separately rounded with apical margin finely serrate, lateral margins straight or slightly arcuate; striae well-marked, deep strial punctures setose, teeth absent at bases of striae; humeri granulate or with fine transverse carina. Front coxae nearly contiguous at apices, separated basally by narrow triangular prosternum; middle coxae separated by rounded mesosternal plate, hind coxae nearly contiguous, each hind coxa about 1¼ times as wide as hind femur; each hind femur with shallowly sulcate ventral margin and with a small single tooth on inner margin of sulcus at apical fourth; apex of each hind tibia with 5 to 7 short teeth surrounding insertion of basitarsus, basitarsus 1½ times as long as remaining four segments; claws lobed at base. First abdominal sternite three times as long as second; second, third and fourth subequal; fifth slightly longer and shallowly emarginate in male but unmodified in female. Pygidium grayish with vague or bold darker markings, nearly vertical.

General discussion: Neltumius does not seem to be closely related to any of the other recognized species groupings in the New World. A broad study of world genera of Bruchidae may be necessary to elucidate the relationships of this genus. The structure of the hind femur indicates that it might be an offshoot of the Old World *Bruchidius* complex, but other characters need to be confirmed. Bradley thought that the species in *Neltumius* were probably close relatives of *Gibbobruchus mimus* (Say) because of the gibbous prothorax in *mimus;* but this relationship is remote because of the greatly swollen hind femora with several teeth and the broad, flat body shape of *mimus*. *Gibbobruchus* Pic embraces several species in the tropics and appears to be a close relative of *Specularius* Bridwell and *Caryedes* Hummel.

[1] Entomology Research Division, Agric. Res. Serv., U. S. Department of Agriculture, Washington, D. C.

The wing venation of *Neltumius* is of a fairly consistent type peculiar to most Bruchidae and does not indicate any primitive or specific characteristics.

The distribution of *Neltumius* is apparently restricted to the Sonoran Desert areas of the United States and probably includes parts of Mexico although records are lacking from that country.

Host plant records indicate a preference for species of *Prosopis,* the common and the screwbean mesquite, but further collections are needed. Mesquite is host to several species of Bruchidae. *Neltumius arizonenis* has been reared several times from *Prosopis juliflora* and *N. gibbothorax* from *P. odorata* (screwbean) by Mr. C. D. Johnson. Other records from other host plants may be merely those of adult feeding. More care is needed in recording the true host relationships.

Only two host records are known for *Neltumius texanus.* If they truly reflect the host relationships of this species, they indicate a radical departure from the habits of the other two species in the genus and indeed from known food habits of other Bruchidae. I suspect that the records for *texanus* may reflect only accidental hosts or adult feeding.

Key to the Species of Neltumius

1. Hind tibia uniformly gray. Dorsum of body mostly grayish-white with prominent patches of dark brown and ochreous setae. Single median gibbosity near anterior margin of prothorax. Prominent elongated white spot at middle of the third interval of elytra. Fine transverse carina on each humerus ---------- **GIBBOTHORAX** (Schaeffer)

   Hind tibia with brown band at middle of posterior margin. Dorsum with strongly contrasting dark brown and grayish elongated patches. Third interval with two or more elongated white patches separated by dark brown. Humerus carinate or granulate -- 2

2. Prothorax with prominent paired gibbosities separated by shallow median and transverse channels, posterior pair more prominent than anterior pair. Humerus with fine transverse carina ---------------------------------- **ARIZONENSIS** (Schaeffer)

   Prothorax with gibbosities and channel only slightly indicated. Humerus granulate -- **TEXANUS** (Schaeffer)

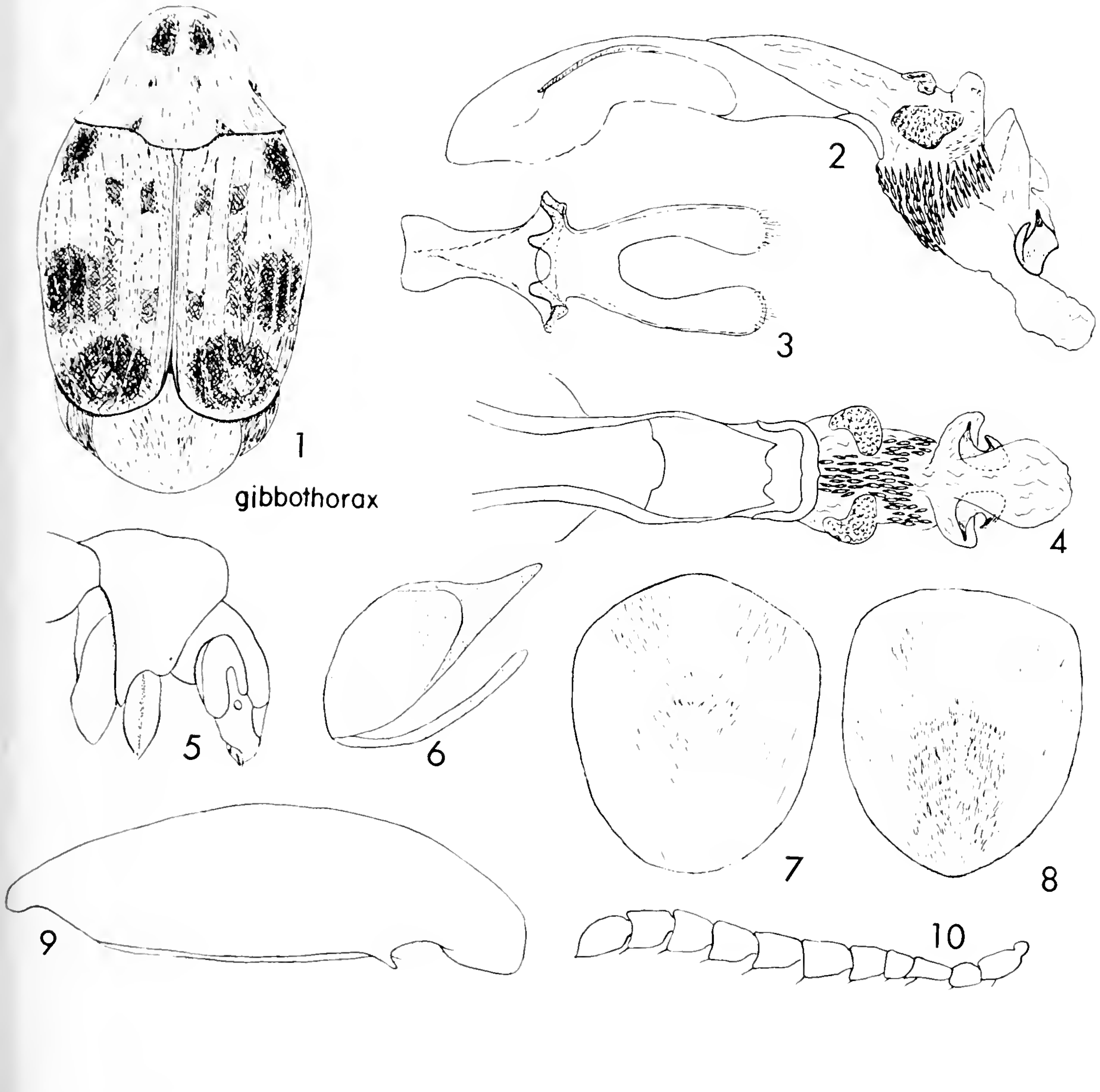
Neltumius gibbothorax (Schaeffer)
(Figs. 1-10)

Bruchus gibbothorax Schaeffer, 1904, Jour. N.Y. Ent. Soc. 12:230; Fall, 1910, Trans. Amer. Ent. Soc. 36:162.
Neltumius gibbothorax: Bradley, 1946, Psyche 53:36.

Color: Dorsum clothed with brown, ochreous, and gray hairs in distinctive pattern (fig. 1); sides and venter with intermixed gray and ochreous hairs; legs evenly clothed with gray hairs; antennae piceous with gray pubescence. *Head:* Antennae as in fig. 10. Fine black median carina extending from interocular fovea nearly to the epistomal suture; vertex finely punctate; frons densely clothed with ochreous and gray hairs; labrum finely granulate. *Prothorax:* Subconical, pleura slightly concave; disk densely covered with ochreous and gray hairs, gibbosity with vaguely defined paired brown blotches; antescutellar area lighter gray; base lobed at middle; apex rounded. *Elytra:* Evenly convex, slightly depressed in scutellar region; humeri prominent and with a fine, serrate, transverse carina connecting bases of striae 6 and 7; striae deep and narrow, strial punctures unisetose. Scutellum white. *Length of body:* Apex of prothorax to apex of pygidium, 2.5-4.0 mm.

Male: Pygidium (fig. 7) evenly convex, uniformly clothed with gray and ochreous intermixed hairs, sometimes with indistinct darker spot in middle; short tuft of gray hairs in middle of first abdominal sternite; posterior margin of last sternite deeply and broadly emarginate; genitalia (figs. 2, 3, 4, 6) with ventral valve U-shaped, separated from apex of median lobe by lightly sclerotized area; everted endophallus girdled by a band of acicular spicules; paired reniform sclerites located laterally near base; paired terminal sclerites as in fig. 6; parameres deeply divided, rounded at apices (fig. 3).

Female: Pygidium (fig. 8) somewhat gibbous at apex; basal half colored as in male, apical half with darker oblong spot divided by lighter median line; first sternite without tuft of hairs; last sternite not emarginate.



FIGURES 1-10, *Neltumius gibbothorax*. 1—Body, dorsal view. 2—Aedeagus, lateral view. 3—Parameres, dorsal view. 4—Aedeagus, ventral view. 5—Prothorax and head, lateral view. 6—Terminal sclerite of endophallus. 7—Pygidium of male. 8—Pygidium of female. 9—Posterior femur, inner aspect. 10—Antenna.

Material examined: ARIZONA: Pinal Mts. (Type locality, lectotype ♀, U.S.N.M. No. 42286); Ft. Yuma, Jan. 20, Apr. 12, Aug. 20, Hubbard & Schwarz; Tacna, May; Alamo Crossing, Bill Williams River, Nov. 21, 1956, *ex* pods of *Prosopis odorata;* Colorado River at Parker, Aug. 15, 1963, C. A. Taschi, at light; 5 miles west of Laveen, Nov. 28, 1959, C. D. Johnson, on *Prosopis odorata;* Bullhead City, Apr. 2, 1956, Werner and Butler, on alfalfa; Phoenix, Feb. 14, 1960, C. D. Johnson, on *Prosopis odorata.* CALIFORNIA: 21 miles north of Blythe, Dec. 8, 1959, C. D. Johnson, *ex* seeds of *Prosopis odorata;* Blythe, June 1, 1956, E. I. Smith, *Prosopis pubescens* seeds. NEVADA: Glendale, May 12, 1930, E. W. Davis, on *Pluchea sericea.* UTAH: St. George, July, Wickham. MEXICO: No specific locality, collected Feb. 1, 1949, in Plant Quarantine Division, U.S.D.A., inspection in seeds of *Prosopis (Strombocarpa) pubescens.*

Discussion: This species is closely related to *arizonensis,* from which it can easily be distinguished by the uniformly gray tibiae, anteriorly placed prothoracic gibbosity, predominantly gray vestiture, and vaguely marked pygidium. From *texanus,* it is distinguished by the carinate humerus, uniformly gray tibiae, distinctive male genitalia, and other characters given in the key.

The male genitalia of *gibbothorax* and *arizonensis* are almost indistinguishable. The only difference I have detected so far is in the shape of the terminal sclerites (figs. 6 and 15), but these may prove to be too variable to be reliable. External characteristics are apparently constant.

Neltumius arizonensis (Schaeffer)
(Figs. 11-15)

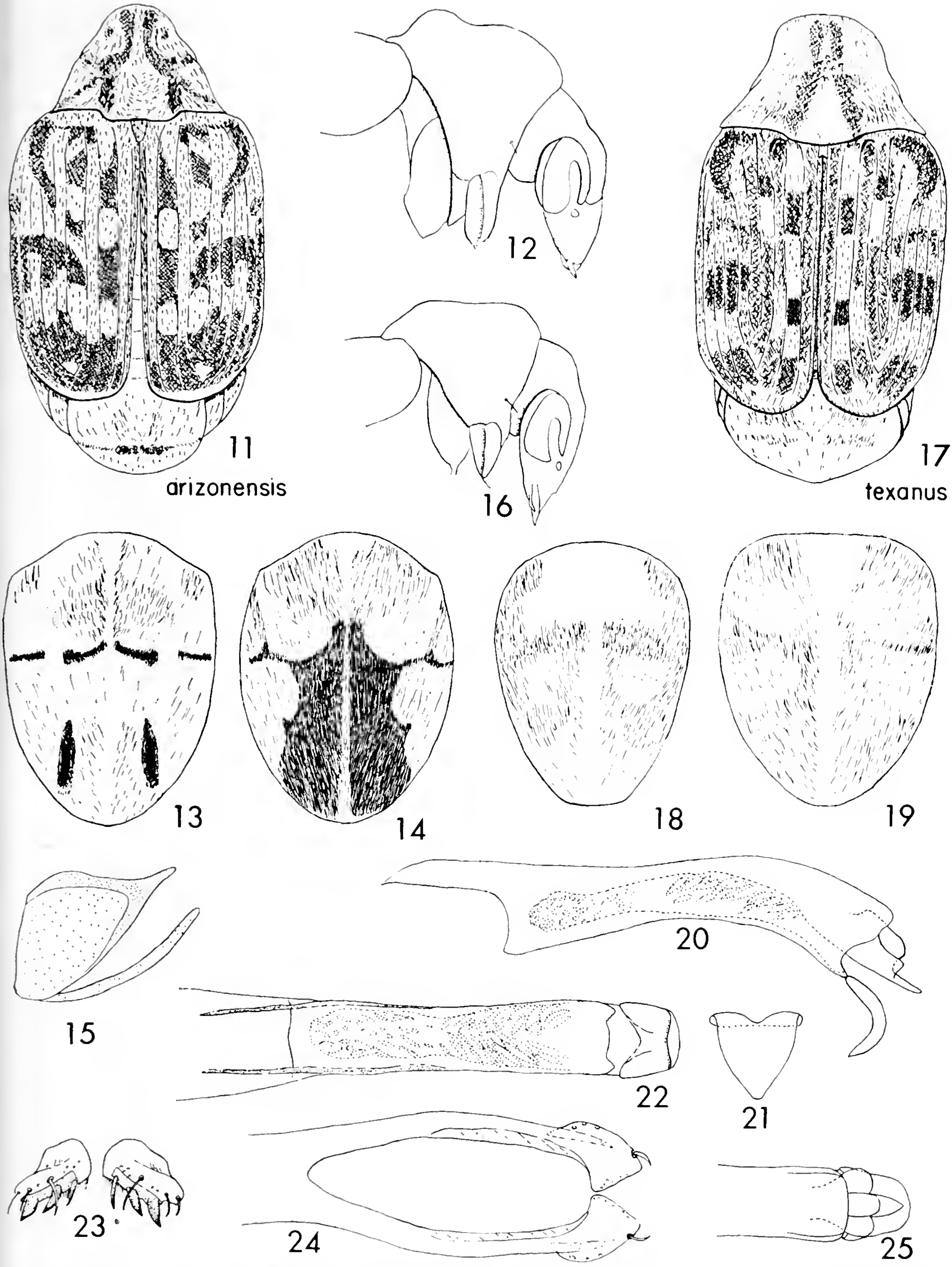
Bruchus arizonensis Schaeffer, 1904, Jour. N.Y. Ent. Soc. 12:229; Fall, 1910, Trans. Amer Ent. Soc. 36:162.

Neltumius arizonensis: Bridwell, 1946, Jour. Wash. Acad. Sci 36(2):54, (generic description); Bradley, 1946, Psyche 53:36.

Color: Dorsum clothed with black and intermixed gray and ochreous hairs in contrasting pattern (fig. 11); sides and venter with gray and ochreous hairs in mottled patterns; legs gray with brown spot or band near apex of each femur and in middle of lateral face of each tibia; antennae piceous with gray pubescence. *Head:* Antennae as in fig. 10; median carina glossy, nearly covered by the gray and ochreous hairs of frons; vertex finely punctate; labrum slightly sulcate. *Prothorax:* Subconical, pleura slightly concave; disk with a gray cruciform indentation separating four dark brown or black gibbosities; antescutellar area whitish-gray. *Elytra:* Evenly convex, slightly depressed in scutellar region; humeri prominent with finely serrate, transverse carina between bases of striae 6 and 7; dorsal pattern composed of gray, ochreous, and black hairs; striae deep and narrow, strial punctures distinct, unisetose. Scutellum white. *Length of body:* Apex of pronotum to apex of pygidium, 2.5-4.0 mm.

Male: Pygidium (fig. 13) evenly convex, gray-ochreous with short, transverse, dark bar in middle and paired longitudinal marks near margin of apex; short tuft of gray hairs in middle of first abdominal sternite; posterior margin of last sternite deeply and broadly emarginate; genitalia discussed under *gibbothorax.*

Female: Pygidium (fig. 14) somewhat gibbous at apex, gray-ochreous with dark T-shaped mark in apical half connected with vague spots near apex, narrow median line gray-ochreous; first sternite without hair tuft; last sternite not emarginate.



FIGURES 11-15, *Neltumius arizonensis*. 11—Body, dorsal view. 12—Prothorax and head, lateral view. 13—Pygidium of male. 14—Pygidium of female. 15—Terminal sclerite of endophallus.

FIGURES 16-25, *Neltumius texanus*. 16—Head and prothorax, lateral view. 17—Body, dorsal view. 18. Pygidium of male. 19—Pygidium of female. 20—Aedeagus, lateral view. 21—Ventral valve, caudal view. 22—Aedeagus, ventral view. 23—Parameres, caudal view. 24—Parameres, dorsal view. 25—Aedeagus, apex, dorsal view.

Material examined: ARIZONA: Pinal Mts. (Type locality, ♀ holotype, U.S.N.M. No. 42285); Miami, 1941, R. L. Furniss, on *Prosopis chilensis,* Nov. 22, 1959, C. D. Johnson, *ex* seeds *Prosopis juliflora;* Yuma Co., no date; Tucson, May 1, Hubbard & Schwarz, Sept. 2, 1959, H. P. Koenig, Dec. 1953, G. D. Butler, in gin trash, June 11, 1954, M. Cazier, July 23, 1938; Sacaton, Nov. 1, 1935, *ex Prosopis velutina;* Wickenburg, Dec. 18, 1959, C. D. Johnson, *ex* seeds *Prosopis juliflora;* Scottsdale, Dec. 6, 1959, C. D. Johnson, *ex* seeds *Prosopis juliflora;* 20 miles north of Florence, Nov. 22, 1959, C. D. Johnson, *ex* seeds *Prosopis juliflora;* 5 miles west of Laveen, Nov. 28, 1959, C. D. Johnson, *ex* seeds *Prosopis juliflora;* Ft. McDowell, Nov. 18, 1959, C. D. Johnson, *ex* seeds *Prosopis juliflora;* Globe, July 4, D. K. Duncan; Arivaca, July 26, 1941, R. H. Beamer. CALIFORNIA: El Centro, Jan. 15, 1945, in mesquite pods; Indio, Sept. 15, 1929; Bard, Oct., 1920, *ex* seeds *Prosopis chilensis;* Blythe, Feb. 20, 1957, C. Tyndall, Dec. 18, 1959, C. D. Johnson, *ex* seeds *Prosopis juliflora;* Calexico, Jan. 1, 1945, *ex* mesquite pods, May 15, 1911. TEXAS: El Paso Co., May 25, 1961, on *Chilopsis linearis;* Presidio, Apr. 27, 1950, J. H. Russell, in light trap. NEVADA: Overton, Apr. 15, 1930, D. Fox on *Covillea tridentata.*

Discussion: The differences between *arizonensis* and *gibbothorax* are discussed under the latter. From *texanus, arizonensis* is distinguished by the slightly larger size, carinate humerus, more prominent prothoracic gibbosities, presence of a hair tuft on the basal sternite in the male, and the distinctive genitalia.

Neltumius texanus (Schaeffer)
(Figs. 16-25)

Bruchus texanus Schaeffer, 1904, Jour. N.Y. Ent. Soc. 12:231; Fall, 1910, Trans. Amer. Ent. Soc. 36:162.
Neltumius texanus: Bradley, 1946, Psyche 53:36.

Color: Dorsum clothed with brown, gray, and ochreous hairs in distinctive pattern (fig. 17); sides and venter with intermixed gray and ochreous hairs; legs clothed with gray and ochreous hairs with median brown band on posterolateral face of each tibia; antennae piceous with gray pubescence. *Head:* Median carina glossy black; frons sparsely covered with gray and ochreous hairs; head finely punctate; labrum bare, somewhat sulcate, yellowish brown at apex. *Prothorax:* Subconical, pleura slightly concave; disk convex with paired brown, obsolete tuberosities near base flanking triangular white antescutellar patch; vaguely defined paired brown spots at apex; base strongly lobed at middle, sinuate laterally, posterior corners acute; apex rounded. *Elytra:* Evenly convex; humeri prominent, granulate, lacking serrate carina of preceding two species; striae narrow and deep with setiferous punctures hardly discernible; scutellum white. *Length of body:* Apex of pronotum to apex of pygidium, 2.0-2.5 mm.

Male: Pygidium (fig. 18) evenly convex, whitish-gray in basal third, mixed gray and ochreous with narrow median gray line in apical third; posterior margin of last abdominal sternite slightly emarginate, apical margin of eighth tergite visible between pygidium and last sternite; tuft of hair on first abdominal sternite in first two species lacking in this species; genitalia with ventral valve deltoid (fig. 21), dorsal valve membranous (fig. 25); endophallus armed with acicular spicules but without terminal or reniform sclerites. Parameres (figs. 23 and 24) deeply divided, armed at apices with stout spines.

Female: Pygidium (fig. 19) with triangular gray spot in middle of base flanked by ochreous spots; faint, brown, transverse median band interrupted by median line of gray; paired vague brown spots near apical margin; last abdominal sternite not emarginate.

Material examined: TEXAS: Esperanza Ranch, Brownsville, May 2 (Type locality, ♀ holotype, U.S.N.M. No. 42287); Victoria, Apr. 6, 1911, J. D. Mitchell, on *Xanthoxylum clava-herculis;* San Antonio, May 10, 1907, E. A. Schwarz; San Diego, May 18 and 31, Hubbard & Schwarz; Winter Haven, May 26, 1949, *ex* berries *Condalia obovata;* Brownsville, Apr. 28, 1904, May 18-22, 1904, June, Wickham, July 2, 1945, on cotton, July 6, 1945, A. J. Chapman. ARIZONA: Mesa, May 13, 1940.

Discussion: This species, although obviously belonging to *Neltumius,* is quite distinctive in several respects. The granulate humeri, the lack of a tuft of hairs on the basal abdominal sternite of the male, and the radically different male genitalia all indicate a distinctly separate line of evolution within the genus. *Texanus* resembles *arizonensis* more closely than it does *gibbothorax* in the color pattern and in the brown-banded tibiae. I was not able to successfully evert the endophallus of *texanus* but it apparently lacks the larger sclerites found in the other two species.

Acknowledgments

Most of the records in this paper were taken from material deposited in the U. S. National Museum Collections. I wish to thank Mr. C. D. Johnson of the University of California, Dr. George Byers of the University of Kansas, Dr. Floyd Werner of the University of Arizona, and Mrs. Patricia Vaurie of the American Museum of Natural History for loans of additional specimens.

SPHENOPHORUS CICATRISTRIATUS. DAMAGING BLUE GRASS LAWNS IN WASHINGTON STATE (COLEOPTERA: CURCULIONIDAE).

Specimens of *Sphenophorus cicatristriatus* Fahrs., damaging blue grass lawns, were collected by E. C. Klosermeyer, in Benton Co., Washington, June 3, 1963. Larvae were found feeding on the roots, and adults were collected in association with the larvae. Some lawns had several square yards of grass killed, with as many as six larvae per square foot. This species has a known distribution from Alberta, through North Dakota and Montana south to Mexico City, Vera Cruz, and Yucatán. Material in the U. S. National Museum collection is from the following states: North Dakota, Nebraska, Wyoming, Colorado, New Mexico, and now Washington. The North Dakota and Wyoming specimens were collected in short grass near alkali lakes and at a dry saline lake. No additional biological information is available.—Rose Ella Warner, *Ent. Res. Div., A.R.S., U. S. Department of Agriculture, Washington, D. C.*

A REVISION OF ORUS CASEY. I. SUBGENUS LEUCORUS CASEY AND A NEW SUBGENUS (COLEOPTERA: STAPHYLINIDAE)

By LEE H. HERMAN, JR.[1]

Casey (1905) differentiated *Leucorus* from the closely related genera *Orus* and *Pycnorus* by an edentate or bidentate labrum and a body color of "... always pale ferrugineus ..." (Casey 1905, p. 192). Species of the other two genera were considered uniformly piceous or black with a quadridentate labrum. Some specimens of two species of *Leucorus* are found, in this revision, to be testaceous and specimens of the subgenus *Orus* to be castaneous or testaceous. The three genera are separated from other Scopaeina by the wide neck.

Originally included in *Leucorus* were four species: *L. ferrugineus*, described from a male specimen; *L. rubens*, from a male and female; *L. luridus*, from a female; and *L. ochrinus*, from two females. Two species, *Orus volans* and *Orus cameroni*, were described and included in *Leucorus* by Blackwelder (1943).

Bernhauer and Schubert (1912) included *Leucorus, Orus* and *Pycnorus* as subgenera of *Scopaeus* Erichson. Leng (1920) listed these three exclusively new world groups as separate genera but Blackwelder (1939a, 1939b), based on his generic revision of the Paederini, fixed the type-species of *Leucorus, Orus* and *Pycnorus* and reduced each of them to subgenera of *Orus* where they remain. *Orus guatemalenus* Sharp, 1886 remained, incorrectly, in *Scopaeus*, was emended (unjustifiably) to *S. guatemalensis* (Bernhauer and Schubert, 1912), and listed as such by Blackwelder (1944).

Measurements used in this paper are taken as follows: the width is of the widest portion; the length of the head is from the anterior portion of the clypeus to the posterior margin of the head; the prothoracic length is the greatest dorsal midline length; and the elytral length is along the midline from the posterior margin of the scutellum to the most posterior margin of the elytra.

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[1] Department of Biology, Catholic University of America, Washington 17, D.C.

[2] One species, *Orus* (*Pycnorus*) *iowanus* (Casey, 1905), has a prominent gular tubercle. The male is unknown.

[3] A male of an undescribed species has a distinctly bidentate labrum but other known males of this subgenus are edentate.

[4] Females should be identified by reference to illustrations of the spermathecae and ninth terga (figs. 1d-f, 2f-h, 3e-f).

Key to the Subgenera of Orus

1.	Mesosternal fovea present; postorbital setigerous fovea present (fig. 2e) ----------	2
	Mesosternal fovea absent; eye with setigerous furrow near eye (fig. 5a) --------	NIVORUS
2.	Labrum bidentate or edentate; last abdominal sternum of male deeply and narrowly incised (fig. 1a); aedeagus with postforamen present (fig. 1b) ------------	LEUCORUS
	Labrum quadridentate; last abdominal sternum of male broadly emarginate; aedeagus with postforamen absent --	3
3.	Gular tubercle well-developed on male[2]; metafemur of male serrate mesally----	PYCNORUS
	Gular tubercle absent; metafemur not serrate --------------------------------	ORUS

Subgenus *Leucorus* Casey

Leucorus Casey, 1905: 191; Bernhauer and Schubert, 1912: 245, 247, 249, 250, 251; Leng, 1920: 104; Blackwelder, 1939a: 24; 1939b: 98, 105, 119; 1943: 230, 277, 278, 279; 1944: 119; 1952: 220, 420; Arnett, 1961: 245, 269.

TYPE-SPECIES: *Orus rubens* (Casey, 1905). Fixed by Blackwelder 1939b: 119, by subsequent designation.

DESCRIPTION. Head: quadrilateral appearance in dorsal aspect, sides broadly arcuate, truncate posteriorly; dorsum punctate; gena minutely sculptured; ventral postgena sparsely punctate; gula with microreticulate sculpturing; labrum distinctly bidentate (females) to edentate or bidentate[3] (males), median emargination, with long setae; right mandible quadridentate, left mandible tridentate; gular sutures with approximately equal divergence at anterior and posterior, median portion nearly parallel; gula without prominent well-developed tubercle; eye tapered posteriorly (fig. 2e); furrow present above eye; postorbital fovea with setigerous tubercle. *Thorax:* prothorax with distinct, rounded anterior angles on apical third; pronotal punctation distinct, umbilicate, median area impunctate; anterior prosternum rugose; profemur robust, with meso-ventral ctenidia; protibia with scopae; mesopleuron and mesosternum with reticulate sculpturing; mesosternum with large, deep fovea; elytra indistinctly punctate, pleural fold present; scutellum sculptured; metafemur entire; metatibia with ctenidia on one side of apex. *Abdomen:* punctulate; sterna of female unmodified; last two sterna of male modified, last sternum deeply and narrowly incised (figs. 1a, 2a, 3a), mesal margins of incision reflexed. *Aedeagus:* bulbous median lobe; dorso-medial parameres prominent, connate, attenuate distally; with dorso-basal median foramen; dorso-distal ostium; distal elongation of median lobe reflexed; median lobe with ventral, ovate, membranous margined sclerite (figs. 2d, 3d); circoforamen and postforamen present.

DISTRIBUTION: GUATEMALA; UNITED STATES (Illinois, Iowa, Arizona, Kansas, California, Texas, Utah, Colorado, New Mexico).

Included in the material used in this description of the subgenus are three specimens of an undescribed species belonging to *Leucorus*. One of the specimens is a male from Del Rio, Texas; the other two are females from Devils River, Texas.

Male genitalia. The median foramen of members of this genus is more or less surrounded by heavy sclerotization. To facilitate description of the aedeagus, the structure encircling the median foramen is designated here the circoforamen. *Leucorus* has an additional modification of the circoforamen, a thick, hooked structure distad of the median foramen termed here the postforamen.

Key to the Described Species of Leucorus

1. Abdominal sterna of penultimate and last visible segments modified ---------- (Males) 2
   Abdominal sterna unmodified ---------- (Females)
2. Abdominal sternum of penultimate segment without pair of lacinia, with longitudinal median furrow (fig. 2a); parameres broader than median lobe (dorsal aspect) (fig. 2c) ---------- **RUBENS**
   Abdominal sternum of penultimate segment with paired lacinia (figs. 1a, 3a); parameres not as broad as median lobe (fig. 1c, 3c) ---------- 3
3. Abdominal sternum of penultimate segment with margin between lacinia produced (fig. 3a); paired postostial lobes present on aedeagus (fig. 3c) ---------- **GUATEMALENUS**
   Abdominal sternum of penultimate segment between lacinia with arcuate margin (fig. 1a); postostial lobes of aedeagus absent ---------- **FERRUGINEUS**

Orus (Leucorus) rubens (Casey)
(Figs. 2a-h)

Leucorus rubens Casey, 1905:194; Leng 1920:104; Blackwelder 1939b: 119; 1943:277; 1952:220.
Scopaeus (Leucorus) rubens (Casey), Bernhauer and Schubert 1912:251.
Orus (Leucorus) rubens (Casey), Blackwelder 1939a:24; 1939b:105.

HOLOTYPE: Iowa (no additional data on label); U. S. National Museum type number 38301; male. The female of the series is labeled as the type but the original description is of a male with a female mentioned in the discussion.

DESCRIPTION OF THE HOLOTYPE. Leucorus; male; ferruginous. *Head:* .60 mm. long, .60 mm. wide; dorsum distinctly punctate; postgena adjacent to gula deeply and distinctly punctate; submentum rugose; postorbital fovea well-defined; furrow above quite evident (fig. 2e). *Thorax:* prothorax in dorsal aspect .62 mm. long, .55 mm. wide, sides convergent posteriorly; anterior median posternum glabrous; elytra .57 mm. long, .58 mm. wide. *Abdomen:* median furrow on penultimate sternum, lateral margins broadly arcuate and with moderately heavy setae; posterior sternal margin emarginate, with setae (fig. 2a). *Aedeagus:* median lobe .60 mm. long, .20 mm. wide; postostial lobes absent; parameres with median portion expanded laterally to nearly as broad as widest portion of median lobe, obtusely aculeate distally; sides of circoforamen convergent posteriorly (dorsal aspect); postforamen prominent (fig. 2c); gradual deflection from postforamen to base of parameres (fig. 2b).

DESCRIPTION OF THE FEMALE. Spermatheca: figs. 2g-h. *Ninth tergum* (fig. 2f).

DISTRIBUTION: IOWA, ILLINOIS (Urbana, Mayview), KANSAS (Manhatten), ARIZONA (Santa Rita Mountains, Chiricahua Mountains).

BIOLOGY: At about 5400 feet specimens were taken by light trapping and from the ground litter at South Fork Canyon in the Chiricahua Mountains on July 10 and 11, 1964. Those from the black light were females; four specimens, two of them males, were taken from the ground litter after a limited area had been saturated repeatedly with water. Others have collected this species from ground litter in the Midwest on the following dates: October 15, 1944, September 16, 1944, August 29, 1943 (Illinois); October 2, 1936 (Kansas).

VARIATION: Most specimens are dark ferruginous but several, particularly those from the Midwest, have an orange cast and are not as dark as specimens from the Southwest. The sternal furrow of the penultimate abdominal segment may be deep with very distinct lateral margins to shallow with indistinct, rounded margins; the lateral margins may be broadly arcuate, parallel, or posteriorly divergent. One specimen has a longitudinal prothoracic impression. The anterior gular region may have a small fovea, slight tubercle or be without either structure. The aedeagus exhibits variation in reflection of the apex of the median lobe and degree of deflection from the postforamen to the base of the parameres. The spermathecae of specimens from S.E. Arizona are similar, though smaller, to that of *O. guatemalenus*. The ninth tergum of specimens from various localities may be more or less acute anteriorly but in no case examined was the *O. rubens* type of spermatheca associated with the *O. ferrugineus* type of ninth tergum. Size variation of this species is as follows: head length .54 mm.-.60 mm., width .50 mm.-.60 mm.; prothorax length .54 mm.-.64 mm., width .47 mm.-.59 mm.; elytra length .55 mm.-.69 mm., width .56 mm.-.71 mm.

Orus (Leucorus) ferrugineus (Casey)
(FIGS. 1a-f)

Leucorus ferrugineus Casey, 1905:193; Leng 1920:104.

Scopaeus (Leucorus) ferrugineus (Casey), Bernhauer and Schubert 1912: 247.

Orus (Leucorus) ferrugineus (Casey), Blackwelder 1939a:24; 1939b:105.

Leucorus luridus Casey 1905:193; Leng 1920:104. (NEW SYNONYMY).

Scopaeus (Leucorus) luridus (Casey), Bernhauer and Schubert 1912:249.

Orus (Leucorus) luridus (Casey), Blackwelder 1939a:24; 1939b:105.

Leucorus ochrinus Casey, 1905:193. Leng 1920:104. (NEW SYNONYMY).

Scopaeus (Leucorus) ochrinus (Casey), Bernhauer and Schubert 1912:250.

Orus (Leucorus) ochrinus (Casey), Blackwelder, 1939a:24; 1939b:105.

Holotype of *Leucorus ferrugineus* Casey: Arizona; U. S. National Museum type number 38299; male.

Holotype of *Leucorus luridus* Casey: Southern California; U. S. National Museum type number 38298; female.

Holotype of *Leucorus ochrinus* Casey: Cañon City, Colorado; U. S. National Museum type number 38300; female.

DESCRIPTION OF THE HOLOTYPE. Leucorus; male; ferruginous. *Head:* .64 mm. long, .62 mm. wide; dorsum finely punctate; postgena with minute sculpturing, indistinctly punctate; submentum with minute reticulate ground sculpturing; anterior gula with median fovea; furrow above eye reduced; margins of postorbital fovea not well-developed. *Thorax:* prothorax .67 mm. long, .57 mm. wide, sides parallel; elytra .74 mm. long, .80 mm. wide, sides divergent posteriorly. *Abdomen:* penultimate sternum with lacinia and shallow, smooth-bottomed, median depression; posterior margin of depression not produced between lacinia; depression margined laterally with heavy setae, tapering and diminishing anteriorly; lacinia short, broad, clothed with heavy setae and with mesal overlap of depression (fig. 1a). *Aedeagus:* median lobe .56 mm. long, .20 mm. wide; postostial lobes absent; parameres acuminate, broadest medially; sides of circoforamen, in dorsal aspect, convergent to postforamen; deflection from postforamen to base of parameres gradual (figs. 1b, c).

DESCRIPTION OF THE FEMALE. Spermatheca: fig. 1e, f. *Ninth tergum:* fig. 1d.

DISTRIBUTION: ARIZONA (Santa Rita Mountains, Chiricahua Mountains, Galiuro Mountains, Pajarito Mountains (Peña Blanca); CALIFORNIA (Azusa, Argus Mountains, Pasadena, Panamint Mountains, Kern County); UTAH (American Fork); NEW MEXICO (Las Vegas H.S.); COLORADO (Cañon City, Colorado Springs).

COLLECTION DATA: Santa Rita Mountains in May; Panamint Mountains in April; Chiricahua Mountains in June and July; Peña Blanca on July 26, 1964 at a black light; Galiuro Mountains in May; Azusa in September; Pasadena in February; American Fork in May.

VARIATION: The color varies from ferruginous to testaceous; two testaceous specimens were collected at the same time and place (Chiricahua Mountains) as a ferruginous specimen. Most specimens are lacking the gular fovea and in one case it is replaced by a slight tubercle. The depression of the penultimate abdominal sternum of the male may have nearly parallel lateral margins, be very shallow with indistinct lateral margins, or be very deep and distinctly margined. The bottom of the depression may be glabrous or partly to completely covered with minute ground sculpture. The length and width of the lacinia vary moderately. Variation of the aedeagus is in the degree of deflection between the postforamen and base of the parameres. No variation was found in the ninth tergum of the females and the spermatheca varies in only one case. In the type specimen of *O. ochrinus,* the spatulate portion of the spermatheca was not expanded laterally as much as in the paratype from the same locality and other females of *O. ferrugineus* but the ninth tergum of the holotype does not vary from that of the other females. Size variation is as follows: head length .57 mm.-.65 mm., width .53 mm.-.66 mm.; prothorax length .58 mm.-.67 mm., width .50 mm.-.69 mm.; elytra length .57 mm.-.74 mm., width .63 mm.-.75 mm.

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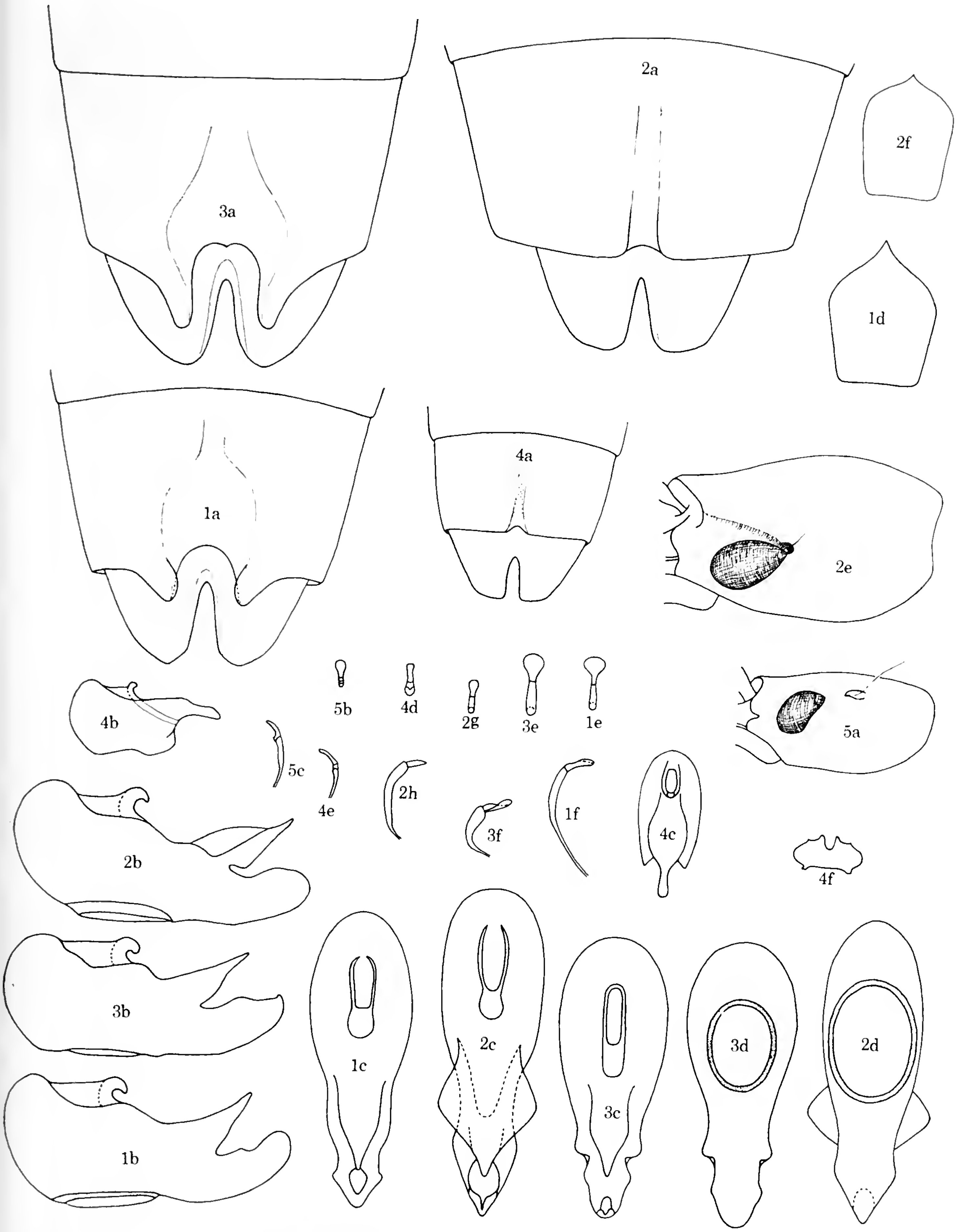
FIGURES 1a-f, *Orus ferrugineus.* a—Abdominal sterna, male; b—Aedeagus, lateral view; c—Aedeagus, dorsal view; d—Ninth tergum, female; e—Spermatheca, basal end; f—Spermatheca, lateral view.

FIGURES 2a-h, *Orus rubens.* a—Abdominal sterna, male; b—Aedeagus, lateral view; c—Aedeagus, dorsal view; d—Aedeagus, ventral view; e—Head, lateral view; f—Ninth tergum, female; g—Spermatheca, basal end; h—Spermatheca, lateral view.



FIGURES 3a-f, *Orus guatemalenus*. a—Abdominal sterna, male; b—Aedeagus, lateral view; c—Aedeagus, dorsal view; d—Aedeagus, ventral view; e—Spermatheca, basal end; f—Spermatheca, lateral view.

FIGURES 4a-f, *Orus cameroni*. a—Abdominal sterna, male; b—Aedeagus, lateral view; c—Aedeagus, dorsal view; d—Spermatheca, basal end; e—Spermatheca, lateral view; f—Labrum, male.

FIGURES 5a-c, *Orus volans*. a—Head, lateral view; b—Spermatheca, basal end; 3—Spermatheca, lateral view.

DISCUSSION: Casey's *O. ochrinus* and *O. luridus* have been synonymized with *O. ferrugineus* because the spermathecae and ninth terga are virtually identical with those of females determined as *O. ferrugineus* taken in the Panamint Mountains, an area which seems to be out of the range of *O. rubens* and *O. guatemalenus*. In his original descriptions, Casey used, "Elytra much longer and wider than the prothorax" for *O. rubens* and "Elytra subequal in length to the prothorax and but little wider" for *O. luridus, O. ochrinus* and *O. ferrugineus;* this couplet served as the basis for primary separation of *O. rubens* from the others (Casey 1905, p. 192). In a series of *O. ferrugineus,* the elytra are from .067 mm. longer to .067 mm. shorter than the prothorax. Specimens of *O. rubens* show similar results. Application of the above couplet will allow certain specimens of either species to be keyed to the wrong species; this is particularly true of females. In neither the original descriptions nor the type specimens is there a concrete basis for distinction of *O. ochrinus* and *O. luridus* from *O. ferrugineus*. Characters used in the original descriptions of *O. ochrinus* and *O. luridus* can be shown to be individual variation when using a series.

Orus (Leucorus) guatemalenus Sharp
(FIGS. 3a-f)

Orus guatemalenus Sharp, 1886:549, pl. 14, fig. 3.
Scopaeus (Orus) guatemalensis Bernhauer and Schubert 1912:248. (UNJUSTIFIED EMENDATION).
Scopaeus guatemalensis Bernhauer and Schubert, Blackwelder 1944:119.

LECTOTYPE: San Geronimo, Guatemala; British Museum (Natural History); male. The lectotype, designated here, collected by Champion, is the only perfect male of the syntypic series.

DESCRIPTION OF THE LECTOTYPE. Leucorus; male; ferruginous. *Head:* .54 mm. long, .54 mm. wide; dorsum distinctly punctate; submentum rugose; labrum slightly produced antero-laterally; furrow above eye quite evident. *Thorax:* prothorax .60 mm. long, .59 mm. wide, sides converging posteriorly; elytra .67 mm. long, .70 mm. wide, parallel sides. *Abdomen:* posterior margin of penultimate sternum with paired lacinia, with smooth surfaced depression; depression broad posteriorly; tapering and diminishing anteriorly, margined laterally by heavy setae, posterior margin slightly produced between lacinia (fig. 3a). *Aedeagus:* median lobe .56 mm. long, .20 mm. wide, with paired postostial lobes; parameres broad medially, obtusely aculeate distally; circoforamen ellipsoidal in dorsal aspect; postforamen prominent; abrupt deflection from postforamen to parameres (figs. 3b-d).

DESCRIPTION OF THE FEMALE. Spermatheca: fig. 3e, f. *Ninth tergum:* as in fig. 2f.

DISTRIBUTION: GUATEMALA (Dueñas, San Geronimo).

VARIATION: Specimens may be from ferrugino-piceous to testaceous. But for a deeper median labral incision and the unmodified abdomen, the three females do not differ appreciably from the males. An antero-median gular fovea is present on one specimen. The lacinia of the abdomen of the males vary in length and width. Size variation is as follows: head length .54 mm.-.60 mm., width .52 mm.-.60 mm.; prothorax length .60 mm.-

.64 mm., width .52 mm.-.59 mm.; elytra length .67 mm.-.74 mm., width .67 mm.-.87 mm.

DISCUSSION: Characters used to separate *O. ferrugineus* and *O. guatemalenus* are perhaps questionable. It is conceivable that the characters used are the result of geographical variation, but this cannot be verified at this time because of the lack of specimens from Mexico.

Subgenus *Nivorus* Herman, NEW SUBGENUS

TYPE-SPECIES: *Orus cameroni* Blackwelder. Designated here.

DESCRIPTION. Head: quadrilateral in dorsal aspect, sides broadly arcuate, slightly emarginate posteriorly; dorsum and venter very feebly punctulate; labrum with deep median emargination, with long setae, quadridentate, mesal denticles prominent, lateral denticles reduced to prominent (fig. 4f); mandibular dentition variable in number; gular sutures divergent anteriorly and posteriorly, median portion nearly parallel; gula without prominent tubercle; furrow above eye absent or present, when present it is similar to that of fig. 5a; setigerous furrow present above or behind eye (fig. 5a); postorbital setigerous fovea absent; eye slightly tapered posteriorly. *Thorax:* prothorax with distinct, rounded angles on apical third, pronotal punctation very feeble, not umbilicate, fine ground sculpturing; profemur robust, with meso-ventral ctenidia; protibia with scopae; mesosternal fovea absent; elytra with pleural fold; metafemur not serrate; metatibia with ctenidia on one side of apex. *Abdomen:* sterna of female unmodified; sterna of male variously modified. *Aedeagus:* median lobe bulbous; parameres connate, free from median lobe or not; median foramen dorso-basal; postforamen present or not; circoforamen present; ventral ovular sclerite absent.

DISTRIBUTION: WEST INDIES (Jamaica, Cuba, Barbados); MEXICO (Michoacan); UNITED STATES (Arizona).

DISCUSSION: Included in the material used for the above description are single specimens of three undescribed species: a female from Barbados; a female from Comanja, Michoacan and a male from Yuma, Arizona.

Originally *O. volans* and *O. cameroni* were placed in *Leucorus* but members of this subgenus, as indicated above, are distinguished from *Orus* and *Pycnorus* by a bidentate or edentate labrum. In no case are there lateral denticles as on *O. volans* and *O. cameroni* (fig. 4f); the original descriptions refer to these species as bidentate with minute lateral prominence on the labrum. The mandibular dentition of *Nivorus* is variable between and within species, a mesosternal fovea is lacking, a setigerous postorbital fovea (fig. 2e) is replaced by a rather distinctive furrow containing a long seta. Additional variation is offered by an undescribed species of *Nivorus* in which the last sternum is broadly emarginate and the postforamen lacking. The male genitalia of *O. cameroni* and the undescribed species both lack a ventral ovular sclerite and an apical ostium.

In general, *Nivorus* is quite variable in the characters used to define *Leucorus;* since taxa should be defined on as many characters as possible, *O. volans* and *O. cameroni* are not retained in *Leucorus* on the basis of a questionable labrum.

Key to the Described Species of Nivorus

1. Setigerous furrow behind eye contiguous with eye ---------- CAMERONI
   Setigerous furrow behind eye separate from eye ---------- VOLANS

Orus (Nivorus) cameroni Blackwelder
(Figs. 4a-f)

Orus (Leucorus) cameroni Blackwelder 1943:278; 1944:119.

HOLOTYPE: Trinityville, Jamaica; U. S. National Museum type number 52420; male.

DESCRIPTION. Nivorus; male; castaneous. *Head:* .34 mm. long, .30 mm. wide; gula with fovea on anterior portion; setigerous furrow behind and contiguous with eye; sculpturing very feeble. *Thorax:* prothorax .33 mm. long, .27 mm. wide, with longitudinal midline, feeble ground sculpturing; prosternum rugose; elytra .33 mm. long, .38 mm. wide, very minutely punctulate; mesosternum and mesopleuron with reticulate sculpturing: *Abdomen:* second and third visible sterna with a transverse impression each with a ctenidia; penultimate sternum with posterior margin shallowly emarginate, with shallow and indistinct furrow containing short, heavy setae; last sternum deeply and narrowly incised, mesal margins reflected (fig. 4a). *Aedeagus:* parameres cylindrical, expanded apically; circoforamen and prominent, hooked post-foramen present; long sclerite present from post foramen to ventral base of parameres; ostium subapical.

DESCRIPTION OF FEMALE. Spermatheca: figs. 4d-e.

DISTRIBUTION: JAMAICA (Trinityville, Troy, Santa Cruz, Milk River, Spanish Town, Fern Gully, Montego Bay, Moneague); CUBA (Cayamas, Baragua); HISPANIOLA (Haiti); GRENADA.

VARIATION: The anterior portion of the gula may have a fovea, slight tubercle or be without either structure. One mutilated specimen has a slight transverse impression on the mesosternum, not at all similar to the mesosternal fovea of *Leucorus*. Size variation is as follows: head length .33 mm.-.37 mm., width .30 mm.-.44 mm.; prothorax length .34 mm.-.35 mm., width .27 mm.-.29 mm.; elytra length .34 mm.-.39 mm., width .34 mm.-.40 mm. The mandibular dentition is variable in number.

Orus (Nivorus) volans Blackwelder
(Figs. 5a-c)

Orus (Leucorus) volans Blackwelder 1943:277; 1944:119.

HOLOTYPE: Milk River, Jamaica; U. S. National Museum type number 52422; female.

DESCRIPTION. Nivorus; testaceous; female. *Head:* .37 mm. long, .32 mm. wide; dorsum and venter with reticulate ground sculpturing; setigerous furrow behind eye not contiguous with eye (fig. 5a); mandibles tridentate. *Thorax:* prothorax .36 mm. long, .31 mm. wide, with longitudinal midline; prosternum feebly rugose; mesosternum with reticulate ground sculpturing; mesopleuron without reticulate sculpturing, shining; elytra .37 mm. long, .38 mm. wide, punctate, without ground sculpturing. *Abdomen:* unmodified. *Spermatheca:* figs. 5b-c.

The male of this species is unknown.

DISTRIBUTION: JAMAICA (Milk River, Spanish Town).

VARIATION: Size variation is as follows: head length (no variation), width .32 mm.-.34 mm.; prothorax length .36 mm.-.38 mm., width .29 mm.-.31 mm.; elytra length .37 mm.-.39 mm., width .38 mm.-.40 mm.

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RANGE EXTENSION FOR TWO INTRODUCED DUNG BEETLES (COLEOPTERA: SCARABAEIDAE)

On April 25, and on May 16, 1964, at Lynden, Washington, I collected in dung a total of twenty *Aphodius fossor* L. and three *Onthophagus nuchicornis* (L.), so determined by Dr. Melville H. Hatch. Several *A. fossor* were likewise taken by Mr. David Milne at Anderson Island, Washington, on April 24, 1964. These are the first records for these European species in Washington, but they have been taken at Creston, B. C. and in Idaho.—Loren Russell, *Zoology Division, University of Washington, Seattle, Washington.*

STUDIES ON OXYGRYLIUS CASEY (COLEOPTERA: SCARABAEIDAE: DYNASTINAE)

By ALAN HARDY[1]

Oxygrylius was first proposed as a genus by Col. Thomas Casey (1915) for three species, two described as new at that time. He included in this genus the species first described in 1856 by LeConte as *Ligyrus ruginasus.* Since Casey's paper, both of his species have been synonymized with *Oxygrylius ruginasus. O. pimalis* Casey was placed in synonymy by Blackwelder (1944), while Saylor (1946) considered *O. peninsularis* Casey conspecific with *O. ruginasus* (LeConte). There is no indication that genitalia were extensively studied in either process, although Saylor does figure the aedeagus of *O. ruginasus.*

In the 1224 specimens of *Oxygrylius* studied, the genitalia of 635 males were examined and form the basis for the classification presented here. Because of this work, I consider *Oxygrylius* Casey, 1915, to be a subgenus of *Bothynus* Hope, 1837.

Specimens were borrowed from several institutions to supplement the specimens at hand. I am indebted to the following for loans of material in their care, and for suggestions on the project: O. L. Cartwright, United States National Museum; H. F. Howden, Canadian Department of Agriculture; H. B. Leech, California Academy of Sciences; E. L. Sleeper, California State College at Long Beach; R. Snelling, F. Truxal and C. Hogue, Los Angeles County Museum. I would especially like to thank Dr. H. F. Howden, who suggested the project, and Dr. E. L. Sleeper, who made suggestions that aided in the solution of some of the problems encountered. I would also like to thank O. L. Cartwright and P. J. Darlington (Museum of Comparative Zoology, Harvard University) for the information on the types in their care.

Bothynus subgenus *Oxygrylius* Casey, NEW STATUS

Oxygrylius Casey, 1915:208.

Type of Subgenus: Ligyrus ruginasus LeConte, 1856, by original designation.

Morphology and Classification. In the original description of *Oxygrylius,* Casey gave the following characters as significant in distinguishing his new genus from *Ligyrus* Burmeister, 1847 (U. S. species now *Bothynus* Hope, 1837): "The single acute denticle of the clypeal apex and the more or less reduced posterior tooth of the mandibles . . . the thoracic fovea is constantly larger, deeper, and is always at least partially rugose at the bottom."

One male specimen in the Los Angeles County Museum Collection (California, Kern Co., McKittrick 29-VIII-'49) has a single tooth on the apex of the clypeus, yet the rest of the body (including the aedeagus) is

[1] Department of Entomology, California State College at Long Beach.

that of a specimen of *Bothynus gibbosus obsoletus* LeConte. The specimen is from an area where at present no *Oxygrylius* have been taken and so evidently does not represent a hybrid, but it probably represents a mutation of a single character, showing the close relationship of the two groups. No other malformations of the clypeus have been noted.

There is variation between the species of the most closely related group *(Bothynus)* with respect to the thoracic fovea, and the character as seen in *Oxygrylius* is not extreme.

The male genitalia of *Oxygrylius* and *Bothynus* show many similarities and are not of such difference to support separate genera on their own merit.

For these reasons I consider *Oxygrylius* not distinct enough to be considered a full genus and recommend that it be given subgeneric rank under *Bothynus* Hope, 1837.

Oxygrylius appears to contain two sibling species, recognizable mainly by the genitalia of the males, which appear to hybridize along the areas of contact; such hybridization is apparent in the male genitalia (see fig. 3). Eleven specimens have been examined which are considered hybrids. They bear the following data: CALIFORNIA: *San Bernardino Co.:* Providence Mountains (3 males); "Ibanpah" (Ivanpah) Mountains (2 males); Needles (1 male). *Riverside Co.:* Joshua Tree National Monument, (Cottonwood Springs) (1 male); Chuckawalla Mountains (Red Cloud Mine) (2 males); Chuckawalla Mountains (Irish Wash) (2 males).

Oxygrylius has been recorded as a pest in Idaho (Essig, 1936), but this was probably a misidentification of *Bothynus gibbosus* (DeGeer), perhaps being older specimens with the two clypeal teeth worn off.

Ritcher (1944) described the larvae of *Oxygrylius ruginasus* from two specimens taken in Mississippi. These may have been examples of another species of Dynastinae, possibly a *Bothynus,* as *Oxygrylius* is not recorded from east of eastern Texas.

Bothynus (Oxygrylius) ruginasus (LeConte), NEW COMBINATION (FIGS. 2, 4)

Ligyrus ruginasus LeConte, 1856:20; Horn, 1875:143; Bates, 1888:316.
Oxygrylius ruginasus (LeConte): Casey, 1915:209; Ritcher, 1944:27, fig. 79; Blackwelder, 1944:255; Saylor, 1946:44.
Oxygrylius pimalis Casey, 1915:209.

Length 14 mm. to 21 mm., width 7 mm. to 11 mm. Oblong, shining, reddish-brown. Clypeus with single medial tooth. Clypeus and front rugose, the rugae formed by irregular pitting, pits becoming scattered at occiput, becoming separated by more than twice their own width. Frontal carina thinning medially and laterally, not quite extending to lateral edges of front. Pronotum convex, anteriorly and laterally margined. Posterior edge slightly sinuate, not margined. Apical angles acute, posterior angles rounded. Anterior margin with well developed median tubercle, greater than clypeal tooth. Posterior to this tubercle is a deep fovea, the surface having a punctation similar to that on front. Pits becoming scattered at edges of fovea, until they are separated by at least their own diameters on rest of pronotum.

Pits at margins becoming confluent, resembling in texture the front and fovea. Scutellum smooth with a few scattered punctures. Elytra longer than wide, about twice as long as pronotum; fine punctures scattered throughout and mixed with annular punctures, few of which are confluent, the coarse punctures finer and denser posteriorly. Pygidium moderately punctate throughout, the punctures generally separated by at least their own diameters, laterally denser in corners. Margin on ventral edge widest at lateral angles of pygidium and just laterally of medial point; narrower between (fig. 4). Underside quite hairy, prosternal process completely so. Anterior tibia tridentate, emarginations between teeth deep, with pits outside longitudinal row of setigerous punctures. Apex of hind tibia slightly flared, its width approximately one-third to one-half length of tibia measured along inner edge. Aedeagus distinct from other species, but with minor individual variations (fig. 2). Female differs from male in having pygidium more flattened, and in not having an emargination in the last abdominal sternite.

TYPE: Museum of Comparative Zoology, Harvard University, LeConte Collection.

TYPE LOCALITY: Ringgold Barracks, Texas (near Rio Grande City, Starr County).

SPECIMENS EXAMINED: 700 (351 males, 349 females).

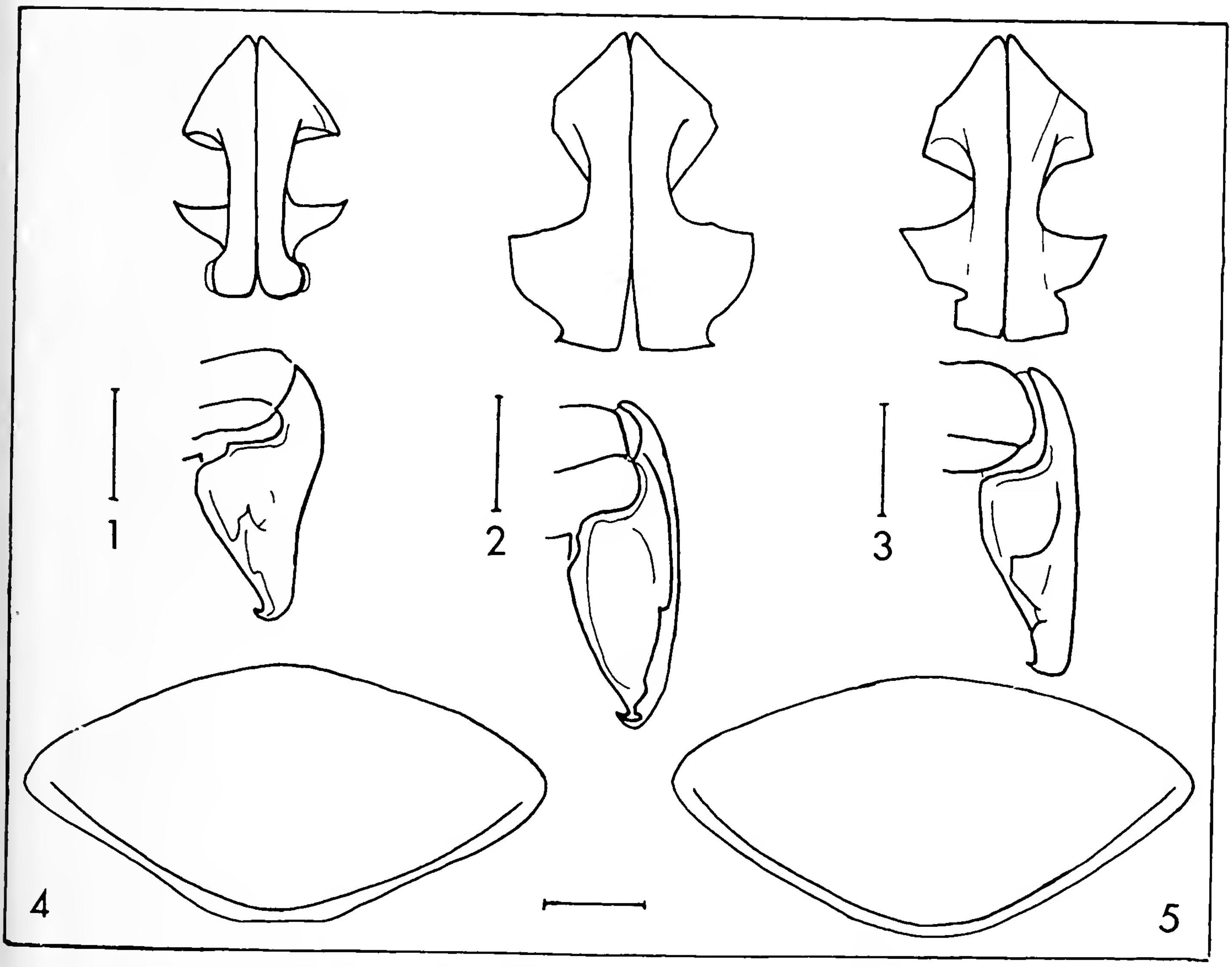
DISTRIBUTION: Sonoran desert and drier areas of southwestern United States (except most of California), and northern and western Mexico.

UNITED STATES. CALIFORNIA: *San Bernardino Co.;* Needles; Providence Mountains. ARIZONA: "Ariz."; "Canyon"; "Canyon Lake"; Safford; 2 mi. w. Magna; Santa Catalina Mountains (Pepper Sauce Canyon); Baboquivari Mountains. *Cochise Co.:* Cochise; Portal; Lowell; Whetstone Mountains (Dry Canyon Sands Ranch); Huachuca Mountains; Chiricahua Mountains. *Gila Co.:* Globe; Miami; Pinal Mountains. *Graham Co.:* Geronimo. *Greenlee Co.:* Clifton. *Maricopa Co.:* Wickenburg; Phoenix; Arlington; Gillespies Dam; Gila Bend; Higley. *Pima Co.:* Organ Pipe Cactus National Monument (Quitobaquito, W. Bates Well, Walls Well Road, Hockers Well, Headquarters); Santa Catalina Mountains (Agua Caliente Ranch); Tucson; San Xavier Mission; Ajo Mountains (Alamos Canyon). *Pinal Co.:* Apache Junction; Oracle. *Santa Cruz Co.:* Santa Rita Mountains (Madera Canyon); Nogales; "Washington Mountains near Nogales." *Yavapai Co.:* Prescott. *Yuma Co.:* 63 mi. e. Yuma. NEW MEXICO: Big Dry Creek. *Doña Ana Co.:* Pyramid Peak; Mesquite (?). *Hidalgo Co.:* Lordsburg. *Sierra Co.:* 16.7 mi. s. Truth or Consequences. TEXAS: "Cameron Co."; "Welder Wildlife Refuge (near Sinton)." *Brewster Co.:* Big Bend National Park (Maverick, Kingsville, Boquillas, Panther Junction, Oak Springs, Chisos Basin, Hot Springs); Lajitas; Terlingua. *Cameron Co.:* Esperanza Ranch (Brownsville). *Duval Co.:* San Diego. *El Paso Co.:* El Paso. *Hudspeth Co.:* Sierra Blanca. *Kimble Co.:* Junction City. *Val Verde Co.:* Del Rio. *Webb Co.:* Laredo.

MEXICO. "Sonora"; "Libertad"; "Nu Laredo." CHIHUAHUA: Santa Eulalia. COAHUILA: Montlave; Boquillas del Carmen. DURANGO: Lerdo. NAYARIT: 21 mi. s. Acaponeta. NUEVO LEON: 5 mi. s. Monterrey; Apodeca. SINALOA: Venoido; "Venedie" (Venodio?); Los Mochis; Topolobampo; 10 mi. s. Guamachil; 35 mi. n. Guamachil; 18 mi.

n.e. San Blas; Mazatlan; 5 mi. n. Mazatlan; 7 mi. n. Mazatlan; 8 mi. n. Mazatlan; ½ mi. s. Villa Union; 3 mi. n.e. Villa Union; 26 mi. n.e. Villa Union; Rio Piaxtala (1 mi. w. Mex. #15); Culiacan; Vinaterio. SONORA: Rio Mayo; "San Bernardino, Rio Mayo" (San Bernardo?); Hermosillo; 36 mi. n. Hermosillo; Posa; 25 mi. s. Llano; Campo Utah; San Carlos Bay; Louis; Saric; Ciudad Obregon; Navajoa; 1 mi. n.w. Navajoa; La Aduana; 2.1 mi. w. Alamos; Magdalena; Esperanza; Valle del Yaqui; El Oasis (45 mi n. Hermosillo).

REMARKS: The genitalia of Casey's *pimalis* seem to show no difference from the specimens from Texas, and the author agrees that this should be considered a synonym of *B. (O.) ruginasus.* This species is taken from May to December and is apparently most common in August. Individuals of this species are readily attracted to lights.



FIGURES 1-5. *Bothynus (Oxygrylius)* spp. (Scale equals 1 mm.) 1—*peninsularis,* male genitalia, dorsal and lateral views. 2—*ruginasus,* male genitalia, dorsal and lateral views. 3—Hybrid of *Bothynus* spp., male genitalia, dorsal and lateral views. 4—*ruginasus,* male pygidium. 5—*peninsularis,* male pygidium.

Bothynus (Oxygrylius) peninsularis (Casey), NEW COMBINATION (Figs. 1, 5)

Oxygrylius peninsularis Casey, 1915:209.

This species is nearly identical to the preceding, except in the male genitalia (fig. 1) and the following variable character: Ventral margin of the pygidium usually widest only at the lateral angles, becoming increasingly narrower medially (fig. 5).

TYPE: United States National Museum 48598, Casey Collection.

TYPE LOCALITY: San Jose del Cabo, Baja California Sur.

SPECIMENS EXAMINED: 513 (303 males, 210 females).

DISTRIBUTION: Southern California and peninsula of Baja California.

UNITED STATES. NEVADA: Lake Mead. CALIFORNIA: "Cal." *San Bernardino Co.:* "Ibanpah Mountains" (Ivanpah Mountains?); Providence Mountains. *Riverside Co.:* Palm Springs; Joshua Tree National Monument (Sunrise Well, Lower Covington Flats, Smithwater Wash, Pinto Wash Well, Cottonwood Springs, n. side Eagle Mountain); Chuckawalla Mountains (Irish Wash, Red Cloud Mine). *San Diego Co.:* Borrego; San Felipe; Mason Valley; Vallecito. *Imperial Co.:* Kane Springs; San Felipe Creek (near Junction Carrizo Creek).

MEXICO: BAJA CALIFORNIA NORTE: 10 mi s. Catavina; Valle Trinidad; e. base Sierra de Juarez below La Rumerosa. BAJA CALIFORNIA DEL SUR: La Paz; 15 mi. w. La Paz; 25 mi. w. La Paz; Palmanita, Purissima; Las Parras; Comondu; 10 mi. s.w. Comondu; 20 mi. n. Comondu; Triunfo; 6 mi. n. Triunfo; San Jose del Cabo; 10 mi. s.w. San Jose del Cabo; Miraflores; 5 mi. s. Miraflores; 4 mi. w. San Ignacio; 15 mi. n. San Ignacio; 45 mi. n. San Ignacio; 50 mi. n. San Ignacio; Canipole; 10 mi. s.w. Canipole; Cabo San Lucas; San Vanancio; Coyote Cove (Conception Bay); San Francisquito Bay; 25 mi. n. Santa Rosalia; 6 mi. s.w. Santiago; 4 mi. n. Todos Santos; 3 mi. n. San Pedro; 5 mi. w. San Bartolo; 50 mi. s. El Arco; Ruffo Ranch (Isla Cerralvo).

REMARKS: The adults of this species are active from late June to late December, and are taken most frequently in August and September. A specimen kept in captivity lived from late October to the summer months of the following season, in the adult stage, so apparently there is some overwintering by adults. Early records of this species may represent these adults. This species is frequently collected at lights. Evidently the adults spend the days in the soil, coming to the surface at night to fly about in search of mates.

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DESCRIPTION OF A BRACHYPTEROUS FIREFLY FEMALE OF THE GENUS PHOTINUS (COLEOPTERA: LAMPYRIDAE)[1]

By JAMES E. LLOYD[2, 3]

In the revision of the genus *Photinus* by J. W. Green (1956) the females of seven of the 28 described Nearctic species were found to be brachypterous and the females of two more species were suspected to be so. No females of the species *P. frosti* Green and *P. tenuicinctus* Green were in collections at that time. On June 29, 1964, two females of *P. tenuicinctus* (fig. 1) were collected at Fayetteville, Arkansas.

[1] This investigation was supported by U. S. Public Health Service Predoctoral Fellowship No. 1-F1-GM-22,196-01, the Sigma Xi-RESA research fund, and the Bache Fund, Grant No. 481.

[2] Department of Entomology, Cornell University, Ithaca, New York.

[3] Grateful acknowledgment is hereby made to Mr. John W. Green of The California Academy of Sciences for reading the manuscript.

Photinus tenuicinctus Green, FEMALE. Brachypterous, texture firm. Eyes small, separated by more than diameter of eye. Pronotum with piceous central spot slightly narrowing posteriorly, nearly attaining base and diffusing anteriorly without reaching apex; rectangular area each side of central spot fulvous; pronotal margin flavate and weakly translucent laterally and anteriorly. Base of scutellum and mesonotal areas piceous, scutellum pale in about apical half. Elytra black, extending slightly beyond apical margin of first abdominal tergite; sutural bead and lateral margins pale fulvous, continuously around apex. Abdomen above piceous black, pygidium perceptibly lighter. Ventral abdominal segments 2-5, 7 brown, 6 pale, luminous in median third, 8 flavate. Length 9.5 and 11.5 mm.

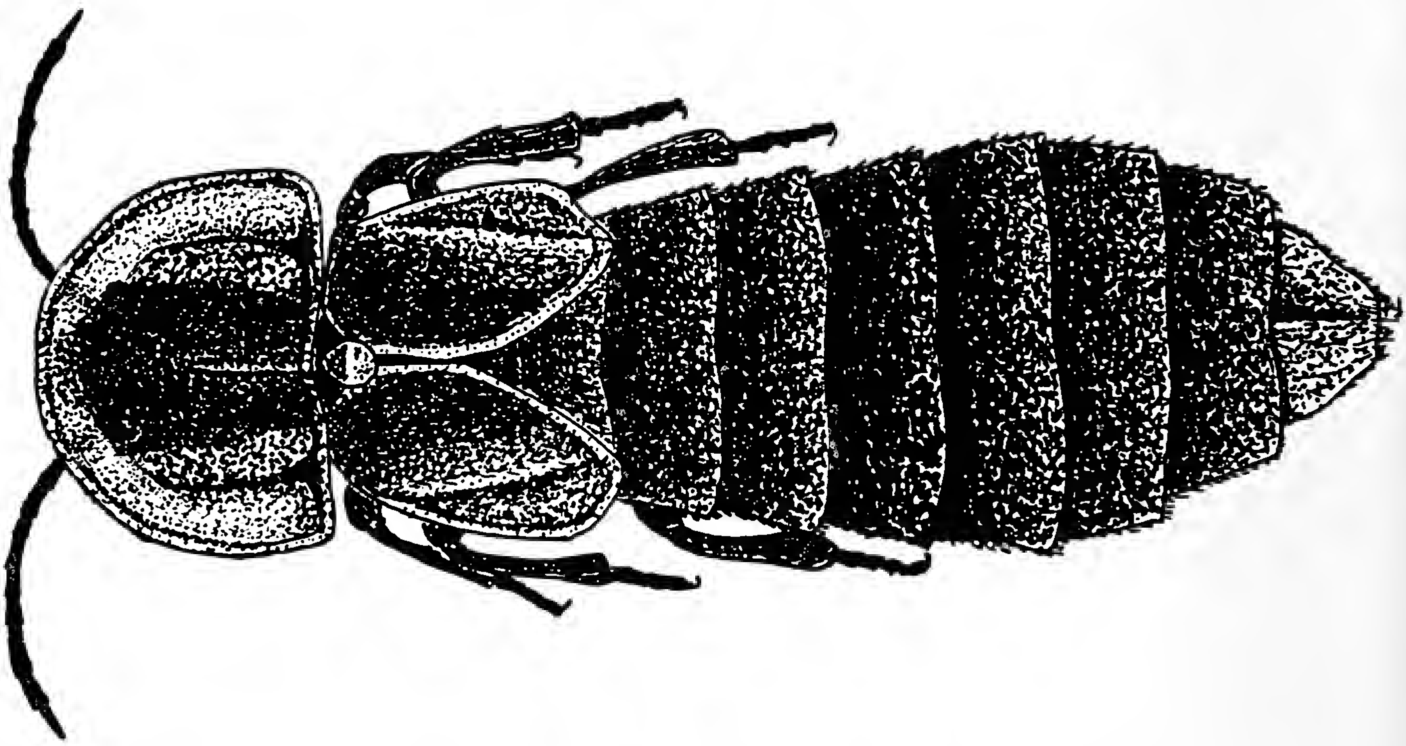

FIGURE 1. *Photinus tenuicinctus,* brachypterous female, length 9.5 mm.

The species *P. tenuicinctus, P. brimleyi* Green, and *P. punctulatus* LeConte are closely related and form a natural group within the genus. The females now in collections may be separated by the following key.

1. Pronotum with central dark spot; pronotum with median longitudinal impression or carina; body texture firm; pronotum narrowly rounded anteriorly ------------ 2
   Pronotum without central dark spot; pronotum without median longitudinal impression or carina; body texture soft; pronotum broadly rounded anteriorly --- BRIMLEYI
2. Pronotum punctate (individual pits usually clearcut and well defined); pronotal spot narrowing posteriorly (wedge-shaped); pronotum with median impressed longitudinal line -- PUNCTULATUS
   Pronotum not punctate (individual pits ocassionally seen but usually obscured by surface irregularities); pronotal spot only slightly narrowing posteriorly; pronotum with median longitudinal carina in basal half ------------------- TENUICINCTUS

Because of the limited number of specimens available it is impossible to know the general value of the key characters given. For example, males of *P. brimleyi* do have a pronotal spot and the absence of it in the two females now present in collections may not reflect the general condition.

LITERATURE CITED

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THE COLEOPTERISTS' BULLETIN

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The Coleopterists' Bulletin

A QUARTERLY PUBLICATION DEVOTED TO THE STUDY OF BEETLES

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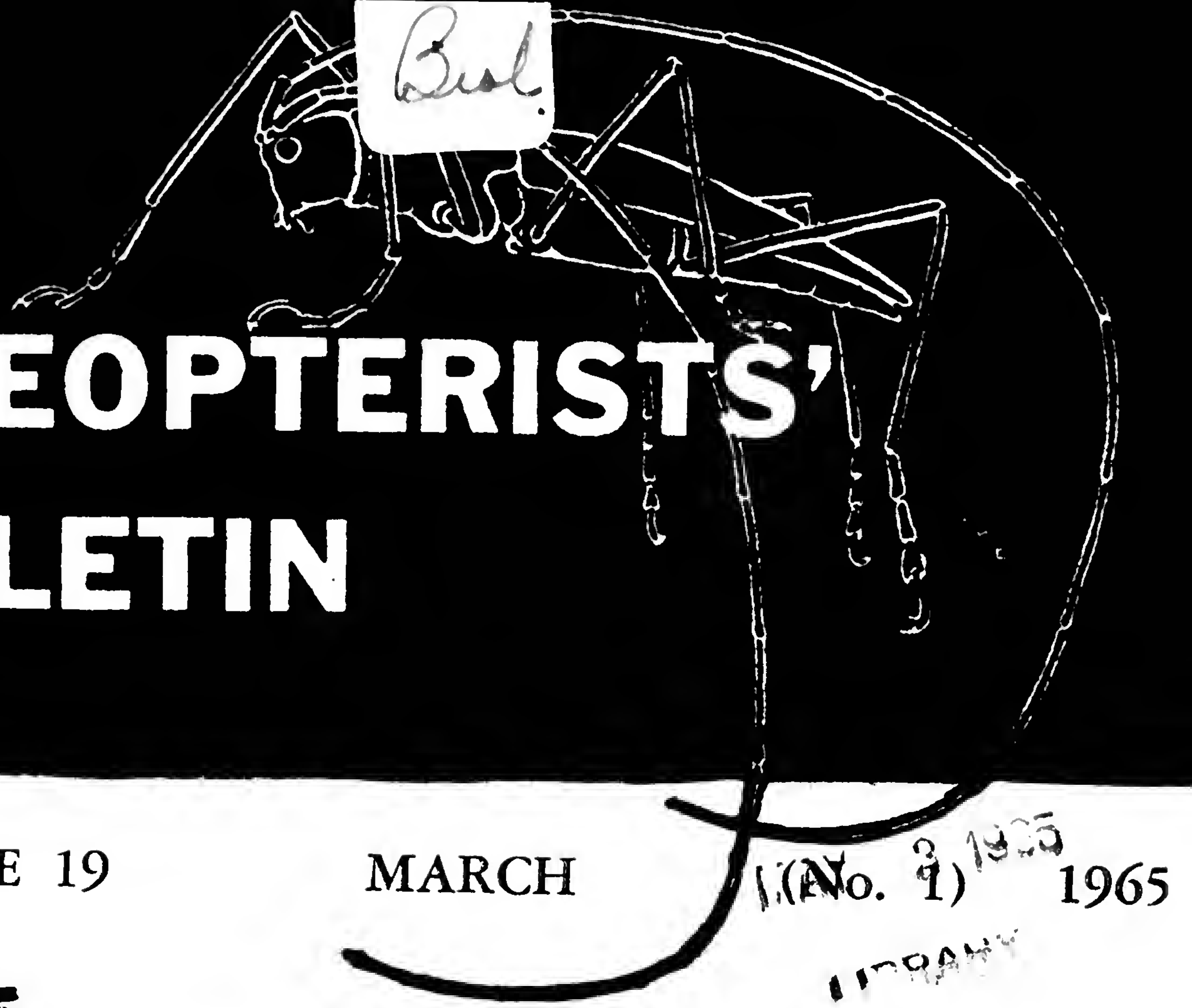
December (No. 4), pp. 97-128, December 30, 1965.



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The Coleopterists' Bulletin

Volume 19 March (No. 1) 1965

A REVISION OF BRACHINUS OF NORTH AMERICA: PART I. THE CALIFORNIA SPECIES (COLEOPTERA: CARABIDAE)

By TERRY L. ERWIN[1]

INTRODUCTION

The most recent revision of this genus for North America was that by John L. LeConte (1862:523). Blatchley (1910:157) used LeConte's work as the basis for his own treatment of *Brachinus* in his monumental "Coleoptera of Indiana." The species of these "bombardier beetles" have been confused for many years because of their extreme similarity and no recent revision has been attempted. The original descriptions in most cases are not very definitive, usually stating that the species are iron-red with blue elytra, and seldom offering any really reliable differentiating characters.

George E. Ball (1960:164) echoes the attitude of most contemporary entomologists when he says: "The taxonomy of the North American species of this group is very poorly understood and it is almost a waste of time at present to attempt to determine individuals to species."

The present paper deals primarily with the taxonomy and distribution of *Brachinus* in California. Subsequent articles will stress the ecology, biology, and behavior of these beetles. This study is preliminary to a revision of all New World species, which will require several more years to complete.

The taxonomic characters remain quite constant throughout the entire range of each species. Even the color characteristics seem to be reliable in more than 95% of the 7,000 specimens studied during this investigation. After the small but constant morphological differences are recognized, reliable determinations can easily be made of both sexes of all known California "bombardier beetles."

The male genitalic structures are of great taxonomic value in most species, but many supplemental differences have also been utilized in this revision. The nature of the elytral pubescence is one of the most easily recognized differentiating characters. The variation ranges from nearly entirely glabrous (in *B. costipennis* Motschulsky) to completely and densely pubescent (in several of the desert forms). The color of the mesepisterna, the abdomen, the various antennal segments (and even the elytra, in the case of *B. lateralis* Dejean) provide many excellent recogni-

[1] San Jose State College, San Jose, California.

tion characters. The females of the various species differ from the males, only in their wider and less convex elytra and the shape of the last tergite which is visibly modified in the male.

Dissecting Techniques

As in most carabids, the aedeagus is easily removed from fresh or relaxed specimens without damaging them. The phallus (with accompanying parameres) should be placed in cold 10% KOH for 12 hours, to dissolve the muscle tissue. These structures are heavily sclerotized, therefore, they are not visibly distorted by cold 10% KOH even after submersion for 18 hours. The terminalia should be removed from the KOH, washed in dilute acetic acid, then placed in clove oil for 12 hours to "clear" the walls of the aedeagus. The completely prepared terminalia should then be placed in 70% ethyl alcohol vials which are themselves kept inverted in larger jars of alcohol (to prevent accidental destruction by evaporation of the alcohol in the small vials). Following this clearing technique the sclerotized *virga* (at the tip of the endophallus) becomes visible through the wall of the phallus. This small virga (Snodgrass, 1935:622) will be of considerable taxonomic importance in more extensive revisions, and is a useful comparative morphological character, even in this limited study of California species. For more lucid observations, one may extract the virga with a hooked needle thrust into the apical orifice of the aedeagus or extrude it with the pressure of an injection of alcohol into the basal orifice of the aedeagus from a micro eyedropper. The shape of the phallus, the virga, and the parameres are illustrated for each California species in the accompanying plates. For the identification of most specimens, the complicated clearing process described above is not absolutely essential, because identification can be accomplished by just comparing the aedeagal apices that are visible after the terminalia have been drawn a short distance out of the abdominal tip. The above dissecting methods have been modified from those of Lindroth (1963) and Bell (1960).

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The following abbreviations indicate the museums in which the specimens cited are located: CAS, California Academy of Sciences; LACM, Los Angeles County Museum; SDNHM, San Diego Natural History Museum; SJSC, San Jose State College Museum; UCD, University of California at Davis; ATM, A. T. McClay; UIM, University of Idaho Museum; JGE, J. G. Edwards; VVB, V. V. Baicher; RES, R. E. Stecker; and TLE, the author's personal collection.

Brachinus Weber

Brachinus Weber, 1801:22.
(*Carabus* Linné, Fabricius; *Brachynus* auct.)

TYPE OF GENUS: *Carabus crepitans* Linné, here designated. This was the second species listed by Weber, because *bimaculatus* (which Weber listed first) is now included in *Pheropsophus* Solier 1833.

Description: Small to medium sized beetles with blue or brown elytra and ferrugineus head and thorax. The following characters are representative of this genus: second antennal segment short and all segments with at least some pubescence; eyes prominent and with a "bead"[2] at dorsal edge; labrum short and broad; mandibles each with a single tooth; galae palpiform and two-segmented, with apical segment obconical; maxillary palpi four-segmented, with second and third segments obconical; labial palpi three-segmented, with first and second segments obconical; anterior tibiae with an "antennal comb" (formed of a fringe of stiff setae) in middle of posterior edge, and with an apical tibial spine; elytra costate to a variable degree, and truncate to dehiscent at apex; epipleura elevated above margin of elytra from humeri to outer apical corner; venter of thorax and abdomen mostly pubescent; middle coxal cavities disjunct; abdomen with seven visible sterna; parameres of male genitalia glabrous, reduced, the right one being very much smaller than the left.

These beetles, when alarmed, forcibly eject a liquid (composed in part of nitrogen and P-benzoquinone) from the pygidial glands that are located in the caudal half of the abdomen under the reproductive organs. This liquid volatizes instantly upon contact with the air, generating a small puff of "smoke" accompanied by an audible popping or crackling sound. If this liquid touches human skin, the skin will burn for an instant and then turn dark brown which lasts for several days, eventually fading to normal color.

[2] "Bead" in the sense used here refers to a raised ridge similar to a welding bead.

Enemies of *Brachinus* (birds, insects, skunks, etc.) no doubt will be affected in much the same manner and will not "forget" the lesson. The popping will act to scare any enemy capable of hearing, and the puff of "smoke" would serve to startle an enemy. This ability to crepitate has resulted in both the common name of these beetles ("bombardier beetles") and in many of the species names such as *Brachinus explodens* Duft., *B. crepitans* (Linné), *B. fumans* (Fab.), and *B. librator* Dejean.

Brachinus beetles are usually not far from water, in streamside, lakeside, or marshy habitats. Most members of this genus are capable of flying and do so when the food supply is scarce or the environmental conditions become unsuitable.

Key to Brachinus of California[3]

1. Mentum flat or slightly convex, with scattered setae; elytra with at least the 8th interval[4] densely pubescent ---------- 2
   Mentum concave, surrounded by a ring of setae; elytra without dense pubescence in any interval ---------- **COSTIPENNIS** Motschulsky
2. Elytra with dense pubescence restricted to 8th interval, but scattered hairs may occur on the apical third of elytra ---------- **GEBHARDIS** new species
   Elytral pubescence not restricted to 8th interval ---------- 3
3. Elytra with pubescence restricted to 6th, 7th, and 8th intervals at middle (but also covering most of the apical third of the elytra) ---------- 4
   Elytra with entire dorsal surface pubescent ---------- 6
4. Elytra blue, with blue epipleurae ---------- 5
   Elytra brown, with testaceous epipleurae ---------- **LATERALIS** Dejean
5. Antennal segments 3-5 usually black, at least in part (rarely ferrugineus), outer segments dusky; mesepisterna and sides of abdomen black; last 3 abdominal terga darkened, usually black ---------- **FIDELIS** LeConte
   Antennae pale ferrugineus; abdomen, mesepisterna and last 3 terga pale ferrugineus (browner in some populations) ---------- **PALLIDUS** new species
6. Pronotum smooth or shallowly rugose ---------- 7
   Pronotum with deep punctations forming a strongly rugose surface -- **FAVICOLLIS** new species
7. Pronotum strongly cordiform, with sides more or less explanate before the middle; abdomen and mesepisterna black; antennal segments 3-11 entirely black ---------- **TSCHERNIKHI** Mannerheim
   Pronotum narrow, distinctly longer than wide and with sides not explanate; venter pale; antennal segments 3-11 dusky ---------- 8
8. Elytra feebly costate, feebly pubescent; pronotal disc glabrous, with only a few scattered hairs around margins; head with frontal furrows deep and rugose ---------- **IMPERIALENSIS** new species
   Elytra not costate, densely pubescent; pronotal disc with dense pubescence; head with shallow frontal furrows ---------- **VELUTINUS** new species

Brachinus costipennis Motschulsky

Brachinus costipennis Motschulsky, 1859: 139.
Brachinus carinulatus Motschulsky, 1859; 139. (NEW SYNONYMY)
Brachinus glabripennis LeConte, 1858: 28. (NOMEN NUDUM)

In 1862 (p. 523) LeConte listed *Brachinus lecontei* Motschulsky as a synonym of *B. costipennis,* however Ponamarenko has compared the "type"

[3] This key treats the species known to occur naturally in California, but some of these have ranges that extend far beyond the boundaries of this state.
[4] In this key "elytral interval" refers to the depressions between the costae.

specimens of these species, and they are definitely different. For further details, see *Brachinus fidelis* LeConte.

TYPE LOCALITY: *B. costipennis:* "California"; *B. carinulatus:* "California."

TYPE SPECIMENS: Two cotypes of *B. costipennis* and two cotypes of *B. carinulatus* are in the Motschulsky collection at the University of Moscow. One specimen of *B. costipennis* is in the LeConte collection, designated as type number 8329, at the Museum of Comparative Zoology, Cambridge, Massachusetts. Dr. Darlington states that this specimen is very likely a cotype from Motschulsky, with whom LeConte is known to have corresponded.

DISTRIBUTION: This species is found in most of the southwestern United States and as far north as Tehama County in California. It is one of three species occurring on Santa Cruz Island, 20 miles off the coast of Santa Barbara County in southern California (fig. 10).

DESCRIPTION: *Size.* Length 5 to 8 mm.; width 4 to 4.2 mm. *Coloration.* Elytra of both sexes bluish with blue epipleura; head and pronotum ferrugineus; mesal edges of mandibles piceous; antennal segments 1-3, legs, palpi, and venter ferruginotestaceous; antennal segments 4-11 dusky brown; mesepisterna and sides of abdominal sterna ferrugineus, rarely brown. *Head.* Labrum entire; dorsal surface of mentum concave, with a ring of setae surrounding concavity; bead around eyes entire except for a short area behind each antenna; furrows on frons very shallow and smooth; only a few setae at most behind eyes and on top of head; microsculpture consists of small isodiametric meshes. *Pronotum.* Widest at anterior third; anterior angles prominent and rounded; posterior angles prominent, acute and directed posteriorly, with lateral basal impressions shallow; lateral margins slightly reflexed and narrowly beaded with dark reddish brown; disc flat, sometimes slightly convex, barely rugose down midline and at most a few setiferous discal punctures; anterior transverse impressions deep; microsculpture consists of isodiametric meshes. *Elytra.* Male elytra truncate, widest just behind middle; moderately costate; microsculpture consists of small isodiametric meshes; glabrous except for regularly spaced hairs in 8th interval. Female elytra similar except proportionally wider than those of male. *Aedeagus* (fig. 1). Phallus strongly arched; ending in an apical knob; microsculpture lacking. Endophallus bears a poorly pigmented virga, consisting of a "V" shaped tip, with a median ventral fin. A pigmented intravirgal piece occurs at the base of this fin.

CALIFORNIA LOCALITY RECORDS: 397 specimens were examined. *Alameda County:* (Oakland Hills) CAS; *Fresno County:* (Sanger) CAS, (LeFerre Creek) CAS, (Camp Greeley) CAS; *Humbolt County:* (Garberville) CAS; *Imperial County:* (Carrizo) SDNHM, (Castiac) UIM; *Los Angeles County:* (San Francisquito Canyon) LACM, (Pasadena) LACM, (Camp Bonita, San Gabriel Mts.) LACM, (Big Dalton Dam) ATM, (Big Tujunga) LACM, (Los Angeles River) LACM, (Rio Hondo) LACM, (Frenchman Flats) LACM, (Lake Arrowhead) CAS, (Tujunga Pass) ATM; *Madera County:* (Coursegold) UIM CAS; *Mendocino County:* (Ukiah) VVB; *Monterey County:* (Stone Canyon) CAS; *Orange County:* (Costa Mesa) ATM; *Placer County:* (Placer County) CAS; *Riverside County:* (Simond's) LACM, (Palm Canyon) LACM, (Riverside) CAS, (Elsinore Lake) CAS, (Hemet) VVB, (Gilman Hot Springs) ATM; *San Bernadino County:* (Cajon Wash) LACM, (Colton) CAS, (Cajon Pass) ATM; *San Diego County:* (Mission Dam) SDNHM, (Mission Valley) SDNHM, (Pine Valley) SDNHM, (Dehesa) SDNHM, (El Monte Oaks) SDNHM, (San Diego) SDNHM, (Valley Center) SDNHM, (Warner's Ranch)

SDNHM, (Rincoln) SDNHM, (Banner) SDNHM, (Oceanside) CAS, (Poway) CAS, (Descanso) CAS; *San Luis Obispo County:* (Arroyo Grande) CAS; *Santa Clara County:* (Adobe Creek) CAS; *Santa Cruz Island:* (Santa Cruz Island) CAS; *Sonoma County:* (Duncan Mills) CAS; *Tehama County:* (hills west of Tehama County) CAS; *Tulare County:* (Sequoia Park) VVB; *Ventura County:* (Santa Paula) CAS; *Yolo County:* (Davis) ATM.

DERIVATION OF THE NAME: Latin, *costa* = rib; *pennis* = wing; referring to the costate elytra.

DISCUSSION: This species is unique among the *Brachinus* in our fauna because of the concave mentum surrounded by setae. Also, this is the only California species whose members possess glabrous elytra. The male is further distinguishable by having the apical knob of the adeagus so well developed. The species is widely distributed within the state, as indicated by the collection records.

Brachinus gebhardis Erwin, NEW SPECIES

TYPE LOCALITY: Uvas Creek, 5 miles west of Morgan Hill, Santa Clara County, California.

TYPE SPECIMENS: The holotype male and the allotype female have been deposited in the entomological museum at the California Academy of Sciences in San Francisco. Both were collected by the author at the type locality, on 9 February 1964. Forty-six paratypes (of both sexes) were collected by the author along Coyote Creek, 7 miles east of Gilroy, Santa Clara County, California (below Gilroy Hot Springs). Ten of these paratypes are deposited in each of the following: CAS, MCZ, AMNH, and the author's personal collection Two paratypes are in each of the following: SJSC, UCD, and the University of Moscow. The remaining paratypes have been returned to their owners.

DISTRIBUTION: This species is confined to the extreme west coast of California except at the type locality and in Riverside County. It is one of the three species which occur on Santa Cruz Island, 20 miles off the coast of Santa Barbara County (fig. 11).

DESCRIPTION: *Size.* Length 6 to 8:5 mm.; width 4.5 to 4.6 mm. *Coloration.* Elytra of both sexes blue with blue epipleura; head and pronotum ferrugineus; mandibles reddish brown with piceous mesal edges; antennal segments 1-4, legs and palpi pale ferrugineus; antennal segments 5-11 slightly darker than segment 4; mesepisterna black; sides of abdominal sterna usually ferrugineus but rarely black. *Head.* Labrum slightly emarginate; dorsal surface of mentum convex, with a seta only at each anterior corner; bead around eyes entire; frons with shallow, finely rugose frontal furrows; numerous setae arise behind eyes and on top of head; microsculpture consists of small isodiametric meshes. *Pronotum.* Widest before middle with sides deeply sinuate; anterior angles not prominent; posterior angles acute, with lateral basal impressions shallow; lateral margins broadly reflexed; marginal bead dark ferrugineus; disc flat, somewhat rugose down midline and with several setiferous punctures in basal half and a few at anterior corners; anterior transverse impression reduced to a triangular depression; microsculpture consists of small isodiametric meshes. *Elytra.* Male elytra truncate, widest at apical third, narrowing slightly to squared humeri which are not prominent; deeply costate; microsculpture consists of fine isodiametric meshes; pubescent band confined to 8th interval, but a few scattered hairs occur at apex and in scutellar region. Female elytra similar but wider at apical third than those of male. *Aedeagus* (fig. 2). Phallus fairly straight; ending in a rounded point; microsculpture lacking. Endophallus bears a poorly pigmented virga which is fused apically, but has two basal lobes.

CALIFORNIA LOCALITY RECORDS: 70 paratypes were examined. *Alameda County:* (Arroyo Mocho) TLE; *Amador County:* (Horse Creek) TLE; *Los Angeles County:* (Pasadena) CAS, (Soledad Canyon) LACM, (San Francisquito Canyon) LACM, (Tanbark Flat) ATM; *Monterey County:* (Bryson) CAS; *Orange County:* (Lower San Juan Campground) LACM; *Riverside County:* (San Jacinto Mts.) CAS; *San Diego County:* (Valley Center) SDNHM; *San Luis Obispo County:* (Atascadero) CAS, (San Luis Obispo) CAS; *Santa Barbara County:* (Cuyama River) CAS, (West Santa Ynez River) ATM, (Oso Canyon) ATM; *Santa Cruz Island:* (Santa Cruz Island) CAS; *Santa Clara County:* (Uvas Creek) TLE, (Pacheco Pass) UIM, (Gilroy Hot Springs) TLE; *Stanislaus County:* (Del Puerto Creek) TLE; *Ventura County:* (Foster Park) ATM.

DERIVATION OF THE NAME: Greek, *geb* = born; Old French, *hardi* = shovel-shaped; referring to the "spade" shaped dorsal outline of these beetles.

DISCUSSION: This species is poorly represented in collections and seems to be more rare than the other northern species. The pubescent band of the elytra being confined to the 8th interval serves as an excellent field identification character. The lack of a ridge at the dorsal apex on the penis easily separates males from those of *B. fidelis,* which are otherwise quite similar to *B. gebhardis.*

Brachinus lateralis Dejean

Brachinus lateralis Dejean, 1831: 424.

Brachynus leucoloma Chaudoir, 1868: 301. (NEW SYNONYMY)

TYPE LOCALITY: *B. lateralis:* "Moritz, Angustura, Guayama baja, Misiones Del Coronis" is handwritten on the label of Mannerheim's specimen, which was given to him by Dejean; *B. leucoloma:* "de Rio Gila, en California" is cited in Chaudoir's description (refers to the Gila River in the extreme southeast corner of California).

TYPE SPECIMENS: One syntype of *B. lateralis* is in the Mannerheim collection at the University of Helsinki. One cotype of *B. leucoloma* is in the Muséum National d'Histoire Naturelle, Paris.

DISTRIBUTION: This species is widely distributed across the southern United States from Florida to California and into Mexico. Blatchley (1910) records one specimen from Indiana, but the record is doubtful because he indicates the elytra are blue-black instead of brown (fig. 12).

DESCRIPTION: *Size.* Length 7 to 9 mm.; width 4.3 to 4.5 mm. *Coloration.* Elytra of both sexes brownish with pale testaceous epipleura; head and pronotum dark ferrugineus; mandibles piceous at apex; antennal segments 1-4, legs, palpi, and frons ferrugino-testaceous; antennal segments 5-11 dark ferrugineus; mesepisterna and sides of abdominal sterna dark brown (similar in color to the elytra). *Head.* Labrum slightly notched at apex; dorsal surface of mentum convex with a seta at each anterior corner; bead occurs only around top half of eyes; frons with rugose longitudinal furrows which widen at base of clypeus; only a few setae arise behind eyes and on top of head; microsculpture consists of small isodiametric meshes. *Pronotum.*

Slightly wider just before middle and with sides deeply sinuate; anterior angles not very prominent (barely exceeding width of anterior margin); posterior angles prominent, acute with lateral basal impressions almost absent; lateral margins slightly reflexed, narrowly beaded with dark reddish brown bead; disc flat, slightly rugose down midline and with a few setiferous punctures at base and at midapex; microsculpture consists of small isodiametric meshes. *Elytra.* Male elytra truncate, widest at apical third, narrowing anteriorly to prominent humeri; very slightly costate; microsculpture consists of very fine isodiametric meshes; pubescent bands occur near humeri only in 7th and 8th intervals, but broadened gradually and covering entire elytra beyond apical sixth. Female elytra similar, but proportionately slightly wider than those of male in apical half. *Aedeagus* (fig. 3). Phallus heavily sclerotized ending in a blunt tip; a median dorsal ridge and two lateral ridges occur near apex and the apical half is rugose between ridges; microsculpture lacking. Endophallus bears a poorly pigmented virga consisting of two lateral plates.

CALIFORNIA LOCALITY RECORDS: 94 specimens were examined. *Imperial County:* (Yuma) CAS, (Salton Sea) VVB, (Mecca) Coachella Valley Mosquito Abatement District Collection, (Calpatria) CAS, (El Centro) CAS; *Los Angeles County:* (Pasadena) CAS, (Long Beach) CAS, (Lake Hodges) SDNHM, (Cypress) LACM, (Los Angeles) CAS; *Orange County:* (Laguna Canyon) ATM, (Anaheim) SDNHM; *Riverside County:* (Elsinore) CAS, (Elsinore Lake) CAS UIM, (Blythe) UIM LACM, (Corona) ATM; *San Bernadino County:* (Needles) CAS, (Ontario) CAS, (Saratoga Springs, Death Valley) ATM; *San Diego County:* (Oceanside) CAS, (San Diego) SDNHM, (San Juan Capistrano) UIM, (Sweetwater Valley) SDNHM.

DERIVATION OF THE NAME: French, *lateralis* — side; referring to the pale epipleura.

DISCUSSION: This species is very easy to recognize because it is the only North American species with brown elytra. The aedeagus is also very distinctive.

Brachinus pallidus Erwin, NEW SPECIES

TYPE LOCALITY: Mad River, 5 miles east of Mad River Post Office, Trinity County, California.

TYPE SPECIMENS: The holotype male and allotype female have been deposited in the entomological museum at the California Academy of Sciences in San Francisco. Both were collected by the author at the type locality, on August 16, 1964. Forty-eight paratypes (of both sexes) were collected by the author at the type locality and from Coyote Creek, 7 miles east of Gilroy, Santa Clara County, California (below Gilroy Hot Springs). Ten of these paratypes are deposited in each of the following: CAS, MCZ, AMNH, and the author's collection. Two paratypes are in each of the following: SJSC, UCD, UIM, and the University of Moscow. The remaining paratypes have been returned to their owners.

DISTRIBUTION: This species is mostly restricted to northern California, with only two populations known to occur south of Monterey Bay (fig. 13).

DESCRIPTION: *Size.* Length 7 to 9 mm.; width 3 to 3:5 mm. *Coloration.* Elytra of both sexes dark blue with blue epipleura; head and pronotum ferrugineus; mandibles reddish brown with piceous mesal edges and tip; antennal segments 1-2, legs, and palpi ferrugino-testaceous; antennal segments 3-11 ferrugineus; mesepisterna and sides of abominal sterna ferrugineus (occasionally caudal half of mesepisterna is brown, in which case sides of abdominal sterna will also be brown). *Head.* Labrum entire; dorsal surface of mentum slightly convex, with a setae at each anterior corner; bead around eyes entire, thickened at dorsal edge; frons with shallow frontal furrows which are finely rugose; numerous setae arise behind eyes and on top of had; microsculpture consists of very fine isodiametric meshes. *Pronotum.* Wider just before middle and with sides deeply sinuate; anterior angles slightly prominent; posterior angles acute and directed posteriorly, with lateral basal impressions shallow; lateral margins slightly reflexed, with a narrow bead of slightly darker color than pronotum; disc flat, quite rugose down midline and with a few setiferous punctures on basal half and at anterior corners; microsculpture consists of fine isodiametric meshes. *Elytra.* Male elytra with sides almost parallel, narrowing very little to slightly prominent humeri; deeply costate; microsculpture consists of fine isodiametric meshes; pubescent bands occur near humeri only in 7th and 8th intervals, but broaden to cover entire elytra beyond apical fourth; a few hairs occur in scutellar region. Female elytra similar, but proportionately wider than those of male in apical half. *Aedeagus* (fig. 4). Phallus prominently compressed resembling a "T" shape in cross section and ending in a feebly rounded point; microsculpture lacking. The endophallus bears a lightly pigmented bilobed virga which is connected ventrally by a thin "bridge."

CALIFORNIA LOCALITY RECORDS: 392 paratypes were examined. *Alameda County:* (Arroyo Mocho) TLE, (Livermore) CAS, (Sunol) CAS, (Niles Canyon) SDNHM; *Amador County:* (5 miles west of Sutter Creek on Horse Creek) TLE; *Butte County:* (Oroville) CAS; *Calaveras County:* (Mokelumne Hill) CAS; *Contra Costa County:* (Marsh Creek) TLE; *Fresno County:* (Camp Greely) CAS; *Glenn County:* (Elk Creek) CAS; *Humbolt County:* (Garberville) CAS UIM, (Schively) ATM, (Fort Seward) CAS UIM; *Lake County:* (Middletown) CAS UIM, (North Fork Cache Creek, Hwy. 20) ATM; *Madera County:* (Coursegold) CAS UIM; *Marin County:* (Pt. Reyes) ATM CAS; *Mariposa County:* (Jolon) CAS, (3 miles S. E. of Jolon) CAS; *Napa County:* (Rutherford) TLE, (Monticello) ATM; *Placer County:* (Auburn) ATM; *San Joaquin County:* (San Joaquin County) SJSC; *San Luis Obispo County:* (Atascadero) CAS; *Santa Clara County:* (Gilroy Hot Springs) TLE, (Uvas Creek) TLE, (Isabel Creek) TLE, (Los Gatos) CAS, (Mt. Hamilton) CAS, (San Jose) CAS, (Arroyo Bayo) JGE, (Santa Clara) CAS; *Siskiyou County:* (south of the Shasta River) CAS; *Shasta County:* (Anderson) CAS, (Redding) CAS VVB; *Sonoma County:* (Del Puerto Creek) TLE; *Tehama County:* (Red Bluff) CAS; *Trinity County:* (Mad River) TLE; *Yolo County:* (Putah Canyon) ATM, (Davis) ATM.

DERIVATION OF THE NAME: Latin, *pallidus* = pale; referring to the pale ferrugineus venter, limbs, head, and thorax.

DISCUSSION: Members of this species are easily recognized by the compressed ventral surface of the aedeagus, and by the light color of the abdomen and mesepisterna.

Brachinus fidelis LeConte

Brachinus fidelis LeConte, 1862: 524.

Brachinus lecontei Motschulsky, 1859: 139. (Primary homonym of *B. lecontei* LeConte, 1844:49.)

In 1859, Motschulsky described *B. lecontei* from California, but it was a primary homonym of *B. lecontei* LeConte, 1844, from the southern United States. According to LeConte (1862) *B. lecontei* LeC. is a synonym of *B. perplexus* Dejean. Motschulsky's name *B. lecontei* must also be rejected, on the grounds that it was, when proposed, a primary homonym. LeConte, in 1862, described *B. fidelis,* from California, as a species distinct from *B. lecontei* Mots. During the course of this research the author sent identical specimens of *Brachinus* from Del Puerto Creek, California, to both A. G. Ponomarenko and P. J. Darlington with requests that several characters be critically compared with those of the type specimens at the University of Moscow Museum and the Museum of Comparative Zoology. As a result of these comparisons, it was determined that the Del Puerto Creek specimens are identical both with Motschulsky's two type specimens of *B. lecontei* (in Moscow) and with LeConte's eleven type specimens of *B. fidelis* (in the Museum of Comparative Zoology). Accordingly, *B. fidelis* LeC. is a synonym of *B. lecontei* Mots. Because *B. lecontei* Motsch. is invalid, the first available valid name is *B. fidelis* LeConte 1862. (*B. lecontei* Dejean [1837: 14] must be considered a *nomen nudum.*)

TYPE LOCALITY: *B. fidelis:* "Kern" is handwritten on the label of LeConte's first specimen. A gold disc represents the state of California on all of LeConte's types of this species. *B. lecontei:* "California" is cited in Motschulsky's description, but his cotypes are labelled *B. latipennis lecontei* Motsch., California.

TYPE SPECIMENS: Two cotypes of *B. lecontei* Mots. are in the Motschulsky collection at the University of Moscow. Eleven specimens are in LeConte's series of *B. fidelis* LeC. at the Museum of Comparative Zoology. The first specimen in this latter series is designated as type number 5852. The last specimen in the series is labelled "Or."

DISTRIBUTION: This species, as far as is known, is confined to California, Arizona, and Mexico, occurring sympatrically with *B. costipennis.* It is one of the three species occurring on Santa Cruz Island, 20 miles off the coast of Santa Barbara County in southern California (fig. 14).

DESCRIPTION: *Size.* Length 7 to 9 mm.; width 4.5 to 4.6 mm. *Coloration.* Elytra of both sexes dark blue with blue epipleura; head and pronotum ferrugineus; mandibles dark red-brown to piceous at tips and along mesal edges; antennal segments 3-5 black or banded black; segments 6-11 dusky to brown; mesepisterna and sides of abdominal sterna black (venter may vary from dark ferrugineus to dark brown). *Head.* Labrum entire; dorsal surface of the mentum convex at middle with a setae at each anterior corner; bead around eyes entire joining with ridge over antennal base; furrows on frons shallow, finely rugose usually in form of a "V"; numerous setae arise behind eyes and a few from top of head; microscultpure consists of fine isodiametric meshes. *Pronotum.* Widest just behind anterior angles well in front of middle; anterior angles prominent and rounded; posterior angles prominent and acute; with lateral margins narrowly reflexed and narrowly beaded with a dark reddish-brown color; disc convex to flat, slightly rugose at center and at most a few setiferous punctures occurring in apical and basal transverse impressions; anterior transverse impression reduced to almost a triangular fovea; microsculpture consists of small isodiametric meshes. *Elytra.* Male elytra truncate, widest at apical third narrowing toward rounded humeri which are not prominent; deeply costate; microsculpture consists of fine isodiametric meshes; pubescent band confined anteriorly to 7th and 8th intervals, but broadened gradually and covering entire elytra beyond apical third. Female elytra similar, but proportionately wider than those of male in apical half. *Aedeagus* (fig. 5). Phallus cylindrical, ending in a rounded point; a median ridge occurs on dorsal surface at apex; microsculpture lacking. Endophallus bears a poorly pigmented virga consisting of two lateral plates.

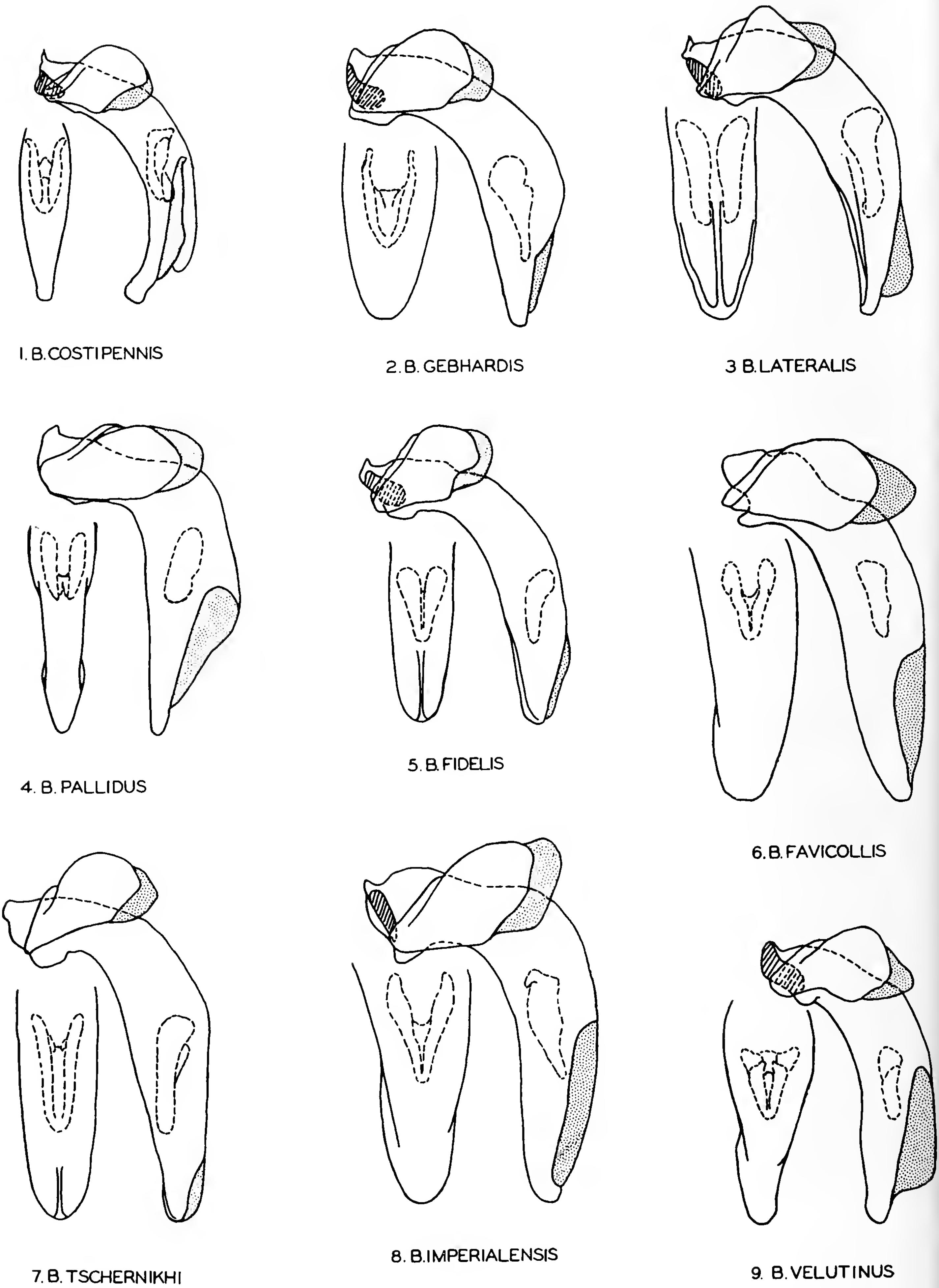
CALIFORNIA LOCALITY RECORDS: 894 specimens were examined. *Alameda County:* (Niles Canyon) ATM, (San Leandro) UIM, (Oakland Hills) CAS, (Livermore) CAS; *Amador County:* (5 miles west of Sutter Creek) TLE; *Colusa County:* (Hwy. 20 and 16) ATM, (Rumsey Canyon) ATM; *El Dorado County:* ("El Dorado County") CAS; *Fresno County:* (La Ferre Creek) CAS; *Imperial County:* (Calpatria) CAS; *Inyo County:* (Little Lake) CAS, (Owens Lake) CAS, (Westgard Pass Plateau) CAS, (Olancha) CAS, (Deep Springs Lake) CAS, (Big Pine) CAS, (Independence) CAS, (Freeman) CAS, (Lone Pine) CAS, (Diaz Lake) CAS; *Glenn County:* (Elk Creek) CAS; *Los Angeles County:* (Alhambra) CAS, (Frenchman Flat) CAS, (Arroyo Seco Canyon) VVB, (San Dimas) CAS, (Pasadena) CAS, (Los Angeles) CAS, (Big Dalton Dam) ATM; *Madera County:* (O'Neals) ATM, (Coarsegold) CAS; *Mariposa County:* (Mariposa) CAS; *Merced County:* (Merced) CAS; *Monterey County:* (Stone Canyon) CAS, (3 miles S. E. of Jolon) CAS, (Jolon) CAS; *Napa County:* (Monticello) ATM; *Orange County:* (Laguna Beach) CAS, (Black Star Canyon) ATM; *Placer County:* ("Placer County") CAS; *Riverside County:* (Colton CAS, (Hemet) VVB, (Riverside) CAS, (Palm Canyon) CAS, (San Jacinto Mts.) CAS, (Palm Springs) CAS; *San Benito County:* (Panoche Valley) CAS; *San Luis Obispo County:* (Cambria) CAS, (San Luis Obispo) CAS, (Santa Margarita) CAS, (Atascadero) CAS; *San Diego County:* (Mt. Palomar) CAS, (Carrizo) UIM, (Guatay) UIM, (San Juan Capistrano) UIM, (Poway) CAS, (3 miles south of Dehesa) TLE, (Jacumba) CAS, (Sweetwater River) RES, (Chicken Creek) CAS, (Knaus) CAS, (9 miles east of Pine Valley) ATM, (Mission Valley) ATM; *San Joaquin County:* (Corral Hollow) TLE; *San Bernadino County:* (Cajon Pass) ATM; *Santa Barbara County:* (Gaviota) CAS, (Cuyama River) CAS, (Santa Ynez River, San Lucas) CAS, (Canada del Venadeto) ATM, (Bluff Camp, San Rafael Mts.) ATM; *Santa Cruz Island:* (Santa Cruz Island) CAS; *Santa Cruz County:* (Santa Cruz) CAS; *Santa Clara County:* (Gilroy Hot Springs) TLE, (Pacheco Pass) UIM, (Uvas Creek) TLE, (Alum Rock Park) CAS, (Arroyo Bayo) JGE; *Stanislaus County:* (Del Puerto Creek) TLE, (Del Puerto Canyon) UIM; *Tehama County:* ("hills west of Tehama County") CAS; *Tulare County:* (Kaweah) CAS; *Ventura County:* (Santa Paula) CAS ATM, (Wheeler Hot Springs) CAS, (Ventura) CAS, (Fillmore) CAS, (Foster Park) ATM; *Yolo County:* (Putah Canyon) ATM, (Davis) ATM, (Putah Creek) TLE.

DISCUSSION: This is the most common species of *Brachinus* in California. It is easily recognized by the darkened 3rd and 4th antennal segments, together with the dark mesepisterna and abdominal sides.

Brachinus favicollis Erwin, NEW SPECIES

TYPE LOCALITY: Jamul, San Diego County, California.

TYPE SPECIMENS: The holotype male and allotype female have been deposited in the entomological museum at the California Academy of Sciences in San Francisco. Both were collected by F. E. Blaisdell at



FIGURES 1-9, *Brachinus* spp. Aedeagus from dorsal and lateral view.

the type locality, on March 20, 1899. Seventy-six paratypes collected on various dates and at various localities are indicated in the CALIFORNIA LOCALITY RECORDS and they have been returned to the museums also indicated there.

DISTRIBUTION: This species is restricted to southern California and possibly Mexico. It occurs sympatrically with *B. lateralis* in the latter's western-most range (fig. 15).

DESCRIPTION: *Size.* Length 9.5 to 10.5 mm.; width 4.5 to 4.8 mm. *Coloration.* Elytra of both sexes blue with a violaceous cast and epipleura blue; head and pronotum ferrugineus to brown; mandibles red-brown with piceous mesal edges; antennal segment 1 and legs ferrugineus; antennal segments 2-11 and palpi ferrugineus-brown; mesepisterna black; sides of abdominal sterna ferrugineus to brown. *Head.* Labrum emarginate, with yellow lateral edges; dorsal surface of the mentum slightly convex with a seta at each anterior corner; bead around eyes entire but finer at antennal base; frons with deep frontal furrows which are rugose and punctate; numerous setae arise behind eyes and on top of head; microsculpture consists of very fine isodiametric meshes. *Pronotum.* Widest at apical third and with sides moderately sinuate; anterior angles not prominent; posterior angles acute with lateral basal impressions shallow; lateral margins somewhat reflexed with a narrow bead of slightly darker color than pronotum; disc flat with many deep punctures forming a very rugose surface and with many setiferous punctures scattered over entire surface; microsculpture consists of small isodiametric meshes. *Elytra.* Male elytra truncate, widest at apical third, narrowing slightly to humeri which are not prominent; deeply costate; microsculpture consists of small isodiametric meshes; pubescent bands occur in each interval from humerus to apex. Female elytra similar, but proportionately wider and flatter than those of male in apical third. *Aedeagus* (fig. 6). Phallus cylindrical and ending in a blunt point; with apical sixth twisted very slightly; microsculpture lacking. Endophallus bears a lightly pigmented bilobed virga which is fused apically.

CALIFORNIA LOCALITY RECORDS: 76 paratypes were examined. *Los Angeles County:* (Pasadena) CAS, (San Francisquito Canyon) LACM, (Los Angeles) LACM, (Azusa) LACM, (Tujunga Creek) LACM; *Orange County:* (Black Star Canyon) ATM; *Riverside County:* (Hemet) VVB, (Palm Canyon) LACM, (Palm Springs) ATM; *San Bernadino County:* (Mojave River) CAS; *San Diego County:* (Jamul) CAS, (Pamo Valley) LACM, (Mission Valley) SDNHM.

DERIVATION OF THE NAME: Latin, *favus* = honeycomb; *collis* = neck; referring to the strongly punctured thorax of members of this species.

DISCUSSION: This species is one of four whose members have pubescence covering the entire elytra. The deeply punctate pronotum is a good field recognition character.

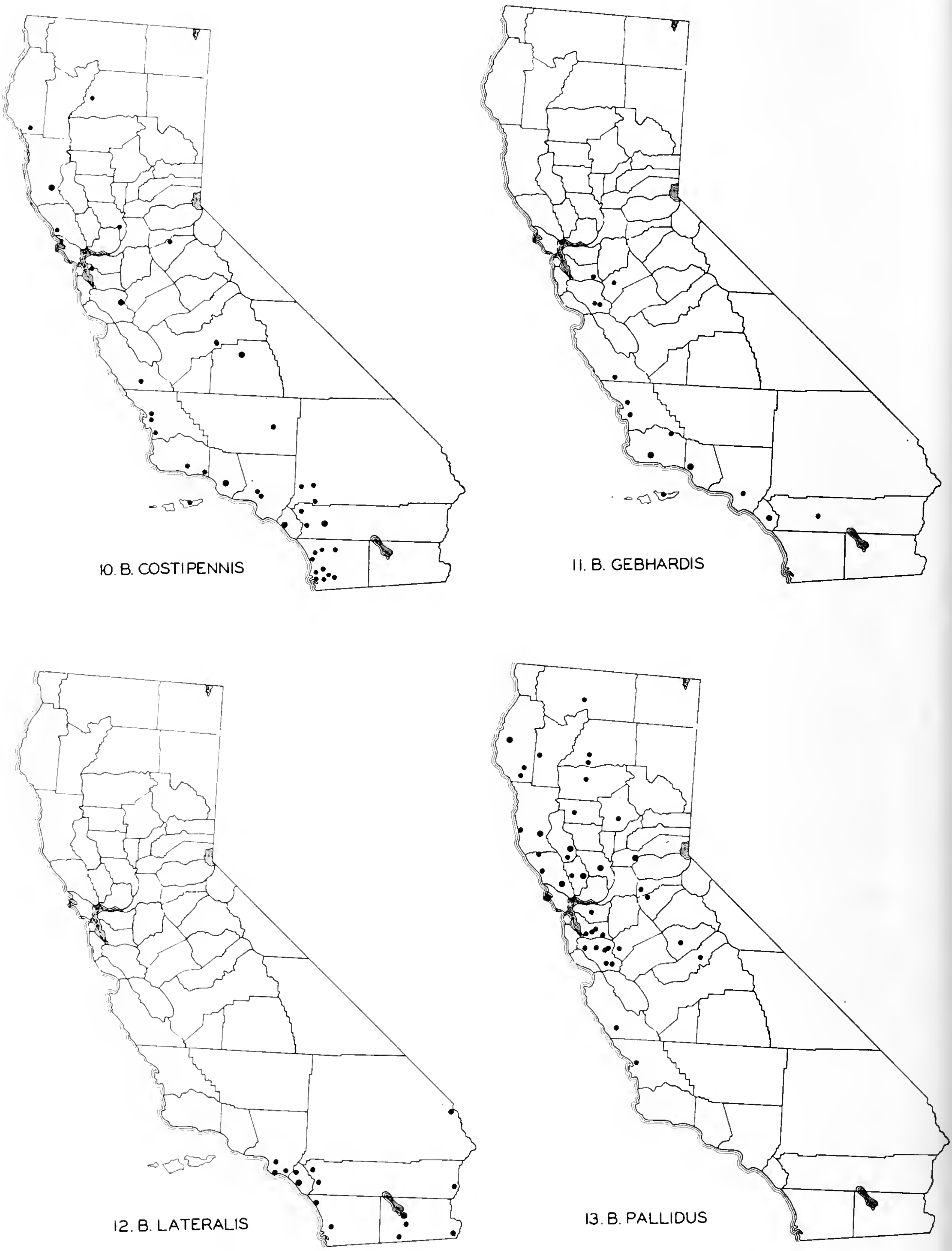
Brachinus tschernikhi Mannerheim

Brachinus tschernikhi Mannerheim, 1843: 184.

Brachinus puncticollis LeConte, 1858: 28, (NOMEN NUDUM). In LeConte's 1862 revision this name was omitted.

TYPE LOCALITY: "California."

TYPE SPECIMENS: The types of this species are presumed lost. The author has contacted the museum at the University of Helsinki in attempting to locate the types. Mr. Meinander, the Curator, states that these types are not in the Mannerheim collection. Material collected by Tschernik



FIGURES 10-13, *Brachinus* spp. California distribution maps.

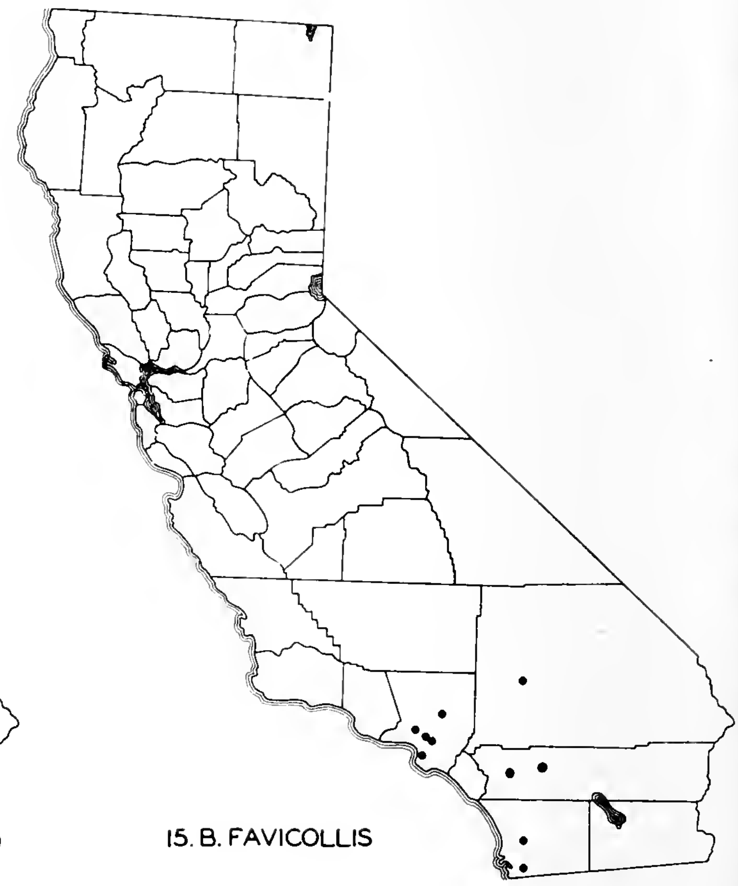
in California was sent by Fischer von Waldheim to Mannerheim (1843: 180). If this material were reclaimed by von Waldheim it would be either in his collection at the University of Moscow or in Leningrad, but A. G. Ponomarenko in Moscow states that the types of *B. tschernikhi* are not in the Fischer von Waldheim collection. Dr. O. L. Kryzhanovskij states that the types are not in the Leningrad Museum, either. The University of Moscow does have three specimens, in the Motschulsky collection, labelled "*B. tschernikhi,* California." It is possible that Motschulsky could have seen the Mannerheim types and subsequently identified his own specimens under that name. It is also conceivable that these specimens actually were Mannerheim's type specimens, but there is no concrete evidence indicating that to be the case. The following description is based on these three specimens, because of the assumption that they were at least compared with the "types" by Motschulsky, even if they are not Mannerheim's actual type specimens.

DISTRIBUTION: This species has a very limited range in central California, from Lake County to Merced County, but it also inhabits parts of Oregon (fig. 16).

DESCRIPTION: *Size.* Length 7 to 9.5 mm.; width 4.2 to 4.4 mm. *Coloration.* Elytra of both sexes blue with blue epipleura; head and pronotum ferrugineus (sometimes varying from a yellowish shade to ferrugineus); mandibles piceous; antennal segments 1-2, legs, and frons ferrugineus; segments 3-11 black; mouthparts very dark, approaching color of outer segments of antennae; meseipsterna and venter black. *Head.* Labrum entire; dorsal surface of mentum slightly convex with a seta at each anterior corner; bead around eyes entire; eyes very prominent; frons with moderately deep and rugose frontal furrows; a few setae arise behind eyes and on top of head; microsculpture consists of small isodiametric meshes. *Pronotum.* Widest at middle with deeply sinuate sides behind; anterior angles very prominent; posterior angles very prominent, acute, with lateral basal impressions deep; lateral margins reflexed with a definite bead; disc flat, slightly rugose down midline; setiferous punctures sparsely covering dorsal surface; microsculpture consists of small isodiametric meshes. *Elytra.* Male elytra truncate, widest at apical third narrowing very little to prominent humeri; barely costate; microsculpture consists of small isodiametric meshes; pubescence sparse but covering elytra, occurring in all intervals. Female elytra similar, but proportionately slightly wider than those of male in apical half. *Aedeagus* (fig. 7). Phallus long with a ridge at the dorsal apex; microsculpture lacking. The endophallus bears a poorly pigmented virga consisting of two lateral basal plates with a small median fin on the ventral side, and fused at the apex.

CALIFORNIA LOCALITY RECORDS: 47 specimens were examined. *Lake County:* (Clear Lake) CAS, (Cache Creek) ATM, (Lower Lake) CAS; *Merced County:* (Los Banos) CAS; *Sacramento County:* (Sacramento) UIM ATM; *Yolo County:* (Davis) UIM CAS ATM, (Cause Way) ATM, (Clarksburg) ATM.

DISCUSSION: Members of this species are the darkest in color of all the California *Brachinus.* The entire venter is black, unlike any other species. The black antennal segments are also unique (except in *B. fidelis,* which has the 3rd and 4th segments dark). The aedeagus closely resembles that of *B. fidelis,* which also indicates a close phylogenetic relationship between these species.



FIGURES 14-17, *Brachinus* spp. California distribution maps.

Brachinus imperialensis Erwin, NEW SPECIES

TYPE LOCALITY: Potholes, Imperial County, California.

TYPE SPECIMENS: The holotype male and allotype female have been deposited in the entomological museum at the California Academy of Sciences in San Francisco. Both were collected by E. P. Van Duzee at the type locality, on April 9, 1923. Eighteen paratypes collected on various dates and at various localities are indicated in the CALIFORNIA LOCALITY RECORDS and they have been returned to the museums also indicated there.

DISTRIBUTION: This species is restricted to desert habitats along the Colorado River and outlets of the Salton Sea in Imperial County (fig. 17).

DESCRIPTION: *Size.* Length 9 to 10.5 mm.; width 4 to 4.1 mm. *Coloration.* Elytra of both sexes blue with a violeceous cast and with epipleura blue; head and pronotum ferrugineus; mandibles piceous at tips and on mesal edges; antennal segment 1 ferrugino-testaceous; antennal segments 2-11, legs, palpi, and frons ferrugineus; mesepisterna and venter ferrugineus; sides of abdominal sterna black. *Head.* Labrum slightly emarginate; dorsal surface of the mentum convex with a seta arising at each anterior corner; bead around eyes very weak; frons with deep frontal furrows which are somewhat rugose; numerous setae arise behind eyes and a few from top of the head; microsculpture consists of small isodiametric meshes. *Pronotum.* Widest just before middle and with sides moderately sinuate; anterior angles prominent, finely acute, with lateral basal impressions moderately deep; lateral margins narrow with a dark lateral bead; disc slightly convex, barely rugose down midline; sparsely pubescent at base and at anterior corners; microsculpture consists of finely isodiametric meshes. *Elytra.* Male elytra truncate, sides almost parallel, but narrowing slightly toward humeri which are not at all prominent; barely costate; microsculpture consists of small isodiametric meshes; pubescence sparsely covering elytra, occurring in all intervals. Female elytra similar, but proportionately slightly wider than those of male in apical third. *Aedeagus* (fig. 8). Phallus asymmetrical, ending in a rounded point; with apical third twisted considerably; microsculpture lacking. Endophallus bears a poorly pigmented virga consisting of two lateral basal lobes, which are fused apically.

CALIFORNIA LOCALITY RECORDS: 18 paratypes were examined. *Imperial County:* (Potholes) CAS, (Yuma) CAS, (Palo Verde) UIM, (Holtville) CAS, (El Centro) CAS, (Brawley) CAS, (Calipatria) CAS, (Calexico) ATM; *Riverside County:* (Blythe) CAS; *San Bernadino County:* (Needles) CAS.

DERIVATION OF THE NAME: Imperial County—the place the types were collected; Latin, *ensis*—denoting place, locality or country.

DISCUSSION: Members of this species are very similar to their more western counterpart, *B. favicollis,* but they lack the strong punctations and the pubescence. Also, the elytra are scarcely costate in *B. imperialensis.* The alkali river bank habitat of this species is quite different from the run-off stream environment of *B. favicollis.*

Brachinus velutinus Erwin, NEW SPECIES

TYPE LOCALITY: Davis, Yolo County, California.

TYPE SPECIMENS: The holotype male and allotype female have been deposited in the entomological museum at the University of California, Davis, California. Both were collected at the type locality by A. T. McClay, on September 1, 1949. Fifteen paratypes collected on various dates and at various localities are indicated in the CALIFORNIA LOCALITY RECORDS and were returned to the museums also indicated there.

DISTRIBUTION: This species has been collected from only four locations in Central California (fig. 17).

DESCRIPTION: *Size.* Length 7 to 8.2 mm.; width 3.2 to 3.4 mm. *Coloration.* Elytra of both sexes blue with a violaceous cast and with epipleura blue; head and pronotum ferrugineus; mandibles piceous at tips and along mesal edges; antennal segment 1 ferrugino-testaceous; antennal segments 2-11, legs, palpi, mesepisterna ferrugineus; sides of abdominal sterna brown to piceous. *Head.* Labrum entire; dorsal surface of mentum flat with a seta at each anterior corner and a few along caudal edge; bead on dorsal part of eyes only; frons with very shallow frontal furrows; only a few setae arise behind eyes and on top of head; microsculpture consists of very fine isodiametric meshes. *Pronotum.* Widest just behind apical margin with sides moderately sinuate behind; anterior angles slightly prominent; posterior angles prominent, acute, with lateral margins slightly reflexed without a definite bead; lateral basal impressions shallow; disc flat, and barely rugose down midline, with dense pubescence on entire dorsal surface; microsculpture consists of small isodiametric meshes. *Elytra.* Male elytra truncate, widest at apical third narrowing strongly to very narrow humeri which are not at all prominent; not costate; microsculpture consists of very small isodiametric meshes; pubescence densely covering elytra. Female elytra similar, but proportionately slightly wider than those of male at apical third. *Aedeagus* (fig. 9). Phallus asymmetrical, ending in a twisted blunt knob; microsculpture lacking. Endophallus bears a poorly pigmented virga consisting of two lateral plates which are fused apically.

CALIFORNIA LOCALITY RECORDS: 15 paratypes were examined. *Contra Costa County:* (Brentwood) CAS; *Stanislaus County:* (Newman) ATM; *Tulare County:* (Visalia) ATM; *Yolo County:* (Davis) CAS ATM.

DERIVATION OF THE NAME: Latin, *velutinus* = velvet; referring to the velvety-down appearance of the elytral pubescence.

DISCUSSION: This species is the most peculiar of all the California species. Its members, with their narrow shoulders and densely pubescent prothorax and elytra, do not appear to be closely related to any other species from this area. The twisted aedeagus would seem to place it, however, near *B. favicollis* and *B. imperialensis.*

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LITERATURE NOTICE

A REVISION OF THE NORTH AMERICAN SPECIES OF ANTHICUS, S. STR. (COLEOPTERA: ANTHICIDAE). By Floyd G. Werner. Misc. Publ. Ent. Soc. Amer. 4(5):193-242, 101 figs. 1964.—This revision contains 48 species; 21 have been taken south of the U.S.A. border, 16 overlap between the U.S.A. and Mexico or farther south, and 11 are not known from north of Mexico. A key to species, descriptions, distributions, illustrations of the whole beetle and genitalia, and distribution maps of a few species are included. Also included is a key to all the genera of Anthicidae known from North America northward of Panama, the West Indies, and probably all that are to be found in northern South America.

MONOGRAPHISCHE BEARBEITUNG DER GATTUNG AGATHIDIUM PANZER (COLEOPTERA). By Joseph Hlisnikovsky. Acta Ent. Mus. Nat. Prague, Suppl. 5:1-255, 405 figs. 1964.—Descriptions and keys to 7 subgenera and 177 species are included in this comprehensive world revision of this leiodid genus. Outline drawings are given for the antennae and for the lateral and dorsal views of the body and male genitalia.

COLEOPTERORUM CATALOGUS SUPPLEMENTA. PARS 35 FASC. 3. CHRYSOMELIDAE: HISPINAE. CORRIGENDA ET ADDENDA. By E. Uhmann. Dr. W. Junk, The Hague. Pp. 399-490. 1964.—Fascicles 1 and 2 of the Hispinae appeared in 1957 and 1958.

APHENOLIA MONOGAMA (CROTCH), A NEW COMBINATION (NITIDULIDAE: COLEOPTERA)

By LORIN R. GILLOGLY [1, 2]

The species *Epuraea monogama* Crotch was described in 1874 as the largest known *Epuraea*. The genus *Aphenolia* Reitter was established in 1884 for a single very large species from Japan which was separated from *Epuraea* by its size and on the basis of its simple hind tarsi. In *Epuraea* the first three tarsal segments of each leg are bilobed but the hind tarsi of *Epuraea monogama* Crotch are simple. I am therefore transferring *monogama* to *Aphenolia* (NEW COMBINATION).

During a recent exchange of specimens with Dr. Sadanari Hisamatsu I received two examples of *Aphenolia pseudosoronia* Reitter and was startled at their close resemblance to *Aphenolia monogama* (Crotch). Indeed, it required some study to satisfy myself that they were distinct. In *Aphenolia pseudosoronia* Reitter the second segment of the antenna is about one-half the length of the third, while in *A. monogama* (Crotch) it is only slightly shorter than the third. Also, in both species the middle tibiae of the males are dilated on the inner margin near the tip. In *A. pseudosoronia* Reitter the dilation is about one-third as long as the tibia, while it is about one-fifth as long as the tibia in *A. monogama* (Crotch) (Hisamatsu 1962).

Hisamatsu reports *A. pseudosoronia* Reitter from *Cryptoporus* (*Polyporus*) *volvatus* (Peck) Hubbard in Japan. Gillogly (1954) discussed *A. monogama* (Crotch) from the same fungus in California.

The rare *Epuraea liebecki* Parsons from Arizona is of similar size but nothing has been published as to its host nor the character of its hind tarsi. Judging from its size, it may yet be found to belong to the genus *Aphenolia*.

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1 Port Entomologist, California Department of Agriculture, Bureau of Plant Quarantine, San Pedro, California.

2 This is published under my name at the insistence of Dr. Hisamatsu who furnished specimens and who sent me a translation of his paper.

THE NEW COMBINATION LUCIDOTA ARMATA AND A NOTE ON LUCIDOTA EUCERA (COLEOPTERA: LAMPYRIDAE)

By FRANK A. MCDERMOTT[1]

Lucidota armata (Gorham), NEW COMBINATION

Photinus armatus Gorham, 1884. Biol. Centr.-Amer., Ins., Coleop. 3(2):265, pl. 12, fig. 2.

It is somewhat difficult to understand why Gorham called this species *Photinus* in spite of his explanation; however, his use of *Photinus* included also *Macrolampis, Ellychnia,* and some species now listed as *Lucidota.* As some features of *Lucidota armata* are not developed by Gorham, a redescription of the species is given below. The species was described from Panamá. I have received 7 males and 4 females from Peru.

One of the seven males was selected for this description, collected at Avispas, Peru, September 10, 1962, by Luis E. Peña.

Dimensions, 6.0 mm. long by 1.8 mm. broad; subparallel. Superficially resembles *Pyropyga.*

Pronotum, 0.95 x 1.6 mm.; semi-elliptic; broad black panduriform vitta from base to above eyes, with a narrow median channel. Base a smooth curve, leaving the angles acute and produced. Borders transparent except tinged brownish forward of the black vitta. Disk pink between vitta and lateral borders; latter coarsely punctate, disk very finely so; sparse, short pale villosity. Scutellum relatively large, black, finely punctulate, sparsely hairy. Mesonotal plates black.

Elytra, 4.4 x 0.9 mm.; translucent dark brown, appearing black over body; very narrow explanate margins slightly paler than disk. Very rugose, with fairly dense villosity especially pronounced on sides and suture; latter not pale.

Frons dark brown, slightly concave. Maxillary palpi very short and blunt; brown. Labial palpi very small, terminal article securiform, pale yellowish. Mandibles small. Antennae broad, compressed, black, except last article white; slightly serrate; 3.45 mm. long.

Prosternum pink, meso- and metasterna practically black. Ventral abdominal segments 2 to 7 reddish brown; 8th long, medially convex, with sharp median point, apically black. 9th (genital) segment large, like convex portion of 8th (fig. 1).

Abdominal tergites and pygidium black, latter convex, posterior edge rounded.

Posterior coxae and femora whitish.

Aedeagus composed of a slightly curved, medially channeled median lobe and two unsymmetrical lateral lobes, one of which (the left) is divided into a narrow spirally twisted portion with a very acute apex which may form a hook in some specimens, and a shorter portion bearing a strong recurved hook. Right lateral lobe bears a long yellow projection with a small protuberance on the side; this structure projects at a right angle to the body on the right side in dorsal view in three specimens.

Gorham gives no explanation of his aedeagal drawings, in which *a* is apparently a lateral view with the lateral lobes removed, and *b* is a ventral view of the median lobe. Both of these agree with the present specimens from Peru. Sketch *c* represents the complicated arrangement of the lateral lobes and differs from my specimens in that the spiral twist

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[1] Wilmington, Delaware.

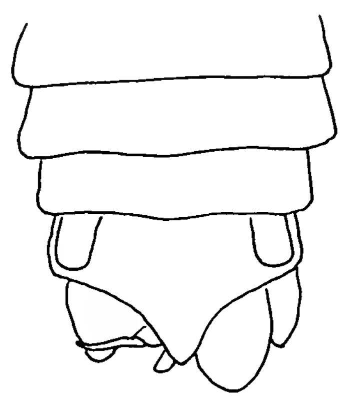
and acute point of one of the portions of the left lobe is not well indicated, nor is the recurved hook on the other portion; the third (right hand) member in his sketch *c* is the right lateral lobe with the projection shown at an angle different from its appearance in my specimens. The entire arrangement is very complicated for a lampyrid.

One female collected at Avispas, Peru, October 1, 1962, by Luis E. Peña was selected for comparison with the male.

Dimension, 6.5 mm. long by 2.05 mm. broad; subparallel. Generally similar to male; antennae nearly as long. Last ventral segment broadly subtriangular, notched apically; larval luminous organs pronounced, possibly functional (fig. 2).

Variations: the pronotal vitta may be reduced to scattered spots, leaving the disk mainly salmon-pink. In some specimens two or three distal antennal articles are white. Total length varied up to 7.5 mm.

In view of the remarkable terminalia this species should perhaps be made the type of a new genus, as suggested by Gorham.



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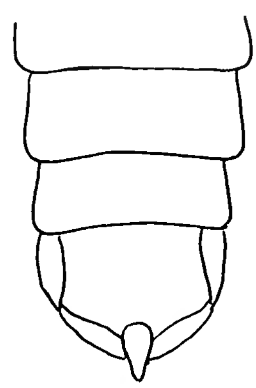

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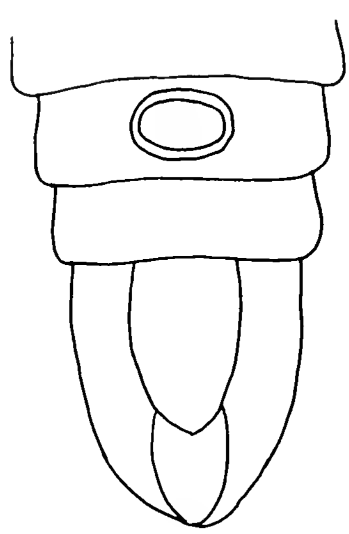

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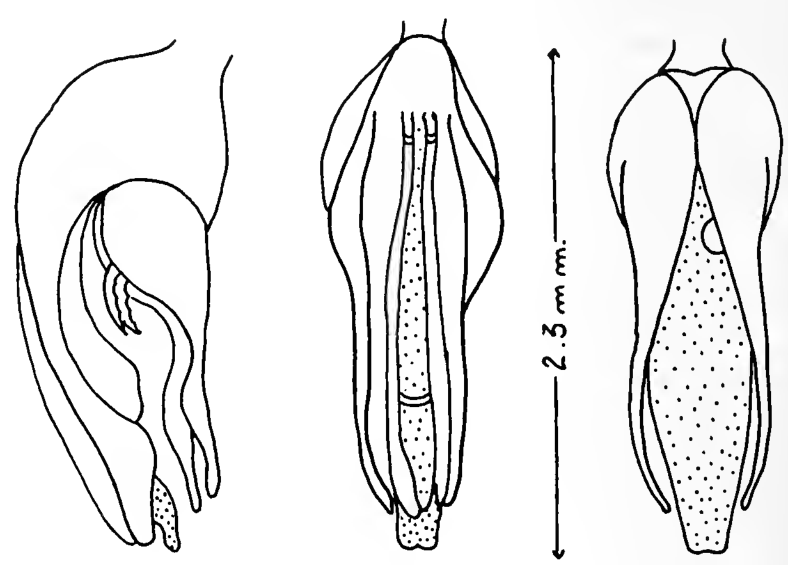


4

FIGURES 1-2, *Lucidota armata*. 1—Outline of posterior ventral segments of male; note projecting point at left side of segment 8. 2—Outline of posterior ventral segments of female.

FIGURES 3-4, *Lucidota eucera*. 3—Outline of posterior ventral segments of male; note single elliptical luminous organ on segment 6. 4—Aedeagus; left to right, lateral, ventral, and dorsal views.

Lucidota eucera E. Olivier

Lucidota eucera E. Olivier, 1907. *In* Wytsman's Gen. Ins. 53:20.

Three males of this species were received from Peru; the species was described from French Guiana. It has an unusual development of the genital segment (fig. 3) and a relatively large aedeagus (fig. 4).

BOOK REVIEW

THE GROUND-BEETLES (CARABIDAE, EXCL. CICINDELINAE) OF CANADA AND ALASKA, PART 3. By Carl H. Lindroth. Opuscula Entomologica Suppl. 24:201-408, figs. 102-207, 1963. (Price, kr. 35:-; $6.85.)

This volume continues the monograph of the Canadian and Alaskan Carabidae started in 1961 (see Coleopt. Bull. 16:106). The first part, the introduction, will be published after the text has been completed.

The importance of part 3 is apparent to any student of Coleoptera when it is pointed out that the work is concerned with the genus *Bembidion*. The 161 species treated include 16 new species, bringing the total for the genus in North America to about 411 species. Most of the species occur north of Washington, D. C., to about the tree line. Thus a substantial portion of the range of the genus is covered in this work. The care in which it is written and the detail of the study make it the standard work at the present time and it will replace all previous work for years to come.

It might well be added that any Coleopterist or entomology library that does not buy this series as issued will regret it when it is no longer available at the publisher's price.—ROSS H. ARNETT, JR.

LITERATURE NOTICE

CATALOGUE OF THE CANTHONINI (COL. SCARAB.) INHABITING THE WESTERN HEMISPHERE. By M. A. Vulcano and F. S. Pereira C.M.F. Ent. Arb. Mus. Frey 15(2):570-685. 1964.—This is a synonymical list with literature citations to every mention of each genus and species. Geographical distributions by countries, a bibliography of articles not mentioned by Blackwelder, and an index are also given.

BOOK REVIEW

CURCULIONIDAE OF AMERICA NORTH OF MEXICO. A KEY TO THE GENERA. By David G. Kissinger. v, 143 pp., 59 figs. Taxonomic Publications, South Lancaster, Massachusetts. 1964. (Price, $7.50.)

The purpose of this work is to provide keys to the nearly 400 curculionid genera occurring in North America north of Mexico. The author has admirably fulfilled this purpose.

In this work 42 subfamilies are treated. Keys are provided for the subfamilies, and each subfamily is provided with keys to the genera. No attempt has been made at identifications on the species level. For each subfamily and genus treated there is a general account of the group. The account of each genus includes the author, date, synonyms, principal references to keys to species, the habitat and habits, and the distribution (by states and provinces).

Structural features that are used in identifying genera have been used in the construction of the keys. A section on the taxonomically important adult structures is given but the treatment is not and was not intended to be a complete study of the adult curculionid morphology.

The keys represent an improvement over those of Bradley, A Manual of the Genera of Beetles of America, North of Mexico, Ithaca, N. Y. 1930, and Arnett, The Beetles of the United States (A Manual for Identification), Catholic Univ. of America Press, Washington, D. C. 1960. There are a few keys with which the user is apt to have trouble. Difficult groups are still difficult. For example, in the key to the genera of Subfamily No. 1, which contains 44 couplets, all 17 genera from couplet 29 to the end are hard to separate.

The work is not without errors. Most of these should have been corrected in galley proof. An erratum sheet will have to be published but a few of the more obvious are pointed out below. The spelling of the specific name of the cotton boll weevil on p. 55 is *grandis,* not *grandus;* p. 5, *Magdalis,* not *Magdalus;* p. 74, *Perigastes* should be *Perigaster;* p. 130, fig. 30 and p. 37, *Cyrtepistomus* instead of *Cyrtepistomis.* There is a faulty reference on page 67-68; under the generic name *Cryptorhynchus* the author says to consult Sleeper (1955a) for a key to separate the species. That work contains the description of seven new species of weevils in miscellaneous genera but there are no keys to the *Cryptorhynchus.*

Students wishing to pick a group of curculionids for study will find this work most helpful as the author has indicated in many instances which genera are in need of revision and where keys to the species are desired.

The book represents a much needed and valuable contribution to our entomological literature; it will be indispensable to anyone interested in the Curculionidae of America north of Mexico.—ROSE ELLA WARNER, *Ent. Res. Div., A.R.S., U. S. Department of Agriculture, Washington, D. C.*

LITERATURE NOTICE

DIRECTORY OF ZOOLOGICAL (AND ENTOMOLOGICAL) SPECIMEN COLLECTIONS OF TROPICAL INSTITUTIONS. By United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris. 31 pp. 1962. (Price: $1.00 U.S., 3,50 N.F.)—This is another in the series Humid Tropics Research. More than 40 collections are listed, with short statements on each as to content or specializations, identification, and exchange.

A NEW FOSSIL BRUCHID GENUS AND ITS RELATIONSHIPS TO MODERN GENERA (COLEOPTERA: BRUCHIDAE: PACHYMERINAE)

By JOHN M. KINGSOLVER[1]

The study of most fossil beetles is difficult because of the fragmentary nature of many of the representative specimens. Only amber and calcareous nodules preserve specimens so that they may be observed from all angles. In most fossil beetles, the specimen is usually an impression of a crushed, often disarranged, individual or fragments of an individual which must be observed as is, without recourse to a more convenient or more advantageous view, to observe details of structure. Morphological characters necessary to place the specimen in a genus or even in a family are often indistinct or missing; thus, its placement becomes a matter of the experience and background of the worker in his observations of habitus of a wide range of families and genera of Coleoptera. The classification of fossil beetles can probably never become as exact and definitive as that of extant beetles; consequently, fossil genera and species should be judged by different standards than recent taxa. A species based on an elytron or on another part of the body usually lacks essential characteristics for generic placement or association with other species. The profusion of species names resulting from past descriptions of this type should be regarded merely as an index to specimens rather than as a like number of species entities in the biological sense.

Rarely does a worker have the good fortune to observe a series of fossils from the same bed, with common characteristics in sufficient detail to permit the construction of a fairly detailed description of a taxon. Yet, such an opportunity presented itself recently during the examination of a number of fossil impressions of Bruchidae from the H. F. Wickham collection in the U. S. National Museum. Imprints of 15 specimens, preserved in various positions, were observed to have certain common features which linked the entire series. A discussion of these characteristics follows the description. Because differentiating characteristics of species of modern Bruchidae often rest in the male genitalia and because insufficient detail is present in these fossil impressions to distinguish "species," I feel that the best course to take with the present specimens is to assume that the type species, the described species listed below, and the series examined, which contained both identified and unidentified specimens, are representative of an apparently extinct new genus, which is described herein for comparison with modern Bruchidae.

The following descriptions are written as though the actual insects were being observed although details of the surfaces in the fossils are negative impressions of the original specimens.

---

[1] Entomology Research Division, Agr. Res. Serv., U. S. Department of Agriculture, Washington, D. C.

Oligobruchus Kingsolver, NEW FOSSIL GENUS

Colors are not preserved in Florissant beetles and there are no indications of pattern either in the integument or in the vestiture of these specimens.

Head: Eyes apparently deeply emarginate, facets not evident; vertex finely punctate, frons more coarsely punctate; vertical interocular carina distinct. Details of mouthparts not visible. Antennal segments serrate (preserved in part in only one specimen).

Prothorax: Disc coarsely, very densely foveolate (impressions in fossils coarsely and densely granulate in appearance); vestiture not apparent; no distinct asperities evident on disc, which appears to be somewhat saddlelike and not expanded laterally; posterior margin of disc not markedly lobed, apparently evenly arcuate; fine submarginal groove present on disc in two specimens; lateral carina excellently preserved in two specimens and not prominent nor elevated. Venter finely and densely punctate; prosternum moderately long before coxae, intercoxal process very narrow; coxae moderately elongated; trochantinal fossae well preserved in two specimens; postcoxal region obliterated. No specimens had anterior legs preserved.

Mesothorax: Scutellum well-marked in only one specimen, quadrate, slightly longer than wide, perceptibly emarginate at apex. Elytra separately rounded at apices, surface without evident asperities; striae 10, well-defined, regularly placed with elongate, nearly confluent punctures, interspaces not punctate, tenth stria reaching to apical third; no evidence of basal amalgamation of striae nor of basal carinate tubercles or basal strial teeth. Mesopleuron with epimeron and episternum of nearly equal size, pleural suture dividing them diagonally. Mesosternal area trapezoidal with intercoxal process flat, mesocoxae well separated; post-coxal ridge evenly arcuate parallel to posterior margin of coxal cavity; trochantinal fossa distinct in one specimen; surfaces of pleural and sternal areas finely and densely punctate. No specimens with mesothoracic legs preserved.

Metathorax: Flight wings not exposed in any of the specimens. Pleural and sternal areas not especially modified. Parasutural sulci present on each side of pleurosternal suture which separates metepisternum and metasternal region, the sulcus on episternum curving dorsad parallel to anterior margin of sclerite and sulcus on sternal sclerite curving mesad to meet posterior margin of post-coxal ridge of mesothoracic coxal cavities. Median sulcus of sternal area not evident in any of the specimens. Metathoracic coxae about twice as long as wide. Metathoracic trochantin well preserved in several specimens. Metathoracic femur strongly swollen, about 1.5 times as long as wide, outer ventral margin finely serrate but no other dentation evident. Tibia strongly arcuate parallel to ventral profile of femur, bicarinate on outer face, apex acuminate; details of terminal tibial spurs (if any) and of tarsal segments obliterated.

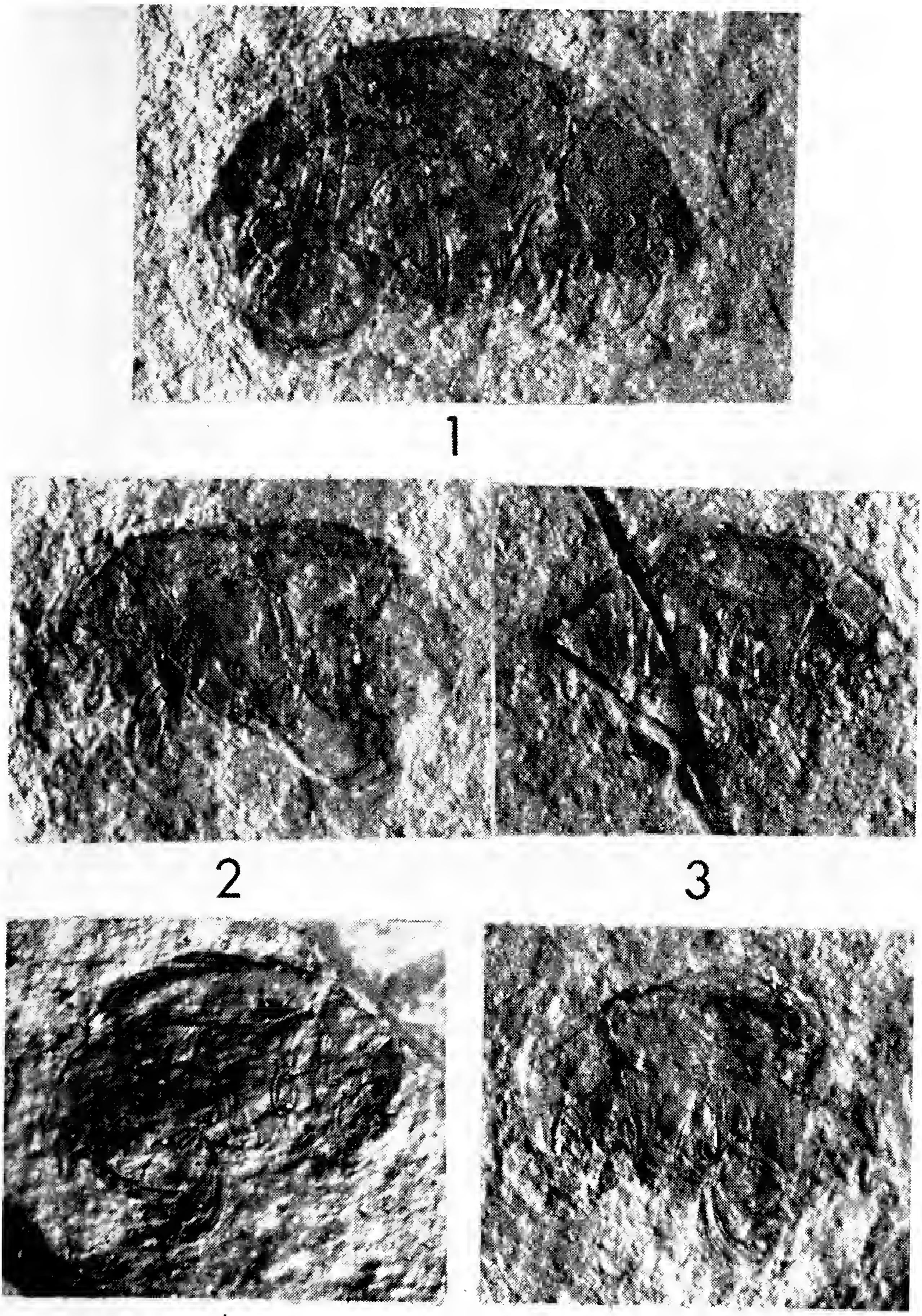
Abdomen: Short, rather stocky, with 5 visible abdominal sternites, last sternite shallowly emarginate (evidently males) in two specimens; pygidium finely, densely punctate, broadly triangular in outline (apparently only the pygidium is sclerotized with the two preceding terga membranous, which distinguishes it from *Kytorhinus* Fischer); intercoxal process acutely triangular.

Length of body excluding head: 3.5 to 4.5 mm.

The size suggests a beetle of about the dimensions and form of *Algarobius prosopis* (LeConte) although the preserved details of structure are quite different from that genus and species.

Type-species here designated: *Bruchus florissantensis* Wickham, 1912: 30-31.

The following additional fossil species are tentatively placed in *Oligobruchus* pending examination of type specimens: *Bruchus scudderi* Wickham, 1912:31, *Bruchus haywardi* Wickham, 1912:31-32, *Bruchus wilsoni* Wickham, 1913:9-20, *Bruchus submersus* Wickham, 1914:481, *Bruchus*



FIGURES 1-5. *Oligobruchus*, new fossil genus. 1—*O. florissantensis* (Wickham). 2—*O. haywardi* (Wickham). 3—*O. scudderi* (Wickham). 4 and 5—*O. florissantensis*. All specimens determined by Wickham. (Photographs by Jack Scott, Smithsonian Institution.)

primoticus Wickham, 1914:480-481. Their placement here is based on descriptions and illustrations in the literature, and on specimens in the U. S. National Museum identified by Wickham as follows: *Bruchus florissantensis*—3, *Bruchus* near *florissantensis*—1, *Bruchus haywardi*—2, *Bruchus scudderi*—4. Five additional specimens which I regard as *Oligobruchus* sp. completed the study series.

Wickham's illustration of *primoticus* (pl. 14, fig. 1) shows five denticles on the lower margin of the hind femur. I have not seen the specimen, but it is possible that their presence indicates dentation of the mesal carina of *Oligobruchus,* which was missing in every specimen I examined. In only two specimens was a finely serrate lateral carina evident. Wickham also illustrated a serrate antenna for *primoticus* similar to that in the only specimen I examined with an antenna retained. It is significant that this antenna is also similar to the antennae in *Pachymerus* Thunberg.

Discussion of Relationships

The generic description is based on a series of 15 specimens selected because they were preserved in various positions yet share at least one of five significant morphological characters. Eight of the specimens have all 5 characters and 11 have at least 4. These specimens serve to associate the entire series, some of which were not preserved in a favorable position to exhibit more than one or two of the characters.

Common to all of the specimens is a densely foveolate prothoracic disc (fig. 1), which to my knowledge is not developed to this extreme in any of the modern Bruchidae, but is approached to some degree in certain species of *Pachymerus.*

Next in frequency of occurrence is a strongly arcuate metatibia with a bicarinate lateral face (fig. 4). This character is found in 13 of the 15 specimens. This specialization of the tibia is present in both of the subfamilies Pachymerinae and Bruchinae, in the latter in species groups near *Caryedes* Hummel. However, the deeply foveolate prothorax and the parasutural sulcus (explained below) are never found in the latter subfamily.

Concurrent with the arcuate metatibia in modern Bruchids is a strongly inflated metafemur (figs. 1 & 4). Eleven of the 15 fossil specimens possess a partial or complete impression of this type of femur.

In most of the Pachymerinae and Amblycerinae in the Bruchidae and in many of the primitive Chrysomelidae and Cerambycidae, the pleurosternal suture of the metathorax is paralleled on either side by a narrow but distinct sulcus which I am calling the parasutural sulcus. The sulcus on the metasternal sclerite joins the post-coxal ridge of the mesocoxal cavities and the sulcus of the episternum curves antero-dorsad to parallel the anterior margin of this sclerite, then bends dorsad still further and ends near the dorsal margin of the episternum. Nine of the 15 fossils show very clearly the impression of this sulcus (figs. 4 & 5).

It is unfortunate that more details of the head, antennae, and legs are not better preserved in these fossils. In these body area, in extant Bruchidae, are found several critical characteristics which, if known in the fossils, might help in determining more precisely the relationships of the fossil genus. *Oligobruchus* undoubtedly belongs in the subfamily Pachymerinae, but I know of no described genus or of any species which possesses the peculiar combination of characteristics manifest in this series of fossil Bruchidae. In the key to the genera of Bruchidae of the United States (Bridwell, 1946:53), *Oligobruchus* would key to *Caryobruchus* from which it may be distinguished by characters given below. Perhaps the nearest extant relatives are *Caryopemon giganteus* Pic, *Caryedon languidus* (Gyll.) and various species in the genus *Pachymerus*. All of these taxa have in common with *Oligobruchus* the swollen hind femur, carinate frons, strongly arcuate hind tibia bicarinate on the outer face, parasutural sulci (at least in the species listed above and in *Pachymerus*), submarginal groove on the prothoracic disc, subequal mesepisternum and mesepimeron and the unmodified striae of the elytra.

Oligobruchus can be distinguished from *Caryopemon* Jekel by the following: In *Oligobruchus,* the posterior margin of the prothoracic disc is evenly arcuate and the disc is densely foveolate, the scutellum is subquadrate, the pygidium is broadly triangular, and the intercoxal process of the abdomen is acutely triangular, while in *Caryopemon,* the posterior margin of the prothoracic disc is deeply and broadly lobed mesally and sparsely punctate, the scutellum is triangular, the pygidium is vertically narrowed and the intercoxal area of the abdomen is broadly rounded. A character shared by these two genera and peculiar to them in this subfamily is the saddlelike prothoracic disc with its weak lateral margin.

Both *Pachymerus* and *Caryedon* Schoenherr are distinguished from *Oligobruchus* by their expanded prothoracic margins, sparsely punctate prothoracic disc, and shallowly emarginate eyes, all apparently being primitive Pachymerine characters.

The other two Pachymerine genera, *Caryoborus* Schoenherr and *Caryobruchus* Bridwell, lack the carinae on the metatibia found in *Caryedon, Caryopemon, Pachymerus* and *Oligobruchus* but share the absence of carinae and many other characters with *Amblycerus* Thunberg, another very primitive genus in the subfamily Amblycerinae. This condition may indicate that a smooth external face is a primitive character in the Bruchidae and that a carinate face is derived. The carinate condition is very common in this family.

In none of the extant Pachymerine genera is the prothoracic disc as densely and deeply foveolate as in *Oligobruchus*. The foveae in the latter genus are very deep and rounded and so closely approximate that the interspaces are carinate.

Characteristics possessed by *Oligobruchus* which I deduce to be primitive are the submarginal groove of the prothoracic disc, parasutural sulci of the metathoracic sclerites, swollen metafemur and correspondingly arcuate metatibia, subequal mesepimeron and mesepisternum, and the unmodified striae of the elytra. (Specialized modifications of the striae in Bruchidae include basal coalescence, basal asperities and denticles, or loss of one or more striae or parts of striae.) Specialized characters are the strongly convex saddlelike pronotal disc, narrow prosternal process, carinate metatibia, and deeply emarginate eyes. The strongly foveolate prothorax is probably also specialized.

Comparison of *Oligobruchus* with other genera suggests that it was representative of a phyletic line, probably now extinct, arising near the origin of the line or lines leading to the modern genera *Caryedon* and *Pachymerus*. Although it possesses many primitive characters already deduced from the study of the extant genera in Bruchidae and other families, there has developed in its evolution a combination of specialized characters sufficiently different from those found in the other groups to warrant its erection as a new fossil genus.

Food Habits

A comparison of the food plants of the extant Pachymerinae with the plant genera listed from Florissant by MacGinitie (1953) indicates little difficulty of correlation. Species of the modern genera *Caryoborus* and *Caryobruchus* breed exclusively in palm seeds, species presently placed in *Pachymerus* attack seeds of palms or legumes, and species of *Caryedon* and *Caryopemon* live exclusively in legumes, the plant family which is host to most of the species of Bruchidae in the world. MacGinitie found no representatives of the Palmaceae in his study but did list nine genera of Leguminosae, five of which are modern. It is quite possible that the host plant of *Oligobruchus* was a legume.

Comparisons of Climate

The climate in Florissant times is said by MacGinitie (1953) to have been "sub-humid and warm temperate, not unlike the present climate of Monterrey, Mexico." This statement concurred generally with the conclusions of James (1939) concerning the Florissant Diptera.

The modern representatives of the Pachymerinae are distributed almost entirely in subtropical regions; thus, there seems to be no discordance in the climatic distribution of the Florissant *Oligobruchus* and that of the modern representatives of the Pachymerinae.

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1946. The genera of beetles of the family Bruchidae in America north of Mexico. Jour. Wash. Acad. Sci. 36(2): 52-57.

James, M. T.
1939. A preliminary review of certain families of Diptera from the Florissant Miocene beds. J. Paleontol. 13(1): 42-48.

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Wickham, H. F.
1912. A report on some recent collections of fossil Coleoptera from the Miocene shales of Florissant. Bul. Nat. Hist., State Univ. Iowa 4(3): 1-38, 8 pls.
1913. Fossil Coleoptera from the Wilson Ranch near Florissant, Colorado. Bul. Nat. Hist., State Univ. Iowa 4(4): 1-29, 7 pls.
1914. New Miocene Coleoptera from Florissant. Bul. Mus. Comp. Zool. 58(11): 423-494, 16 pls.

A HYDROPHILID NEW TO NORTH AMERICA (COLEOPTERA: HYDROPHILIDAE)

Helophorus (Gephelophorus) fennicus Paykull

Elophorus fennicus Paykull, 1798, Fauna Suecica 1:243 [type: Finland].

Helophorus (Gephelophorus) fennicus Gyllenhal: d'Orchymont, 1926, Ann. Soc. Linn. Lyon 72:115-116 [subgeneric characters].

Helophorus fennicus Paykull: Lindroth *et al.*, 1960, Ent. Sällskapet, Lund, 1:64-67 [European distribution].

Gephelophorus sibiricus (Motschulsky): Sharp, 1915, Ent. Mo. Mag. 51:198-200 [subgeneric characters, distribution].

Additional references and synonymy in Knisch, 1924, Junk Coleop. Cat. pars 79: 76-77.

This species is represented in the Canadian National Collection by seven specimens taken during July, 1961, by Dr. R. Madge at Unalakleet and Cape Thompson, which are situated on the Alaskan coast at 63°54′ N. and 68°05′ N. Neither the species nor its subgenus has been reported from North America; the Alaskan specimens match specimens from Lapland that were kindly loaned by Dr. Carl Lindroth.

In *Gephelophorus* Sharp the terminal segment of each maxillary palpus is fusiform and not strongly asymmetric. Each elytron bears a supplementary stria on the basal part of the second interval. The cariniform external margin of each elytron is actually the median line of the eleventh interval, the external portion of this interval being deflected obliquely and inwardly to form a shiny pseudepipleura. This pseudepipleura does not attain the sutural angle and is separated by a carina from the true epipleura, which is opaque and which evanesces at the first abdominal segment. *H. fennicus* is said to occur from eastern Siberia to Lapland and south in the mountains to southern Norway. It measures from 5.0 to 6.0 mm. It has each sutural interval moderately elevated and has intervals 3, 5, and 7 strongly convex and moderately elevated above intervals 2, 4, and 6, which are flat.—W. J. BROWN, *Entomology Research Institute, Experimental Farm, Ottawa, Canada.*

NOTICE

The Robert E. Snodgrass library of reprints on insect anatomy and morphology is now housed in the U. S. National Museum, Department of Entomology, and is being perpetuated as a memorial to Dr. Snodgress. Contributors to the field of insect morphology are invited to send copies of their papers to the *Snodgrass Reprint Collection, Department of Entomology, U. S. National Museum, Washington, D. C.*

BEETLE TALK

The following proposals concerning the scientific names of beetles were placed before the International Commission on Zoological Nomenclature:

Laemophloeus immundus Reitter, 1874 (Insecta, Coleoptera): Proposed suppression under the plenary powers. L. P. Lefkovitch, 1964, Bull. Zool. Nomenclature 21(5):375.

Cotinis Burmeister, 1842 (Insecta, Coleoptera): Proposed conservation under the plenary powers. M. A. Goodrich, 1964, Bull. Zool. Nomenclature 21(6):429.

Cryptorhynchus Illiger, 1807 (Insecta, Coleoptera): Proposed interpretation under the plenary powers. D. G. Kissinger, 1964, Bull. Zool. Nomenclature 21(6):440.

HYPERODES ANTHRACINUS (DIETZ) DAMAGING GOLF GREENS (COLEOPTERA: CURCULIONIDAE)

Specimens of the genus *Hyperodes* were forwarded to me by L. L. Pechuman of Cornell University who had received them from the Skytop Golf Club, Skytop, Monroe Co., Pennsylvania. I identified the species as *H. anthracinus* (Dietz). Information sent with the specimens stated that they were collected in Sept. 1962 and were doing considerable damage to golf greens in Pennsylvania. In 1959 I had received and identified *H. anthracinus* specimens from the Piping Rock Country Club, Long Island, New York. These also were reported doing damage to golf greens. *H. anthracinus* is a Florida species, and, in addition to the above, only two specimens in the National Collection had been collected outside of that State. One was collected at a light trap on Horn Island, Mississippi, June 14, 1944, by E. A. Richmond, the other is merely labelled Virginia. Other than the original description in 1899 and the listing of the species in Richmond (The Flora and Fauna of Horn Island, Mississippi, Gulf Research Reports, Vol. 1, No. 2, p. 87, 1962) there is no literature available on the species.—ROSE ELLA WARNER, *Ent. Res. Div., A.R.S., U. S. Department of Agriculture, Washington, D. C.*

BEETLE TALK

ON CANTHON LAEVIS: If the observer carefully seizes the male and quickly removes it to the collecting vial without jarring the ball, some seconds will elapse before the "widowed survivor" realizes his absence, she then ceases propelling the ball in the direction previously taken; mounts it, peers under it, and on all sides of it; gives it another fitful push or two, and then re-examines it closely with eye and antenna, then in the majority of cases deserts it entirely, on several occasions moving off a few feet only, pushing her head beneath a clod of earth or other loose material, remains perfectly still as if lost in hopeless grief for many minutes.—Sanborn, 1875, Field and Forest, p. 55.

Dr. Schwarz exhibited two specimens of *Mylabris cichorii* L. and said this is a beneficial species, being used for medicinal purposes. This species is often eaten when the Chinese want to commit suicide.—Jour. Wash. Acad. Sci. 13:261, 1923.

NOTICE

CORRECTION: In the BULLETIN 1964, 18(4):105-111, the name *Neltumius gibbithorax* Schaeffer was consistently misspelled *gibbothorax* throughout the paper. I sincerely regret the error.—John M. Kingsolver.

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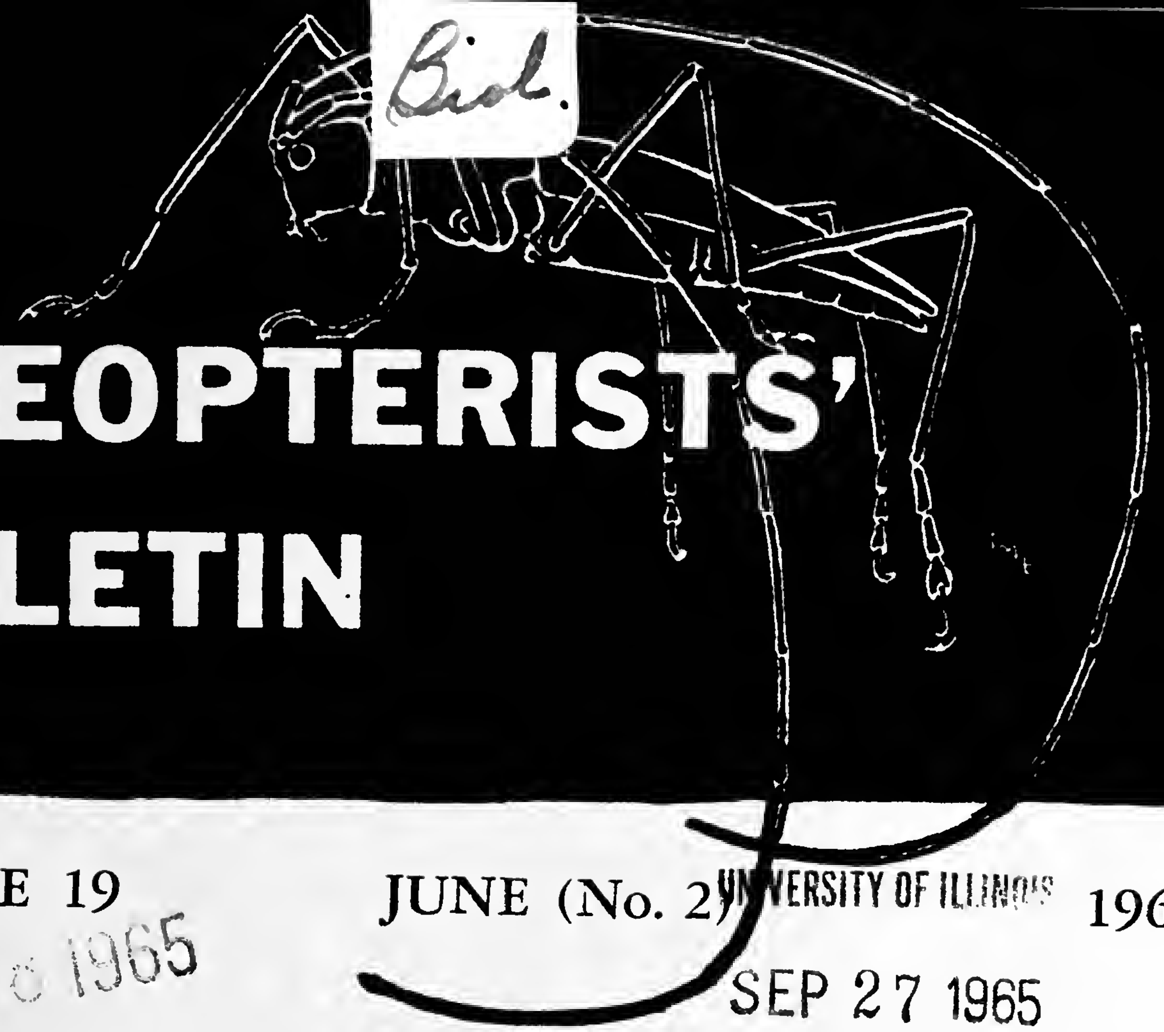

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Founded 1947 by Ross H. Arnett, Jr.

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Any article, note, or news items likely to be of interest to readers of the **Bulletin** will be considered. Articles with illustrations are particularly desired, and *in all cases, descriptions of new species must be illustrated.* Descriptions of new species or genera MUST contain keys or be correlated with existing keys.

A QUARTERLY PUBLICATION DEVOTED TO THE STUDY OF BEETLES

The Coleopterists' Bulletin

Volume 19 June (No. 2) 1965

THREE NEW SPECIES OF CRENITIS FROM THE PACIFIC NORTHWEST (COLEOPTERA: HYDROPHILIDAE)

By DAVID C. MILLER[1, 2]

Three new species of the genus *Crenitis* are described here in order to make the names available for use in the section on Hydrophilidae in the forthcoming Part V of Dr. M. H. Hatch's *Beetles of the Pacific Northwest.*

Thanks are due to the following individuals for the loan of material of these new species for study. The abbreviations in parentheses are those used after the locality listings to indicate the site of deposition of the material. This is generally equivalent to the original source from which it was borrowed. The author's collection is referred to as (DM). Mr. Hugh B. Leech, California Academy of Sciences (CAS); Mr. W. J. Brown, Canadian National Collection, Ottawa (CNC); Mr. H. S. Dybas, Chicago Natural History Museum (CNHM); Mr. Ken M. Fender, McMinnville, Oregon (KF); Mr. Jack Lattin, Oregon State University, Corvallis (OSU); Mr. S. G. Jewett, Portland, Oregon (SGJ); Dr. M. H. Hatch, University of Washington (UW).

Mr. Leech has been most kind in reading a preliminary version of the manuscript and sending additional material for study, including the only known females of *C. palpalis* n. sp. Dr. Hatch aided in many ways with the portions of the work completed while I was at the University of Washington. The drawings are by Mrs. Helen Houk of the University of Washington (fig. 1, 2) and Mr. David Simon of the City College of New York (fig. 3).

THE GENUS CRENITIS

The genus *Crenitis* Bedel may be defined as Hydrobiinae which are under 4 mm. long, with the maxillary palpi subequal to the antennae in length, no deep elytral striae except for the sutural ones, and the mesosternum with neither a longitudinal carina nor a conical tooth. In *morata* (Horn), *digestus* (LeC.), *rufiventris* (Horn) and *seriellus* (Fall), not included in the genus by all authors, the mesosternum has a low transverse ridge in front of a small transverse indentation, but in most species it is entirely plain.

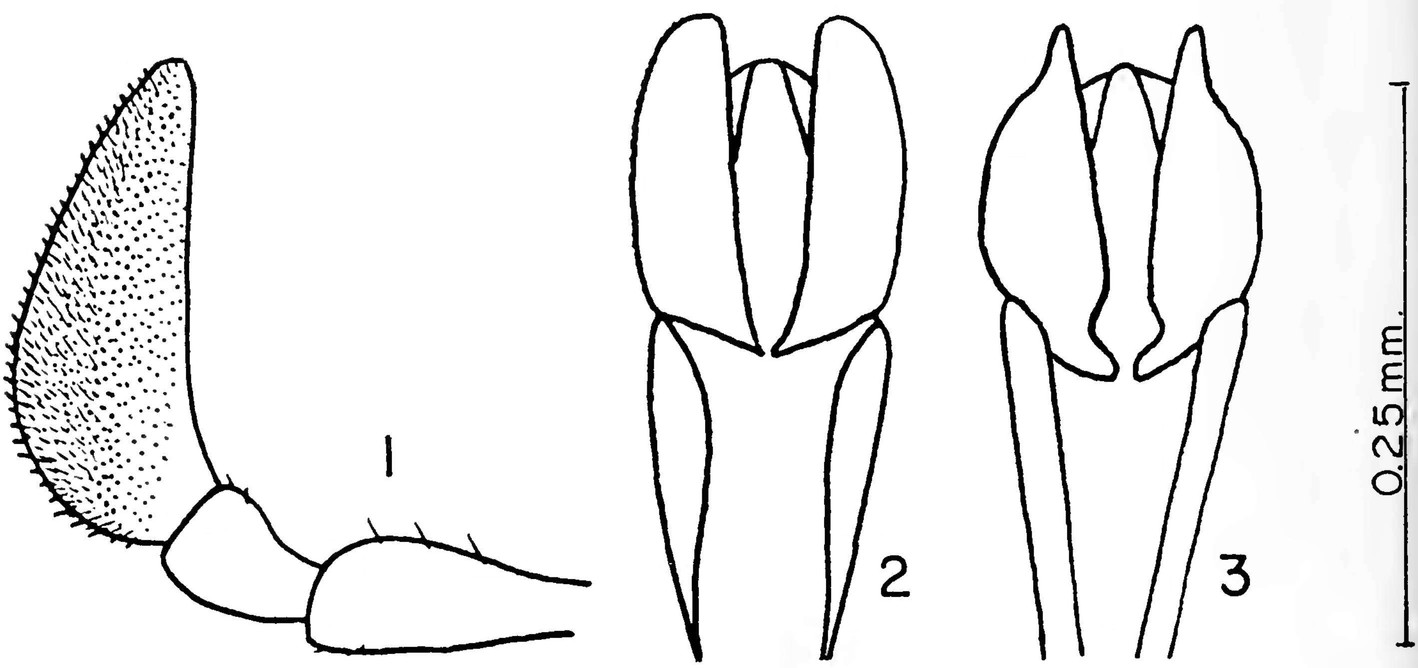
[1] Department of Biology, City College of New York, N. Y. 10031.

[2] The majority of this work was included in a dissertation submitted to the University of Washington in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

The three tiny species described here are obviously closely related, and additional small species from California which are as yet undescribed probably also belong to this group. In all three species the sexes may be separated by the shape of the tarsal claws, which in the female curve gradually from base to tip, while in the male they are angled sharply just after the base and then straight to the tip. Thanks are due to Mr. Hugh Leech for pointing out this distinction to me.

If the color pattern of the pronotum is somewhat loosely interpreted, all three new species will run to couplet 3 in Leech's key to the California *Crenitis* (Leech and Chandler 1956:344) as they have the pronotum dark brown or reddish brown with pale lateral margins. The following key separates the new species and those found in Leech's couplet 3.

3. Metafemora nearly glabrous; antennae 9-segmented; pronotum at most very faintly alutaceous between the punctures; mentum about 1.2 times as wide as long; maxillary palpi with the pseudobasal segment much enlarged; California to Oregon -- **DISSIMILIS** (Horn)
   Metafemora pubescent in basal 2/3 or more; mentum about 1.5 times as wide as long; maxillary palpi with the pseudobasal segment at most slightly enlarged---- 5
5. Pronotum alutaceous between the punctures, especially at the sides; antennae 8-segmented; length 2.2-3.3 mm.; Arizona, California to British Columbia----**ALTICOLA** (Fall)
   Pronotum smooth between the punctures; antennae 9-segmented; length under 2.6 mm. 6
6. Elytra with the pale lateral margin blending into a diffusely paler area at the apex; metatibiae, at broadest point, at least 1/6 as broad as long; maxillary palpi with apical segment glabrous, about twice length of adjacent segment; aedeagus with parameres bluntly rounded at tips-------------------------**SNOQUALMIE** n. sp.
   Elytra with pale lateral margin sharply defined (or occasionally absent), elytral apex not diffusely paler-- 7
7. Apical segment of maxillary palpi glabrous, about twice length of adjacent segment; metatibiae, at broadest point, about 1/6 as broad as long; aedeagus with parameres bulging laterally and drawn out at tips along inner margins----------**MALKINI** n. sp.
   Apical segment of maxillary palpi of males strongly pubescent except along anterior margin, that of females bearing only a few scattered hairs, but that of both sexes about three times length of adjacent segment; metatibiae, at broadest point, about 1/8 as broad as long; aedeagus with parameres bluntly rounded at tips—**PALPALIS** n. sp.



FIGURES 1-3, *Crenitis* spp. 1. *C. palpalis*, terminal segments of maxillary palpus. 2. *C. snoqualmie*, aedeagus, dorsal view. 3. *C. malkini*, aedeagus, dorsal view (specimen from British Columbia).

Crenitis snoqualmie Miller, NEW SPECIES
(FIG. 2)

Crenitis dissimilis snoqualmie Hatch and Kincaid 1958:11. NOMEN NUDUM.

MALE: Length 1.9-2.5 mm.; form elongate oval, nearly parallel sided; head black; pronotum dark brown, with side margins narrowly pale, more broadly so posteriorly; elytra and scutellum dark brown, with narrow lateral margins of elytra pale, blending into diffusely pale area at apex; punctation of head, pronotum, and elytra all thick and fairly strong, subserially arranged on elytra and impressed as very light striae near elytral apex and sides; venter very dark brown; mesosternum unmodified (i.e. with no transverse ridge or indentation); legs dark brown, with femoral apices, tibiae, and tarsi paler; metatibiae at broadest point at least 1/6 as broad as long; femora pubescent except at about apical quarter; maxillary palpi pale, except apical segment very dark, all segments glabrous; antennae dark, 9-segmented; mentum rectangular, about half again as wide as long; abdomen dull, finely and densely pubescent; aedeagus with parameres broad, short, and blunt (nearly truncate) at tips.

FEMALE: Externally identical to the male except for the difference in tarsal claws noted above.

HOLOTYPE: Male, Green River Gorge, King Co., Washington, July 20, 1939, G. Minsk (UW). ALLOTYPE: Female, same data as holotype but Aug. 6, 1937, M. H. Hatch (UW). PARATYPES: *BRITISH COLUMBIA:* 1, Copper Mountain (CNC). *WASHINGTON: Clallam Co.:* 19, Olympic Hot Springs (Olympic National Park) (UW). *Clark Co.:* 7, Skye (UW). *Cowlitz Co.:* 10, Morgan State Park (Toutle River) (7 SGJ, 2 UW, 1 DM). *King Co.:* 22, Green River Gorge (UW); 1, North Bend (CAS); 2, Snoqualmie (UW); 2, Snoqualmie Falls (UW); 7, Snoqualmie River (Maloney's Grove) (UW); 1, Tokul (UW). *Lewis Co.:* 3, Vance (UW). *Mason Co.:* 6, Shelton (UW); 2, South Fork Skokomish River (UW). *Pacific Co.:* 3, Naselle River (UW); 2, North Nemah River (UW); 2, Ocean Park (UW). *Pierce Co.:* 1, Chop River (UW); 4, Fairfax (Carbon River) (UW). *Olympic Peninsula (County?):* 1, Finch Creek (UW). *OREGON: Coos Co.:* 3, Cape Arago (KMF). *Curry Co.:* 2, Pistol River (Myers Creek) (CAS). *Douglas Co.:* 1, Elkton (SGJ). *Lane Co.:* 3, Austa (1 SGJ, 1 UW, 1 DM); 11, McKenzie River (UW); 10, tributary Turner Creek (6 SGJ, 2 UW, 2 DM). *Lincoln Co.:* 9, Butler City (7 SGJ, 1 UW, 1 DM). *Marion Co.:* 13, Detroit (Elk Creek Road) (9 SGJ, 2 UW, 2 DM); 22, Breitenbush (18 SGJ, 2 UW, 2 DM). *Yamhill Co.:* 1, Dayton (UW); 12, McMinnville (1 Peavine Ridge) (UW).

The single specimen from Copper Mountain, British Columbia, is perhaps mislabeled, and should not be accepted in the distribution range of the species until additional material from that area is found. Within the Pacific Northwest the species occurs only west of the Cascade Mountains, from Washington through Oregon, but the southern limit of distribution is not known.

Crenitis malkini Miller, NEW SPECIES
(FIG. 3)

MALE: Identical to *C. snoqualmie* Miller, n. sp., except for the following: elytra usually with a very narrow pale margin laterally, but not diffusely paler at the apex; aedeagus with the parameres bulging laterally and drawn out at the tips along their inner margins.

FEMALE: Externally identical to the male except for the difference in tarsal claws noted above.

HOLOTYPE: Male, Port Orford, Curry Co., Oregon, July 7, 1951, Borys Malkin (UW). ALLOTYPE: Female, same data as holotype (UW). PARATYPES: *IDAHO: Blane Co.:* 3 ♂ ♂, 1 ♀, Galena (2 UW, 1 CNHM, 1 DM). *Custer Co.:* 1 ♀, Twin Creek Forest Camp (Challis National Forest) (UW). *BRITISH COLUMBIA:* 3 ♂ ♂, 4 ♀ ♀, Elk River (Hosmer) (5 CAS, 2 DM). *OREGON: Coos Co.:* 1 ♀, Bridge (OSU). *Curry Co.:* 1 ♂, 1 ♀, Port Orford (♂ UW, ♀ CNHM).

I take great pleasure in naming this species in honor of Mr. Borys Malkin, who collected most of the known specimens and who has added greatly to our knowledge of the northwestern Hydrophilidae by his extensive collections in Idaho and Oregon. The lack of records of this species in Washington probably is simply due to lack of collecting, but it is possible that there are two species represented in this material. The aedeagus of the males from the British Columbia locality is slightly broader and more rounded than that of the males from Oregon and Idaho. The illustration (fig. 3) shows the aedeagus of a male from British Columbia.

Crenitis palpalis Miller, NEW SPECIES

(Fig. 1)

MALE: Length 1.9-2.3 mm.; identical to *C. snoqualmie* Miller, n. sp., in all respects including the aedeagus, except for the following: dorsal color dark reddish brown with base of head darker than pronotum and elytra, pronotum and elytra both with sharply defined narrow pale margins, but elytra not diffusely paler at apex; terminal segment of maxillary palpus much enlarged (more than three times length of previous segment) and strongly pubescent except along anterior margin; metatibiae, at broadest point, about ⅛ as broad as long.

FEMALE: Externally identical to the male except for the following: tarsal claws differing as noted above; maxillary palpi with terminal segment dark reddish brown, slightly less than three times as long as preceding segment, and nearly glabrous, bearing only a few scattered hairs.

HOLOTYPE: Male, Shasta Retreat, Siskiyou Co., California. Elev. 2416′. July. F. E. Blaisdell (CAS). ALLOTYPE: Female, same data as holotype (CAS). PARATYPES: *CALIFORNIA: Siskiyou Co.:* 2 ♂ ♂, 1 ♀, Shasta Retreat (1 CAS, 2 DM). *OREGON: Curry Co.:* 1 ♂, nr. mouth Rogue River (SGJ).

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THE NORTHERN LIMITS OF SEVERAL SPECIES OF COLEOPTERA WITH SPECIAL REFERENCE TO THEIR OCCURRENCE IN THE OTTAWA DISTRICT, ONTARIO

By STANTON D. HICKS[1]

Many insects and plants that occur in southern Ontario are not found in the Ottawa District, an area embraced by a circle of thirty-mile radius centered at the Parliament Buildings in Ottawa (fig. 1). Munroe (1956, p. 400) specifically states, "More than thirty species of trees occur in the Niagara Peninsula that do not occur at Ottawa, and a similar contrast extends throughout the fauna and flora." The Ottawa District as depicted in the accompanying map is in the hemlock-white pine-northern hardwoods region, equivalent to the Great Lakes-St. Lawrence region plus the Acadian region of Halliday, all of which is a tremendous tract extending from southeastern Manitoba to the Atlantic coast. During the years 1948 to 1961, while assisting in the maintenance of the Canadian National Collection and collecting insects in the Ottawa area, I noted that several species of beetles, which I had collected in southern Ontario, were relatively uncommon here. Records of such species form the subject of the present paper. A number of interesting species found near Constance Bay have been excluded because the unusual faunal characteristics of this area have not been adequately studied. The localities referred to are underlined in the map.

Cicindela punctulata Olivier (Cicindelidae). This is one of the most widely distributed tiger beetles in the United States. It can be easily collected in southern Ontario, and according to Wallis (1961, p. 61) it ranges northeast through London, Guelph, Toronto, Kettleby, and Leskard to eastern Ontario. It has been taken in small numbers at Marmora and recently was collected for the first time in the Ottawa District near Bells Corners and in Ottawa at Britannia Heights. The species appears to be restricted to these two District areas on open, sandy soil. The northernmost record is by Hubbard and Schwarz (1878, p. 627) in the Lake Superior region.

In 1964 the author collected fourteen specimens of *C. punctulata* at Beechgrove, near Quyon, Quebec. This appears to be the first authentic record for Quebec; previously, Beaulieu (1900, p. 140) and Beaulne (1914, p. 123) listed the species without locality records.

The seemingly disjunct distribution of this beetle in Canada as recorded by Wallis starts again in southern Manitoba at Aweme, Hartney, and Treesbank, continues to Estevan in Saskatchewan, and Medicine Hat, Burdette, Lethbridge, and Happy Valley in Alberta.

Zonitis bilineata Say (Meloidae). In the United States, this meloid ranges in the East from South Carolina and Kansas northward to Connecticut and Minnesota. It seems to be a rarity in Canada, although perhaps it has been overlooked, since the specimens in the National Collection

[1] Entomology Research Institute, Research Branch, Canada Department of Agriculture, Ottawa, Ontario.

show that it has been found only from July 7 to July 18. At Windsor, Ontario, a few specimens were collected on the flower heads of thistle, *Cirsium* sp., and one specimen has been taken at Marmora. In the Ottawa District only three specimens are known, from Britannia Bay in Ottawa and Bells Corners.

Agrilus celti Knull and *A. lecontei* Saunders (Buprestidae). These small buprestids have a broad range in the United States wherever their hackberry host, *Celtis occidentalis* L., occurs. In the Canadian National Collection there is a series of each species from the numerous hackberry trees in the Point Pelee area of southern Ontario. The only other Ontario record was a series of each species collected by the author in a large hackberry grove at Carleton Place in the Ottawa District, some four hundred miles to the northeast (Hicks, 1960).

It is very possible that the hackberry tree is native to Canada only at Point Pelee and other Carolinian zone sites along the shore of Lake Erie. However, it has been recorded sparingly at scattered localities from London in the southwest to the Ottawa Valley area, and Montreal, the northernmost station. Every one of these localities is on or near water routes formerly used by Indians who had the habit of eating the hackberry nuts as they travelled. How these two species of beetles came to exist on the hackberry at Carleton Place with no records from the south for hundreds of miles is not known.

Phyllophaga futilis (LeConte) (Scarabaeidae). This species was originally described (Agassiz, 1850, p. 226) from the Lake Superior region, the most northern recorded locality. It has been recorded in all parts of the eastern United States and at many points in the southern parts of Ontario (Brown, 1929 and Luginbill, 1953). In the Ottawa District, *P. futilis* is unquestionably a common species but it was not recorded here prior to 1959. Since then, many specimens have been collected in or near the city of Ottawa and south of it at numerous locations both in and outside the District. This scarab has not been recorded due west or east of Ottawa in Ontario and it is not known across the Ottawa River to the north or anywhere in the province of Quebec.

Macrodactylus subspinosus (Fabricius) (Scarabaeidae). The rose chafer is known to range from Colorado, Indiana, Virginia, and the Atlantic States into southern Ontario. It has been an economic pest for many years from Windsor to the Niagara River. Farther north and east, it has been collected at Oakville, Toronto, Belleville, Brockville, and occasionally near the limit of the Ottawa District on the south side at Elgin and Chesterville, and on the east side at Plantagenet. Recent observations show that the species is well established in the District. In 1963, hundreds of adults were observed on the flowers of *Spiraea* sp. at Mer Bleue, a large, cold, bog area. At Kemptville, larvae were common in soil. Adults have also been collected at Britannia Heights in Ottawa, Vernon, and Bourget.

The most northerly record is that of a single specimen collected by Beaulieu (1903, p. 38) at Yamachiche on the north shore of the St. Lawrence River in Quebec. The rose chafer has been reported from several localities in southern Quebec but apparently not in abundance.

Pelidnota punctata (Linnaeus) (Scarabaeidae). This beetle is widespread in the eastern half of the United States as indicated by specimens in the Canadian National Collection from Texas, Oklahoma, Missouri, Tennessee, Kentucky, and Massachusetts. In Ontario, according to the records of the Canadian Insect Pest Review, this species was reported as early as 1871; since then it has been recorded from near Lake St. Clair east to London, the Niagara Peninsula, Toronto, Port Hope, Courtice, Kingston, Marmora, and Newboro. It was first recorded in the Ottawa District in 1946 at Westboro, now part of the city of Ottawa; more recently it has been found infrequently at several other sites in the city and at Winchester, Osgoode, and Richmond. The most recent records are at Kerr Lake near Lanark, and L'Original, just outside the District. This insect is a pest of cultivated grapes in southern Ontario. In the Ottawa region where cultivated grapes are scarce it probably feeds on Virginia creeper and wild grape.

The first records (Robert, 1946) for Quebec were at Rigaud in 1945 and Montreal in 1946. The only others (Robert, 1962) were at Saint-Jean and Terrebonne in 1961, the latter being the most northern anywhere.

Euphoria inda (Linnaeus) (Scarabaeidae). The bumble flower beetle is widely distributed in the United States from Florida and Texas northward. It is common in southern Ontario and ranges northeast through the areas around Toronto, Belleville, Muskoka, and Arnprior to Ottawa. Only three separate records during the last twenty years have been taken in or near Ottawa, indicating that the species is rare in the District. Beaulieu (1903, pp. 110-111) noted that this beetle was common at Montreal, Quebec, and it has been recorded from nearby localities south of Montreal. It has also been recorded at Norway Bay, Quebec, just outside the District. In the Canadian West, the species has been reported from Elgin, Brandon, Winnipeg, and Cartwright in Manitoba, and Aden, Schuler, and Medicine Hat in Alberta.

Desmocerus palliatus (Forster) (Cerambycidae). The cloaked knotty-horn ranges from Louisiana and North Carolina in the United States up into southern Ontario. It occurs commonly in the Niagara Peninsula; northeast of here it has been recorded from Toronto, Peterborough, Marmora, Lyn, and into the Ottawa District. Here it is not common but has been reported at Manotick, Britannia Bay in Ottawa, and Ottawa. Gosse (1840, p. 225) stated that this beetle was not uncommon at Compton, Quebec, and other records from Montreal (Chagnon, 1905, p. 28), Sweetsburg, Knowlton, and St. Chrystostome show that it is known from southern Quebec. There are two, isolated records given in the Canadian Insect Pest Review, one at Sillery, just south of Quebec City on the north shore of the St. Lawrence, and the other at St. Johns, Newfoundland.

Anoplitis philemon (Newman) (Chrysomelidae). North American specimens of this leaf-mining chrysomelid were identified by Gilbert Arrow of the British Museum in 1945 (H. R. Dodge *in litt.*). The species is not well known and there is little in the literature to resolve a geographical picture of its distribution.

In the Niagara Peninsula of southern Ontario, this leaf-miner attracted my attention when I found a population at De Cew Falls (five miles south of St. Catharines) infesting leaves of wood nettle, *Laportea canadensis* (L.) Wedd. Several years' observations showed that most of the adults in this population were blackish but there were a few noticeable pale forms. Color variation also occurred among the larvae and pupae. Dodge (1942, *in litt.*) had also seen color differences and noted especially the very marked difference in the proportion of the two colors between populations observed at Clintonville, Wisconsin, and Carlisle, Pennsylvania; according to him it was the opinion of H. S. Barber of the National Museum, Washington, D. C., that the pale form was an allelic and that no name should be assigned to it.

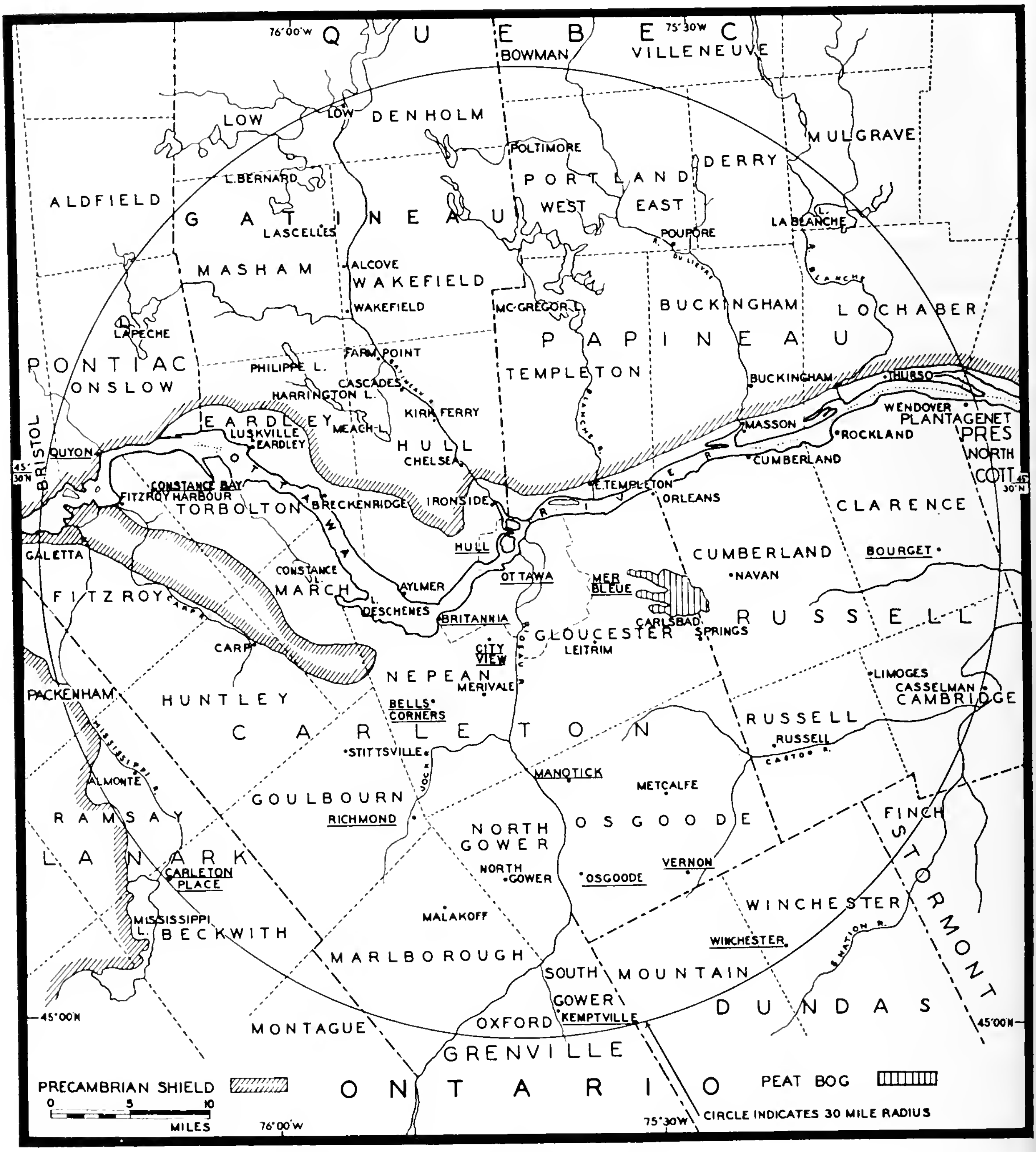

FIGURE 1, Map of the Ottawa District.

In the Ottawa District, this beetle was recently discovered in a small woods in Britannia Heights in Ottawa and across the Ottawa River at Fairy Lake near Hull, Quebec. It was of interest to find that the series of adults collected in each place were all blackish. Although the host of this species has a more or less continuous distribution from De Cew Falls to the Ottawa District, the writer knows of no specimens collected between these two widely separated localities. These records are slightly more northern than those at Clintonville, Wisconsin.

Another *Anoplitis* sp. that is poorly known in the United States (H. R. Dodge *in litt.*) and Canada mined the leaves of climbing bittersweet, *Celastrus scandens* L., in southern Ontario where populations were observed for several years at Windsor, De Cew Falls, and Niagara-on-the-Lake. The host is common to the northeast into the Ottawa District but the distribution of the insect appears to be limited. The author was never able to find adults of this species in the District but four dead pupae, one in each of four mined leaves, were found at Britannia Bay in Ottawa.

Rhodobaenus tredecimpunctatus (Ill.). This species and its varieties, known as the cocklebur billbugs, occur throughout the United States where they feed mostly on species of Compositae. In Ontario, the species has only been found in Ottawa District localities; a few specimens were collected from the purplish flower heads of a Joe-Pye-Weed, *Eupatorium* sp., at Britannia Bay in Ottawa and a few near Uplands Airport, Ottawa. In Quebec, one specimen was taken at Berthierville, the northern recorded locality for the species.

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LITERATURE NOTICE

A REVIEW OF THE CLASSIFICATION OF CLEROIDEA (COLEOPTERA), WITH DESCRIPTIONS OF TWO NEW GENERA OF PELTIDAE AND OF SEVERAL NEW LARVAL TYPES. By R. A. Crowson. Trans. Ent. Soc. London 116(12):275-327, 80 figs., 1 pl. 1964.—Crowson's 1955 (Natural Classification of the Families of Coleoptera) treatment of the Cleroidea is considerably revised and explained. After discussing relationships of and within the superfamily, a key to families (7) of adults and larvae is given. Then, he presents the following keys: Phloiophilidae, only one genus, no keys; Peltidae, to subfamilies (3) of adults, to subfamilies (2) and genera (5) of larvae, to genera (4) of adult Decamerinae; Trogossitidae, to subfamilies (2) of adults and larvae, to genera (3) of adult New Zealand Lophocaterinae, to genera (5) of larval Trogossitinae; Chaetosomatidae, to genera (2) of adults; Cleridae, to subfamilies (8) of adults, to genera (6) of adults and to genera (5) of larvae of New Zealand; Phycosecidae, to species (4) of only included genus; Melyridae, to subfamilies (6) of adults and larvae, to genera (8) or species (12) of larvae. Many discussions, descriptions, or illustrations of larvae, adults, fossils, morphology, and habits explain the systematics.

DIE CRIOCERINEN AFRIKAS (COL. CHRYSOMELIDAE). By E. Heinze and W. Pinsdorf. Ent. Arb. Mus. Frey 13(1):156-270, figs. 1-18 (1962); 14(1): 252-372, figs. 19-28 (1963); 15(2):334-569, figs. 29-45 (1964).—Keys, descriptions, and some illustrations to 3 tribes, 14 genera, and 307 species are included. The genus *Lema* contains 209 of the species.

A MODIFIED MALAISE INSECT TRAP. By G. D. Butler, Jr. Pan-Pacific Ent. 41(1):51-53, illus. 1965.—The modified trap can be inexpensively made, easily transported, quickly set up, and conveniently emptied.

NOTICE

Robert R. Dreisbach of Midland, Michigan, died June 24, 1964. He was a specialist in Hymenoptera but was interested in and collected all orders of insects. His latest efforts were toward a list of the insects of Michigan.

E. O. Essig of the University of California at Berkeley died November 23, 1964. He was a teacher of entomologists and a specialist on aphids. His three books, A History of Entomology, Insects and Mites of Western North America, and College Entomology, are known to all.

James A. G. Rehn died January 25, 1965. He was an outstanding authority on the Orthopetera. However, he was known to all coleopterists as the curator of insects at the Academy of Natural Sciences of Philadelphia.

A REVISION OF THE GENUS CHARISIUS (COLEOPTERA: ALLECULIDAE)

By J. M. Campbell[1]

Introduction

The genus *Charisius* was first described by Champion (1888) in the Biologia Centrali-Americana. He erected the genus to receive four species which he considered distinct from the genus *Allecula* Fabricius. In 1893, Champion added an additional species to the genus in the supplement to the family Alleculidae in the "Biologia," and, in 1901, Linell added a new species from Florida. Since that date, there have been no additional publications pertaining to the genus.

Charisius is a very interesting genus of alleculids because of the high elevations at which all of its species are naturally found. Other related genera, except the monotypic genus *Narses* Champion, are found primarily below 4,000 feet. A few species of *Isomira* Mulsant and *Lobopoda* Solier may be found at moderately high elevations, but only rarely above 4,000 feet.

I have divided *Charisius* into three groups, the Fasciatus Group, the Salvini Group, and the Zunilensis Group. The three species of the Fasciatus Group have been collected at elevations ranging from 5,000 to 10,000 feet, with most recorded localities between 7,000 and 9,000 feet; the two species of the Zunilensis Group are found at elevations ranging from 4,000 to 5,000 feet, except for a possible introduction in Florida; and the Salvini Group is found at somewhat intermediate elevations ranging from 4,000 to 7,000 feet.

The revision of the genus was made possible by the generous loan of material from the British Museum (Natural History) which included syntypes of all the species described by Champion. I would like to acknowledge the assistance of Miss C. M. F. von Hayek of the British Museum throughout the course of this study and to James Marshall for observing the holotype of *Charisius floridanus*. In addition, I would like to express my appreciation to Hugh B. Leech and the California Academy of Sciences for the loan of material and to Richard B. Selander for the donation of material from his personal collection. I would also like to express my appreciation to the Society of the Sigma Xi and the Sigma Xi RESA Research Fund which supported the field work of this investigation. For allowing me to accompany him in Mexico during the summer of 1962, I would particularly like to thank Edward L. Mockford.

The primary objectives of this work are: (1) to give an adequate key for the separation of the species; (2) to designate lectotypes of Champion's species; (3) to suggest a phylogeny for the species of the genus; (4) to describe the new species at hand; and (5) to give a brief discussion of the geographic range of the species of the genus.

[1] Research Entomologist, University of Kentucky, Lexington, Kentucky.

Bionomics

Unfortunately, very little is known of the bionomics of this group. The larvae are unknown. Adults may be found by beating trees bearing an abundant covering of lichens upon which they probably feed. I collected five specimens from a small tree near a tree stump and one specimen was collected on a stump. It is probable that the larvae live in dead wood as do the larvae of most United States genera of Alleculidae.

Methods and Terms

Records are given for all specimens studied. These records list the exact localities of the specimens, the elevation of the locality, the date of collection if known, the collection from which the specimen was borrowed, and finally the number of specimens in each series. The following abbreviations were used to designate the collections: (BMNH) British Museum, (CAS) California Academy of Sciences, and (JMC) my personal collection.

Pronotal index expresses the ratio of the length of the pronotum along the midline to the width at the basal angles. This ratio is multiplied by 100 for convenience in handling. Total length of the specimen is measured *in situ* to the nearest ½ mm. Total length is the distance between the anterior margin of the labrum and the apices of the elytra. All measurements were made with the aid of an ocular micrometer.

The genus *Charisius* has only five visible sterna. These are numbered one through five although morphologically they are the third through the seventh. The morphological eighth and ninth sterna of the male are invaginated and bilobed. In referring to these structures, they are called the lobes of the eighth and/or ninth sterna. The terms basal piece and apical piece are used in describing the male genitalia. The term basal piece was proposed by Sharp and Muir (1912) and has since been referred to as gonocoxite (Michener, 1944) and as phallobase (Snodgrass, 1935). I have used the term apical piece for convenience. It is synonymous with the terms lateral lobes (Sharp and Muir), gonostyli (Michener), and parameres (Snodgrass). The male genitalia, eighth, and ninth sterna are collectively called the male terminalia. The small, modified, triangular setae found on the male terminalia are referred to as dentiform setae.

Systematics

Charisius Champion

Charisius Champion, 1888, Biol. Centr.-Amer., Ins., Coleop. 4(1):421.

Body elongate; glabrous; color ranging from reddish-brown to black; surface smooth, strongly shining. Length 6 to 13 mm.

Vertex moderately densely punctate; a small, impunctate area placed between posterior margin of eyes. Apical segment of labial palpi elongate-triangular, apex slightly longer than outer side; apical segment of maxillary palpi broadly triangular, apex about equal in length to outer side; mandibles with apex shallowly emarginate. Antennae long, filiform; apex of fifth segment reaching to base of pronotum when pulled posteriad over dorsal surface of body; third segment approximately three times as long as second, slightly shorter than fourth; following segments approximately equal in length to third. Eyes moderately small in size, usually separated by distance approximately equal to diameter of an eye.

Pronotum with base distinctly narrower than base of elytra; sides variable, ranging from strongly narrowed from base to apex to widest near middle and rounded; sides and base distinctly margined. Basal foveae small, moderately deeply impressed, connected across base of pronotum by a deep, transverse prebasal groove. Prosternum elongate and transverse anteriad of procoxae, prosternal elongation abruptly declivous posteriad of procoxae; mesosternum abruptly declivous just anteriad of mesocoxae; metasternum very elongate. Venter of thorax moderately densely, deeply punctate; glabrous. Legs moderately sparsely setate; setae short, becoming denser approaching apex of legs. Third and fourth tarsal segments of anterior and intermediate tarsi and penultimate segment of posterior tarsi broadly lobed in both male and female, basal two segments of anterior tarsi of male lobed ventrally (except in *C. salvini*).

Elytra elongate, sides parallel for basal half and then evenly rounded to apex; elytral striae moderately shallowly impressed near base, becoming more deeply impressed approaching apex; strial punctures small, densely placed along striae; strial interstices convex, impunctate, or finely and obsoletely punctate. Elytral epipleurae ending just anteriad of apex of elytra; evenly arched from base to apex. Abdominal sterna impunctate or finely, sparsely punctate. Fifth sternum evenly convex, rarely excavate in male.

Eighth sternum of male with two large, well developed, elongate lobes; lobes moderately broad, straight, or curved mediad approaching apex (angulate in *C. salvini*); apex bearing very small, densely placed denitiform setae which extend along inner margin to base of lobes. Ninth sternum bilobed; lobes small, reaching only to base of eighth sternal lobes; glabrous. Male gentalia narrowed from base to apex; apical piece strongly narrowed, apex very narrowly rounded, bearing densely placed dentiform setae on sides.

Type-Species. I here designate *Charisius fasciatus* Champion as the type-species of the genus.

Discussion. Charisius is a member of the tribe Alleculini of the subfamily Alleculinae. This tribe is distinguished from other tribes of the subfamily in having lobed tarsi and a narrowly triangular intercoxal process of the abdomen. *Charisius* seems to be most closely related to the genus *Allecula* and the wingless monotypic genus *Narses*. All have the same shape and general appearance, similarly shaped maxillary and labial palpi, very broadly lobed anterior and intermediate tarsi, and narrowly elongate eighth sternal lobes.

The genus *Charisius* is distinct from other Mexican and Central American genera of alleculids by the possession of a deep, prebasal, transverse groove connecting the basal foveae of the pronotum. In addition, the shining, glabrous surface of the body; elongate shape; sparsely to moderately densely punctate pronotum; well developed wings; and in some species, the presence of distinct yellow bands across the elytra will easily separate *Charisius* from related genera.

Key to Groups and Species of Charisius

1.	Elytra with two or three light yellow transverse bands------------Fasciatus Group	2
	Elytra without yellow markings---	4

2. Elytra with a greatly expanded yellow band in basal half (fig. 18); band interrupted only by elytral suture; sides of pronotum (fig. 11) distinctly narrowed from base to apex -- MEXICANUS
Elytra with anterior band reduced to oval spot or absent (figs. 15-17), not reaching elytral suture; sides of pronotum (fig. 9-10) parallel, sinuate, or converging slightly in basal half -- 3
3. Anterior yellow spot (fig. 17) extending from sides to middle of each elytron; sides of pronotum (fig. 10) parallel for basal half ----------------------- PICTURATUS
Anterior yellow spot either absent (fig. 16) or represented by a large, oval spot placed in middle of each elytron (fig. 15) -------------------------- FASCIATUS
4. Pronotum coarsely, evenly punctate; anterior tibiae of male slightly expanded ventrally; fifth sternum of male distinctly excavate in middle; apex of elytra black -- Salvini Group SALVINI
Pronotum finely punctate; male anterior tibiae and fifth sternum unmodified; elytra without darkened elytral apices --------------------------- Zunilensis Group 5
5. Pronotum evenly punctate; elytral interstices impunctate; length greater than 8 mm. -- ZUNILENSIS
Pronotum more densely punctate in middle than on sides; elytral interstices very finely punctate; length less than 7½ mm. ----------------------- INTERSTITIALIS

Phylogeny. The suggested phylogenetic relationships of the species of *Charisius* are outlined in figure 1. Based on the Central and South American species of the genus *Allecula* and other related genera of alleculids, the ancestral species of *Charisius* probably had the following characteristics: pronotum with distinct, transverse prebasal groove; surface glabrous dorsally; anterior tibiae of the male widened on the ventral margin; lobes of the eighth sternum of the male either straight or simply curved mediad approaching the apex; fifth sternum evenly convex in both male and female; basal four segments of the anterior tarsi lobed ventrally in the male; color dark brown, without elytral patterns; pronotum only slightly wider than long and coarsely punctate.

Three main lines may be recognized as having evolved from this hypothetical ancestral species. The line giving rise to the Zunilensis Group remains essentially primitive except in having the anterior tibiae of the male unmodified. The line leading to the Salvini and Fasciatus groups is specialized in having sparser punctation of the pronotum, a smaller pronotal index, and at least the beginning of the development of color as shown by the black elytral apices of *C. salvini*. The line leading to the Salvini Group is specialized in having the fifth sternum of the male excavate, the lobes of the male eighth sternum strongly angulate on the sides, and the lobes of the basal two segments of the male anterior tarsi lost. The line leading to the Fasciatus Group is specialized in having the pronotum sparsely punctate, the pronotal index very small, the elytra with distinct transverse bands, and the body larger in size. Within the Fasciatus Group, two lines developed, one leading to *C. mexicanus* and the other leading to *C. fasciatus* and *C. picturatus*. In the line leading to *C. mexicanus* the sides of the pronotum became strongly narrowed, the elytral banding became greatly expanded, and the lobes of the eighth sternum of the male straight.

FASCIATUS GROUP

The Fasciatus Group contains three species, all of which are large (ranging in length from 10 to 13 mm.), elongate beetles with either two or three yellow bands placed transversely across the elytra. The width of the pronotum is distinctly greater than the length and the surface is very finely and sparsely punctate. The elytral striae bear very fine and very closely placed punctures; the strial interstices are flat at the base (except in *C. picturatus)* and convex approaching the apex; and the interstices are impunctate. The anterior tibiae of the male are expanded on the inner side near the middle and the anterior tarsi of the male have the four basal segments broadly lobed ventrally.

Charisius fasciatus Champion
(Figs. 3, 9, 15, 16)

Charisius fasciatus Champion, 1888, Biol. Centr.-Amer., Ins., Coleop. 4(1):421, pl. 19, figs. 12, 12a, 13.

Dark reddish-brown or black; three light yellow transverse bands placed across elytra, anterior band often missing; margin of all yellow areas slightly dentate, completely surrounded by a narrow dark brown to black margin (figs. 15-16). Length 10½ to 12½ mm.

Vertex moderately densely, finely, and shallowly punctate. Pronotum sparsely but evenly punctate; punctures small and very shallowly impressed; sides parallel or slightly converging and sinuate in basal two-thirds then broadly, evenly rounded to apex (fig. 9); pronotal index of five specimens 77 to 80, mean 77.8. Prosternum and proepisterna smooth, impunctate; metasternum impunctate in middle, punctures becoming moderately densely and deeply impressed approaching sides. Anterior tibiae of male slightly, convexly expanded on middle of ventral surface. Elytral striae unimpressed near base, becoming moderately deeply impressed approaching apex, strial punctures very small, shallowly and very densely impressed along striae; interstices flat or very slightly convex near base, becoming distinctly convex nearing apex; impunctate.

Lobes of eighth sternum of male (fig. 3) narrowly and evenly curved medially from near base to apex; apex and inner sides bearing small, densely placed dentiform setae; outer side bearing dentiform setae only on apical half and a few large setae placed on outer margin. Apex of lobes of ninth sternum obliquely transverse.

Type. As lectotype, I have selected a male from Guatemala collected by Champion and labeled Quiche Mts., 7-9000 feet. The specimen is in the British Museum (Natural History).

Geographic Distribution. This species is known only from the highlands of central Guatemala. It has been collected at elevations ranging from 4-5000 feet to 8500-10,500 feet (elevations given as recorded by Champion).

Records. GUATEMALA: Calderas, 7000 feet (BMNH-Biologia Collection) 1; Cerro Zunil, 4-5000 feet (BMNH-Biologia Collection) 2; Quiche Mountains, 7-9000 feet (BMNH-Biologia Collection) 1; Totonicapam, 8,500-10,500 feet (BMNH-Biologia Collection) 2.

Discussion. Charisius fasciatus may be divided into two distinct forms based on coloration. In one form, represented by two specimens from Totonicapam (8,500 to 10,500 feet) and one specimen from the Quiche Mountains (7,000 to 9,000 feet) the body is reddish-brown and the elytra have three distinct yellow transverse bands, each surrounded by a narrow, dark brown to black ring (fig. 15).

In the second form, the body is normally black, the elytra either reddish-brown or black; the anterior yellow band is entirely absent; and the elytral apices are black (fig. 16). In one specimen the apical band is partially reduced to form three small spots. This form is represented by three specimens, two from Cerro Zunil and one from Calderas.

Because of the absence of any clearly defined morphological variation between the two forms either externally or in the male terminalia, I have followed the example of Champion in considering the two forms as members of a single species, but the question of the true status of these two forms can only be satisfactorily demonstrated by additional collections.

By comparing the localities with Champion's (1907) itinerary, I found that the specimen from Calderas was collected during either June or July and those from Quiche Mountains and Totonicapam were collected during August.

Charisius picturatus Champion
(FIGS. 10, 17)

Charisius picturatus Champion, 1893, Biol. Centr.-Amer., Ins., Coleop. 4(1):565, pl. 23, fig. 21.

Reddish-brown; with three light yellow bands placed across each elytron, all bands narrowly, irregularly surrounded by dark brown coloration (fig. 17). Length 11 mm.

Head densely and moderately deeply punctate. Pronotum moderately finely, sparsely, and evenly punctate; punctures moderately shallowly impressed; sides parallel for basal two-thirds and then evenly rounded to apex (fig. 10); sides and base distinctly and deeply margined; mean pronotal index of two specimens 80.0, ranging from 78 to 82. Elytra with striae moderately deeply and evenly impressed from base to apex; strial punctures deeply impressed, circular in shape; strial interstices moderately convex, impunctate. Prosternum moderately densely and unevenly punctate; proepisterna sparsely punctate, punctures large and deeply impressed; metasternum moderately sparsely punctate in middle, punctures becoming very large, densely, and deeply impressed approaching sides. Anterior tibiae of male with ventral margin evenly and concavely expanded from base for basal half and then abruptly narrowed to normal diameter; apical portion of ventral margin densely pubescent.

Type. As lectotype, I have selected a male labeled Omilteme, Guerrero, Mexico, 8000 feet, July. The specimen was collected by H. H. Smith and is in the British Museum (Natural History).

Geographic Distribution. This species is known only from the type locality.

Records. MEXICO: *Guerrero:* Omilteme (Omiltemi), 8000 feet, July (BMNH-Biologia Collection) 1.

Discussion. This species is very similar in appearance to *C. fasciatus,* particularly to the form having three yellow bands across the elytra. It differs primarily in having the margins of the yellow regions very irregular, the anterior spot placed on the outer sides of the elytra, and the apical spot small and somewhat crescent-shaped. Morphologically it differs primarily in having the punctation of the head, pronotum, and the underside of the thorax much denser; more deeply impressed elytral striae; and more convex elytral interstices.

Charisius mexicanus Campbell, NEW SPECIES
(Figs. 4, 8, 11, 18)

Light orange-brown; elytra very conspicuously colored with three large yellow transverse bands (fig. 18). Length 11 to 13 mm.

Head densely and moderately deeply punctate. Pronotum deeply and evenly punctate; sides moderately straight, narrowed conspicuously from base to apex (fig. 11), very strongly deflexed; mean pronotal index of 13 specimens 70.4, ranging from 67 to 74 ($S\bar{x} = .5$); midline slightly depressed longitudinally.

Anterior tibiae of male distinctly, triangularly widened on inner side near middle. Prosternum shallowly, unevenly punctate; proepisterna sparsely punctate, punctures large and deeply placed; metasternum sparsely, shallowly punctate in middle, punctures becoming moderately densely and deeply impressed approaching sides. Elytra with striae very shallowly impressed near base, becoming somewhat deeper approaching apex; strial punctures circular, moderately densely placed; interstices of elytral striae flat in basal half, becoming moderately convex nearing apex; bearing median row of very small and shallow punctures. Abdominal sterna finely, sparsely, and evenly punctate; fifth sternum bearing long, conspicuous setae along sides and near apex; apex bearing densely placed short setae, distinctly concave in middle in male, convex in female; fourth sternum with scattered setae along apical margin.

Lobes of eighth sternum of male (fig. 4) straight, broad; apex evenly rounded; apex and inner side of lobes densely covered with very small dentiform setae, a few long, straight setae placed along outer side. Lobes of ninth sternum narrow, slightly curved mediad approaching apex; apex narrowly rounded. Apex of male genitalia as in Figure 8.

Type. Holotype, male, from 5.2 miles west of Acultzingo (Veracruz) Puebla, Mexico; July 6, 1962; J. M. Campbell. It is in the British Museum (Natural History).

Geographic Distribution. This species is known from elevations above 6000 feet in the Mexican states of Mexico, Morelos and Puebla.

Records. MEXICO: Country label only (BMNH) 2. *Mexico:* Amecameca, 9600 feet, June (CAS) 2. *Morelos:* Tres Marias, 9000 feet (BMNH) 2. *Puebla:* 5.2 miles west Acultzingo (Veracruz), 8000 feet, July (JMC) 5; 6 miles northeast Teziutlan, 6000 feet, August (JMC) 2.

Discussion. I collected specimens of this species near Acultzingo by beating a large tree heavily covered with lichens. This locality is almost directly on the continental divide of Mexico and receives moderately heavy rainfall and very dense fog cover during the rainy season. The larvae of this species possibly live in dead stumps as the adults were collected from a tree adjacent to a dead stump, although other nearby trees of the same species did not yield any specimens.

Charisius mexicanus is similar to *C. fasciatus* and *C. picturatus,* but it may readily be identified by the greatly expanded and very irregularly dentate markings of the elytra and the very conspicuously narrowed sides of the pronotum.

The adults of this species have been collected from June to August.

ZUNILENSIS GROUP

The Zunilensis Group contains two species, both of which are smaller than the species of the Fasciatus Group (from 6½ to 10 mm.). They are characterized by the absence of any yellow markings on the elytra; the large pronotal index; the pronotum distinctly narrower than the base of the elytra; the surface of the pronotum coarsely punctate; the anterior tibiae of the male not expanded; and the broad and straight lobes of the eighth sternum.

Charisius zunilensis Champion
(Figs. 6, 12)

Charisius zunilensis Champion, 1888, Biol. Centr.-Amer., Ins., Coleop. 4(1):422, pl. 19, fig. 14.

Dark brown. Length 8½ to 9½ mm.

Head very densely punctate; punctures moderate in size and depth. Pronotum quadrate with sides slightly narrowed nearing base (fig. 12); mean pronotal index of four specimens 92.5, ranging from 90 to 95; surface densely punctate, punctures moderately small and shallowly impressed.

Male with ventral surface of anterior tibiae unmodified; four basal segments of anterior tarsi distinctly lobed ventrally. Prosternum very sparsely and shallowly punctate; proepisterna moderately punctate, punctures small and very shallowly impressed; metasternum finely and sparsely punctate in middle, punctures becoming moderately densely and deeply impressed near sides. Elytra with striae moderately deeply impressed near base, becoming deeply impressed near apex; strial punctures small, circular, deeply impressed; strial interstices moderately convex, impunctate. Abdominal sterna very finely and sparsely punctate, apical margin of fifth sternum distinctly concave; sides of apical margin bearing a few short setae.

Lobes of eighth sternum of male (fig. 6) moderately broad, straight; apex of lobes evenly rounded, rather densely covered with small, densely placed dentiform setae; inner margin of lobes bearing moderately densely placed small spines. Lobes of ninth sternum short, both outer and inner sides rounded, apex of lobes broadly rounded.

Type. As lectotype, I have selected a male collected by Champion and labeled Cerro Zunil, 4,000-5,000 feet, Guatemala. The specimen is in the British Museum (Natural History).

Geographic Distribution. Known only from the type locality.

Records. GUATEMALA: Cerro Zunil, 4,000 to 5,000 feet (BMNH-Biologia Collection) 4.

Discussion. Three of the six known species of *Charisius* are from Cerro Zunil. These are *C. zunilensis, C. fasciatus,* and *C. salvini.* Each of these species were collected by Champion at an altitude of 4,000 to 5,000 feet. They belong to separate species group and may be readily separated by the key characters.

Charisius interstitialis Champion
(Figs. 7, 13)

Charisius interstitialis Champion, 1888, Biol. Centr.-Amer., Ins., Coleop. 4(1):422.

Charisius floridanus Linell, 1901, Proc. Ent. Soc. Wash. 4:184. (NEW SYNONYMY.)

Elongate; brown, pronotum and head often dark brown. Length 6½ to 7½ mm.

Head very densely, finely punctate. Pronotum with sides parallel for basal two-thirds and then angulate to apex (fig. 13); mean pronotal index of six specimens 89.0, ranging from 86 to 94; surface densely punctate; punctures moderate in size and moderately impressed, becoming more sparsely distributed nearing sides. Punctation of underside of thorax and shape of anterior tibiae and tarsi of male similar to those of *C. zunilensis*. Elytral striae shallowly, evenly impressed; interstices distinctly convex, bearing a median row of very small, shallow punctures. Remainder as in *C. zunilensis*.

Lobes of eighth sternum (fig. 7) very similar to those of *C. zunilensis;* inner side of lobes rounded. Lobes of ninth sternum very short, outer side slightly convex; apex of lobes obliquely truncate.

Type. As lectotype, I have designated a male collected by Hoëge from Jalapa, Mexico. This specimen is in the British Museum (Natural History). The holotype of *C. floridanus* is type number 4174 of the USNM. The specimen is labeled Cocoanut Grove, Florida.

Geographic Distribution. Known only from the type locality and one specimen collected near Miami, Florida.

Records. MEXICO: *Veracruz:* Jalapa (4681 ft.) (BMNH-Biologia Collection) 9. UNITED STATES: *Florida:* Cocoanut Grove, Linell (1899).

Discussion. This species is very similar to *Charisius zunilensis*. Since the known ranges of these two species are widely separated and as there are no intermediate specimens, I have chosen to follow Champion's example and consider the two populations as separate species.

Charisius interstitialis may be separated from *C. zunilensis* by the much smaller size of the body; smaller punctures of the head and pronotum (the punctures are more densely placed in the middle half of the pronotum); and the somewhat more narrowly rounded apices of the male ninth sternal lobes.

The specimen described by Linell from Florida as *C. floridanus* is almost certainly an accidental import. The Cocoanut Grove locality is in the vicinity of a tropical garden.

James Marshall (personal communication, 1964) compared the holotype of *C. floridanus* with a specimen of *C. interstitialis*. He stated that the only apparent difference in the two is that the pronotal groove of *C. floridanus* is somewhat more pronounced. The pronotal index of the holotype is 92.

SALVINI GROUP

The Salvini Group contains only one species, *C. salvini*. The male has the anterior tibiae expanded ventrally, the basal two segments of the anterior tarsi densely pubescent ventrally, the apical margin of the fifth abdominal sternum deeply excavate, and the eighth sternal lobes angulate on the sides. The elytral apices of both males and females are black.

In many respects, the Salvini Group is somewhat intermediate between the Fasciatus Group and the Zunilensis Group. It has the apices of the elytra black and the anterior tibiae of the male expanded near the middle which may suggest an affinity for the Fasciatus Group. The punctation of the head and thorax as well as the elytral structure is quite similar to that of the Zunilensis Group. It is also somewhat intermediate between these two groups in elevation.

Charisius salvini Champion
(Figs. 5, 14)

Charisius salvini Champion, 1888, Biol. Centr.-Amer., Ins., Coleop. 4(1): 423, pl. 19, fig. 15.

Dorsal surface reddish-brown, venter dark reddish-brown to black, elytral apices usually black. Length 8½ to 10 mm.

Head densely, deeply punctate. Pronotum (fig. 14) with sides parallel or somewhat sinuate in basal two-thirds; surface deeply, densely punctate; punctures large and circular in outline; mean pronotal index of twelve specimens 86.6, ranging from 81 to 90 ($s\bar{x} = .7$); surface evenly convex, occasionally slightly depressed along midline.

Anterior tibiae of male very slightly, ovally expanded on inner side near middle; anterior tarsi of male with basal segment densely pubescent ventrally, not lobed; second segment densely pubescent with small narrow lobe. Prosternum moderately densely, unevenly, and rugosely punctate; proepisterna densely, evenly punctate; metasternum moderately punctate, becoming deeply and densely punctate approaching sides. Elytral striae moderately impressed near base, becoming deeply impressed nearing apex; strial punctures large, circular, closely placed along striae; strial interstices moderately convex near base, becoming deeply impressed nearing apex; impunctate. Abdominal sterna finely, sparsely punctate. Fifth sternum of male conspicuously excavate in middle, each side of excavation very densely punctate; punctures bearing moderately long setae.

Male eighth sternum (fig. 5) with lobes angulate near middle of outer side; inner sides evenly and narrowly rounded; apex of lobes blunt, obliquely transverse, bearing small, moderately densely placed dentiform setae. Lobes of ninth sternum moderately broad; outer sides rounded to apex, apex very narrowly rounded.

Type. As lectotype I have selected the male figured by Champion in the "Biologia." The specimen was collected by Champion at Calderas, Guatemala. It is in the British Museum (Natural History).

Geographic Distribution. Known only from the mountainous regions of southeastern and southcentral Guatemala. Collected between the altitudes of 4,000 and 7,000 feet.

Records. GUATEMALA: Country label only (BMNH-Biologia Collection) 7; Calderas (7000 ft.) (BMNH-Biologia Collection) 1; Capetillo (BMNH-Biologia Collection) 1; Cerro Zunil (4000 ft.) (BMNH-Biologia Collection) 1; Chinautla (4000 ft.) (BMNH-Biologia Collection) 1; Duenas (4700 ft.) (BMNH-Biologia Collection) 1.

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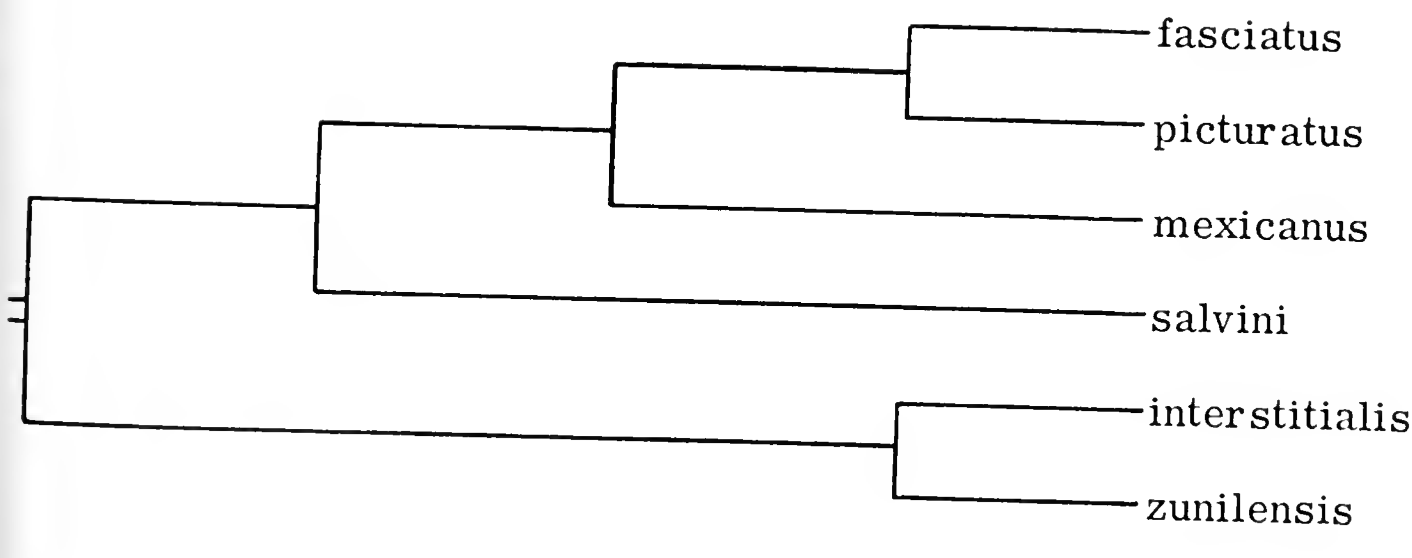


FIGURE 1. Proposed phylogeny of the genus *Charisius*.

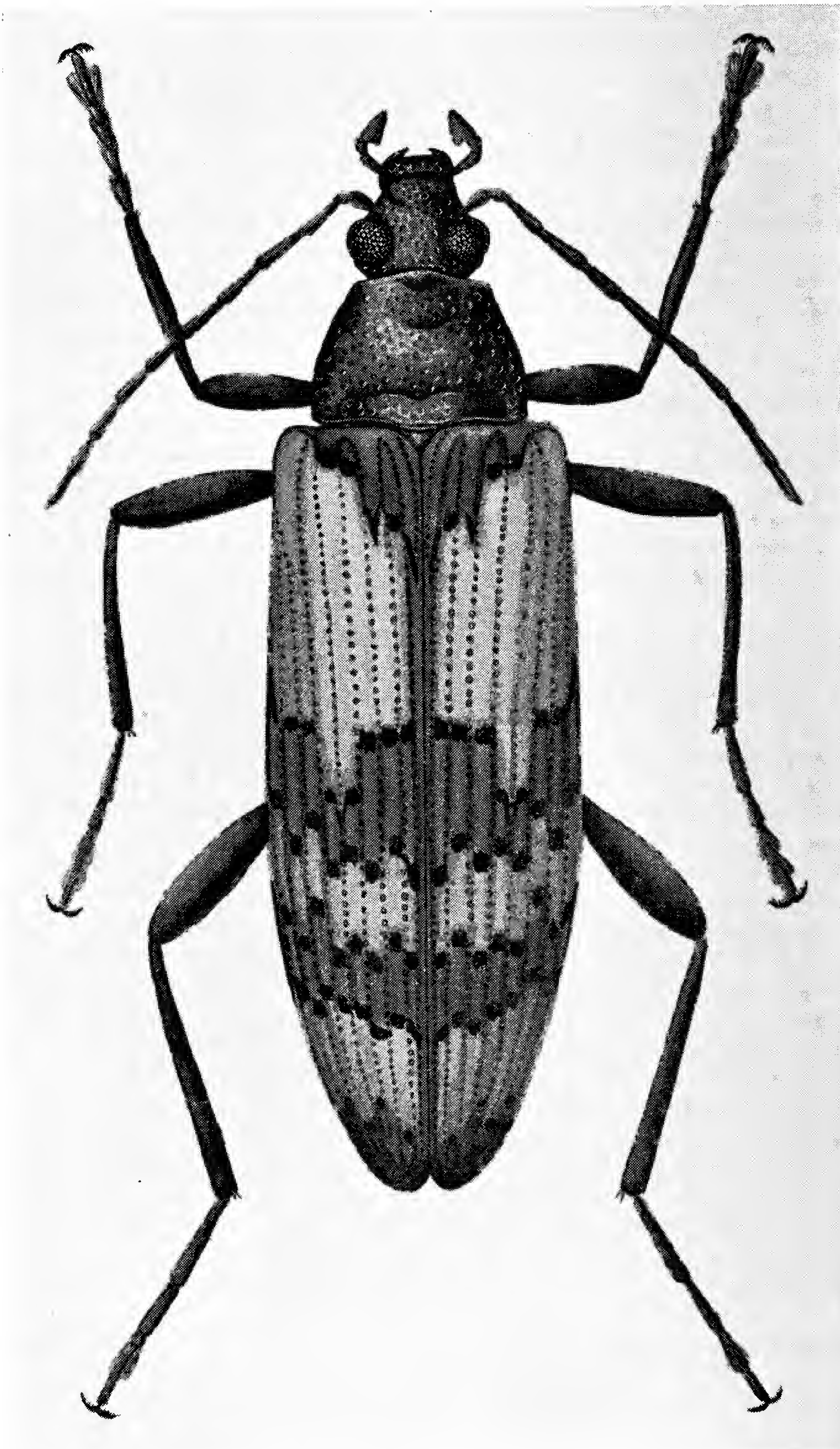
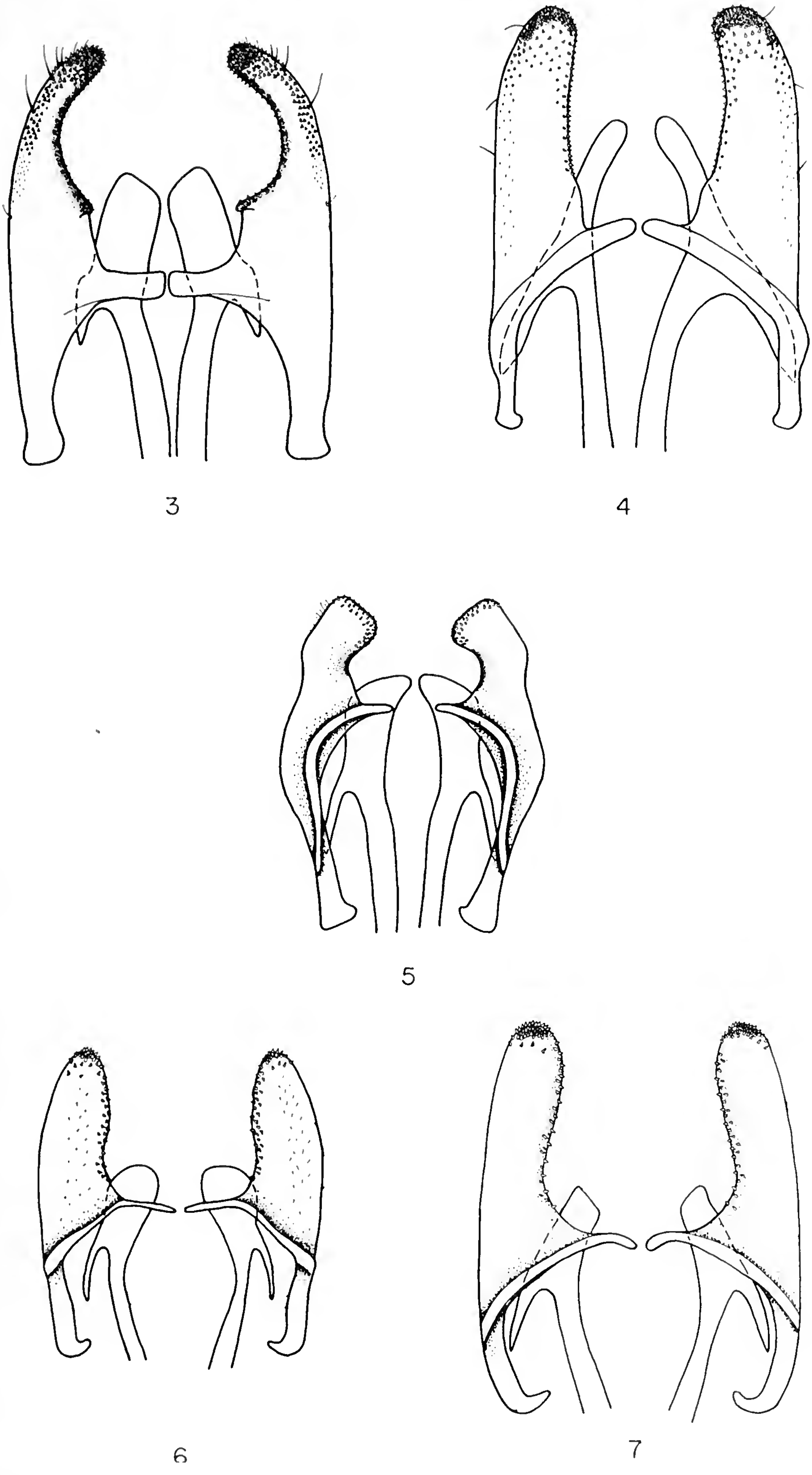


FIGURE 2. *Charisius mexicanus,* new species. (Drawing by Mrs. Thomas Prickett.)



FIGURES 3-7. Ventral view of male eighth and ninth sterna of species of *Charisius*. 3—*fasciatus*. 4—*mexicanus*. 5—*salvini*. 6—*zunilensis*. 7—*interstitialis*.

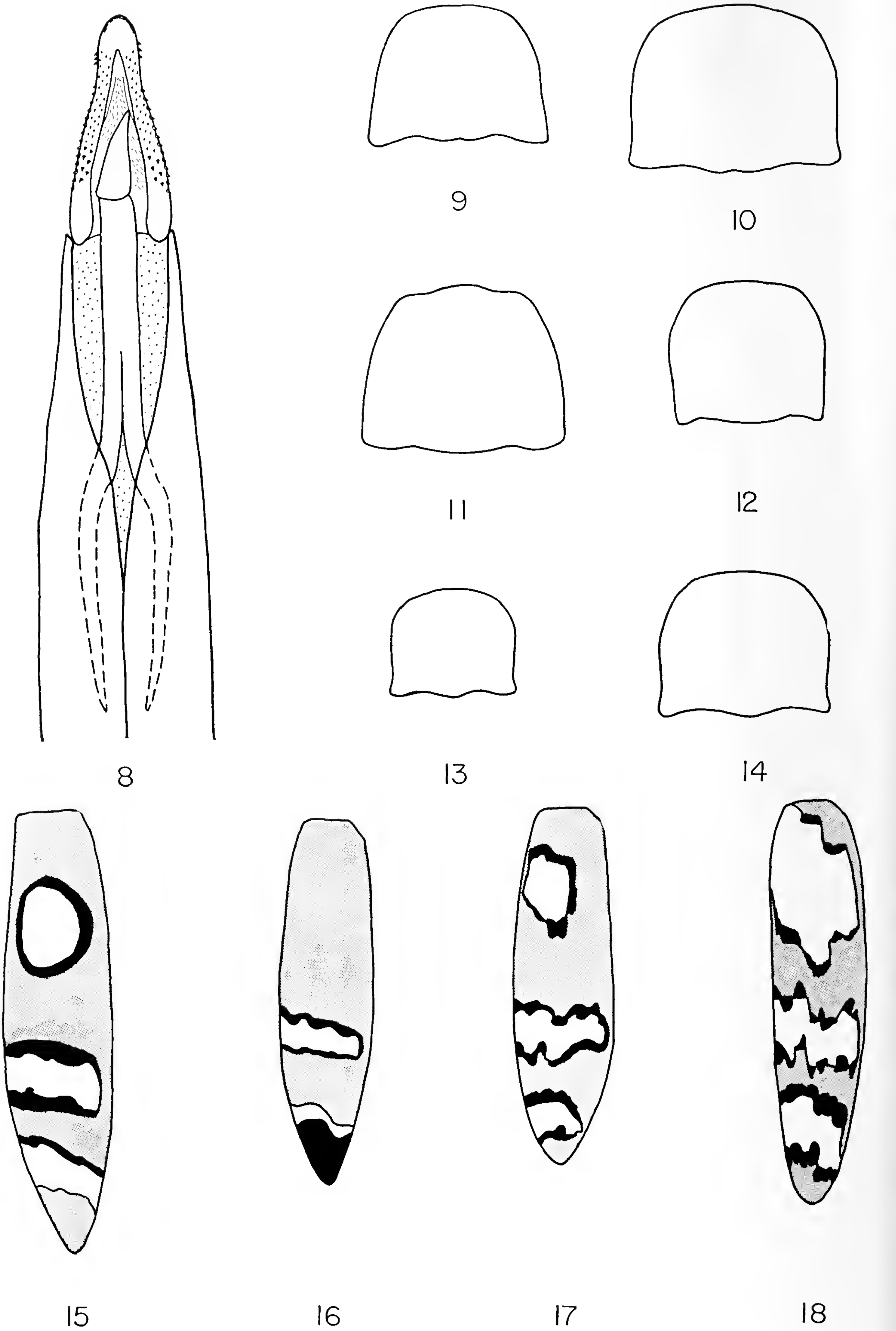


Figure 8. Ventral view of apical two-thirds of male genitalia of *Charisius mexicanus*. Figures 9-14. Pronotal outline of species of *Charisius*. 9—*fasciatus*. 10—*picturatus*. 11—*mexicanus*. 12—*zunilensis*. 13—*interstitialis*. 14—*salvini*. Figures 15-18. Elytral markings of species of *Charisius*. 15 and 16—*fasciatus*. 17—*picturatus*. 18—*mexicanus*.

NOTES ON TWO IMPORTANT COLLECTIONS OF COLEOPTERA IN BRAZIL

By C. A. Triplehorn[1]

When I learned that I had been chosen to spend two years in Brazil as Entomologist on The Ohio State University Contract Team (United States Agency for International Development), I immediately began to assemble as much information as possible on Brazilian insect collections which I might be able to visit. The best source of information was furnished by Doris H. Blake (1964, Some insect collections in South America, Proc. Ent. Soc. Wash. 66:55-59; and *in litt.*). Recently I have had the opportunity to visit two important collections in São Paulo which no serious student of Neotropical insects can afford to neglect.

Mrs. Blake devotes a paragraph to a glowing account of the collections of the Departamento de Zoologia da Secretaria da Agricultura. Nevertheless, I was totally unprepared for the veritable beehive of activity this institution has become. The Director, Dr. P. E. Vanzolini, is well known to United States workers, having obtained his Ph.D. degree at Harvard under Dr. A. S. Romer. Despite the fact that he is primarily a herpetologist, his interests are broad and he is extremely well informed in all phases of Biology. I spent the greater part of a day on a tour of the collections and facilities with Dr. Vanzolini as my guide. As a curator myself, I could only stand in awe at what is being accomplished here.

By purchase, gifts, expeditions and a system of collaborators, the collections are growing at a fantastic rate. Despite the rapidity with which specimens are arriving, a remarkably small backlog of unprocessed material is allowed to accumulate. This is especially impressive in the section of insects where a few enthusiastic collectors can keep a small army of technicians busy mounting, labelling and sorting. The staff is engaged in a number of fascinating ecological and faunistic studies which, of course, are further swelling the collections.

The Coleoptera collection, with which I am most familiar, is well maintained, neatly arranged and systematically up-to-date. As in all museums of any size, there is a sizable backlog of undetermined material in many groups but this is all sorted to families and easily accessible to workers. They do not use the unit tray system but are pinning directly into the bottoms of the drawers, allowing, it would seem, plenty of room for expansion. However, at the rate the collection is growing and the enthusiasm of the current staff, it will be only a short time before expansion becomes a major concern.

Among the insects, current emphasis is placed on the Diptera and Coleoptera. There are three Coleoptera specialists on the staff at present, as previously noted by Blake (1964, p. 56). Hans Reichardt is, at this

[1] Presently at Escola Superior de Agricultura "Luiz de Queiroz," Caixa Postal 9, Piracicaba, Sao Paulo, Brazil; permanently at Ohio State University, Columbus, Ohio, U.S.A.

writing, doing graduate work at Harvard University, specializing on Carabidae under Dr. P. J. Darlington. He also works on Bostrichidae.

U. R. Martins, who works on Cerambycidae, Languriinae and Barini, is planning to enter the Graduate School of the University of California and Padre F. S. Pereira continues his fine work on Scarabaeidae and Passalidae. In addition, Frederico Lane, who has retired, remains on the active list. He is on his fourth year at the British Museum on a National Science Foundation and Brazilian grant to study Cerambycidae and serves as a valuable contact between the two institutions.

Another valuable function performed by the Departamento de Zoologia is the training of zoologists, especially entomologists. Undergraduate students obtain practical experience in museum techniques and problems in taxonomic research and when they have progressed far enough are encouraged and aided in taking graduate work abroad. With such a program for developing well-trained investigators, the future of taxonomic research in Brazil is bright indeed. At present there are two students working on Coleoptera.

The Departamento de Zoologia can supply headquarters, research facilities and help in traveling while in Brazil to any qualified zoologist who so applies. Needless to say, this is a valuable service to keep in mind for anyone contemplating research in Brazil. Dr. Vanzolini has assured me his wholehearted cooperation in sending material to qualified specialists willing to undertake determinations for his institution. It seems to me that this would be an excellent opportunity for coleopterists interested in the Neotropical fauna to obtain a wealth of material for study. At the same time, each group worked up will greatly assist Dr. Vanzolini and his colleagues in their ambitious program. The Departamento de Zoologia staff is young, well trained and dedicated. Their methods are modern in every sense of the word and they are adequately supported financially. This institution appears destined to become the outstanding research center for systematic zoology in South America. Taxonomists interested in borrowing material for study should write to Dr. Vanzolini, Departamento de Zoologia da Secretaria da Agricultura, Avenida Nazaré, 481 Caixa Postal 7172, São Paulo, Brazil.

A large collection of Coleoptera missed by Mrs. Blake is contained in the Instituto Biológico, Sao Paulo. This is an older collection but is well curated with specimens neatly mounted and labelled. Much of it has been determined by specialists and there are some types deposited here (i.e. Bondar's Curculionidae). I have compiled a list of all of their Tenebrionidae and have made rather detailed notes on the remainder of the Coleoptera at the family level. The Coleoptera collection occupies 246 drawers of a modified U. S. National Museum type, housed in 10 large wooden cabinets. Included among these are 42 drawers of Chrysomelidae, 41 Curculionidae, 39 Scarabaeidae, 33 Cerambycidae and 10 Carabidae. Correspondence in regard to this collection may be directed to: Dr. Oswaldo Giannotti, Instituto Biológico, Av. Cons. Rodrigues Alves, 1252, Caixa Postal 7119, São Paulo. While not actively working with the collection, Dr. Giannotti speaks and reads English well and is very sympathetic toward taxonomic research.

LARVAE OF SIX GENERA OF CETONIINAE FROM EASTERN NIGERIA (COLEOPTERA: SCARABAEIDAE)

By M. L. JERATH AND K. L. UNNY[1, 2]

The scarabaeid subfamily Cetoniinae is of world-wide distribution and includes many brightly colored and highly variegated beetles from the tropics. In West Africa the group is represented by about 275 species belonging to about 65 genera.

Larvae of several North American species have been described briefly by various writers. The most important work is that of Hayes (1928 and 1929), Bøving and Craighead (1931) and Ritcher (1945). Larvae of British Cetoniinae, *Cetonia aurata* L. and *Potasia cuprea* F., were characterized by Van Emden (1941).

The only paper on African lamellicorn larvae is from South Africa by Oberholzer (1959), where larvae of three genera were described: *Pachnoda impressa* Goldf., *Hypselogenia geotrupina* Billb., and *Diplognatha gagates* Fabric. The larvae are unknown from West Africa.

The food of cetoniid larvae according to Ritcher (1958) is organic matter in the soil, decaying wood or trash and other debris accumulated in the hollows of trees or elsewhere.

In Nigeria larvae of *Heterorrhina smaragdina* were found in decaying portion of a *Kola nitida* tree whereas those of five other species were collected from raphia or oil palm or coconut palm trees at Umudike. The larvae were reared to the adult stage in the laboratory at the Agricultural Research Station in jam jars on decaying raphia stem. The food was changed once a week. Mortality was about five percent.

Cetoniid larvae usually crawl on their backs and become white and sluggish as they approach pupation. The larva then builds a small cell of decaying material and encloses itself. It remains in that condition for 2-3 days before it pupates. Duration of the pupal stage for the various species at room temperature is as follows: *Pachnoda marginella,* 10-14 days; *Clastocnemis quadrimaculatus,* 18-22 days; *Platygenia barbata,* 20-24 days; *Grammopyga cincticollis,* 12-14 days; *Gnathocera trivittata,* 13-15 days; *Heterorrhina smaragdina,* 23-26 days.

In this paper larvae of six species, *Clastocnemis quadrimaculatus, Platygenia barbata, Gnathocera trivittata, Grammopyga cincticollis, Heterorrhina smaragdina,* and *Pachnoda marginella* are described for the first time and keys presented for their separation. Larval descriptions of the first five genera have not appeared heretofore. The Nigerian larvae agree with those of British (Van Emden, 1941) and North American (Ritcher, 1945) larvae in essential characters.

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[1] Agricultural Research Station, Umudike-Umuahia, Nigeria.

[2] Thanks are due to Dr. Paul O. Ritcher, Head Entomology Department, Oregon State University, U.S.A. and Mr. O. L. Cartwright of U.S.N.M. for going through the paper and making valuable suggestions.

The material studied for this paper is in the collection of the Entomology Department, Agriculture Research Station, Umudike-Umuahia.

Cetoniid larvae may be characterized as follows: Labrum symmetrical; antenna four segmented, first segment longest and the third segment shortest. Ocelli present. Clypeus divided into a small pre- and a large post-clypeus. Mandibles, each with a ventral, oval stridulatory structure consisting of transverse ridges. Maxillary stridulatory teeth with anteriorly directed sharp points; lacinia of each maxilla with a single distal uncus or with two unequal distal unci fused at their bases. Epipharynx with a single nesium; plegmata and prolegmata absent; haptomerum of epipharynx with a conspicuous, transverse curved row of closely placed stout setae. Abdominal segments 1-6, each with three dorsal annulets; segments 7 and 8, each with two dorsal annulets; each annulet with variable rows of setae. Palidia present or absent. Anal slit transverse, often slightly curved.

Key to the Third-stage Larvae of Known Species of Nigerian Cetoniinae

1. Labrum entire; lacinia of maxilla with one terminal uncus; clithra absent (fig. 4); claw falcate (fig. 9); raster without longitudinal palidia (fig. 12) -------------- 2
   Labrum trilobed; lacinia of maxilla with two terminal unci fused at their bases (fig. 5); clithra present (fig. 3); claw sub-conical or cylindrical and rounded apically (fig. 8); raster with two longitudinal palidia (fig. 13) ---------------- 3
2. Distal segment of antenna with four sensory spots; dorso-epicranial setae one long and one short on each side (fig. 1); ninth and tenth abdominal segments not fused dorsally (fig. 10) --------------------- CLASTOCNEMIS QUADRIMACULATUS
   Distal segment of antenna with 13-17 sensory spots; dorso-epicranial setae 2 long and a row of 7-8 short on each side; ninth and tenth abdominal segments fused dorsally -- PLATYGENIA BARBATA
3. Claw cylindrical and rounded apically with more than 8 setae -------------------- 4
   Claw sub-conical with six setae -------------------------- GNATHOCERA TRIVITTATA
4. Scissorial area of left mandible with S_{1+2}, S_3 and S_4 and of right mandible with S_{1+2} and S_{3+4}; laeotorma of epipharynx divided and shaped like an inverted V; each palidium of raster with 9-11 pali -------------- GRAMMOPYGA CINCITICOLLIS
   Scissorial area of left mandible with S_1, S_2, S_3 and S_4 (fig. 6) and of right mandible with S_{1+2}, S_3 and S_4 (fig. 7); laeotorma of epipharynx sub-triangular; each palidium of raster with 12 or more pali --------------------------------- 5
5. Distal segment of antenna with 10-11 sensory spots; each palidium of raster with 12-13 pali ------------------------------------ HETERORRHINA SMARAGDINA
   Distal segment of antenna with five sensory spots; each palidium of raster with 15-17 pali (fig. 13) --------------------------------- PACHNODA MARGINELLA

Clastocnemis quadrimaculatus Afzel
(Figs. 1, 4, 10 and 12)

MATERIAL STUDIED: Six third-stage larvae and a cast skin of a third-stage larva reared to the adult stage. These larvae, together with several others, were collected from coconut palms at Akwete on January 11, 1962 by M. L. Jerath. The reared adults were determined by Mr. R. D. Pope of British Museum, London.

Three third-stage larvae associated with one adult were collected from coconut palm at Umudike on July 24, 1962 by M. L. Jerath.

DESCRIPTION: Maximum width of head capsule of third-stage larva 2.64-3.04 mm. Surface of cranium reticulate and yellowish-brown in color. Frons, on each side, with a single long posterior frontal seta and a single long seta in anterior angle; other frontal setae absent. Dorso-epicranial setae one long and two or three microsensillae. Last antennal segment with four sensory spots. Clithra absent. Scissorial area of the left mandible with S_1, S_2, S_3, and S_4 and of the right mandible with S_{1+2}, S_3 and S_4. Lacinia of maxilla with a single terminal uncus; maxillary stridulatory area with a row of 4-5 anteriorly pointed teeth and a distal conical process.

Prothoracic spiracle 0.32-0.36 mm. long and 0.20-0.24 mm. wide. Spiracles of abdominal segments 1-7 similar in size, those of abdominal segment eight slightly smaller.

Segments nine and ten separate dorsally and each segment with two to three rows of setae. Raster without palidia. Teges consisting of numerous, caudally directed rather short flattened setae, laterally interspersed with several very long cylindrical setae. Lower anal lip with scattered short flattened setae similar to those of the teges. Claws falcate, sharp pointed, and each with two short setae.

Platygenia barbata Afzel
(Fig. 9)

MATERIAL STUDIED: Three third-stage larvae were collected from oil palms at Agriculture Research Station, Umudike by M. L. Jerath. The reared adults were identified by Mr. R. D. Pope of British Museum, London.

DESCRIPTION: Maximum width of head capsule of third-stage larvae 7.19-7.65 mm. Surface of cranium reticulate and reddish-orange in color with small brown spots. Frons bearing on each side, 2 long and 6-7 short posterior frontal setae, 1 to 2 long and 3-4 short exterior frontal setae, 1 to 2 short anterior frontal setae and a single long anterior frontal seta. Dorsoepicranial setae 9-10 on each side, two long and the rest very short and in a row. Last antennal segment with 13-17 sensory spots. Labrum entire. Clithra absent. Scissorial area of left mandible with S_{1+2} and S_{3+4}, and of right mandible with S_{1+2} and S_{3+4}. Lacinia of maxilla with a single terminal uncus. Maxillary stridulatory area with a row of 4-6 anteriorly pointed teeth and a distal conical process.

Prothoracic spiracle 0.96-1.08 mm. long and 0.76-0.84 mm. wide; spiracles of abdominal segments 1-7 similar in size and those of segment eight slightly smaller.

Dorsa of segments nine and ten fused, but covered with numerous setae. Raster without palidia. Tegillar setae scattered on the venter of tenth abdominal segment and the lower anal lip. Claws falcate, sharp pointed, and each with two short setae.

Gnathocera trivittata Swed.

MATERIAL STUDIED: Three third-stage larvae reared from the eggs laid during January 1962 in the laboratory by confining beetles to soil rich in organic matter. (No. U62-5.)

DESCRIPTION: Maximum width of the head capsule of third-stage larva 2.40-2.52 mm. Surface of cranium smooth and light-yellow in color. Frons with a shallow median longitudinal depression forked anteriorly and extends forward from the epicranial stem. Frons on each side, with a single long posterior frontal seta and a single long seta in anterior angle. Dorso-epicranial setae one long and nine short on each side. Last antennal segment with 7-8 sensory spots. Clithra present. Scissorial area of left mandible with S_{1+2}, S_3 and S_4 and of right mandible with S_{1+2} and S_{3+4}. Lacinia of maxilla with two terminal unci fused at their bases, dorsal uncus much the larger. Maxillary stridulatory area with a row of six to eight stridulatory teeth pointing anteriorly and a small distal conical process.

Prothoracic spiracle .38-.32 mm. long and 0.28-0.22 mm. wide. Spiracle of abdominal segments 1-7 similar. Those of abdominal segment 8 slightly smaller.

Dorsa of abdominal segments nine and ten fused and covered with numerous short and long setae. Raster with a pair of palidia and a pair of tegilla. Each palidium is a row of 11-13 stout blunt pali. The palidia being almost parallel. Septula narrow, about four times longer than broad. Tegilla composed of short to long straight sharp pointed setae united anterior to palidia; lower anal lip with tegilla setae. Claw subconical, bearing 6 stout setae.

Grammopyga cincticollis Hope

MATERIAL STUDIED: Several third-stage larvae were collected from decaying raphia palm trees at Umudike on January 4, 1963 by M. L. Jerath. The associated adults were determined by Mr. R. D. Pope of British Museum, London.

Three third-stage larvae and cast skins of two larvae were reared to the adult stage. Larvae were collected from decaying oil palm trees at Umudike on June 21, 1963 by B. O. Bassey.

DESCRIPTION: Maximum width of head capsule of third stage larva 2.90-2.96 mm. Surface of cranium smooth and yellowish-brown in color. Frons with a shallow median longitudinal depression forked anteriorly and extending from the epicranial stem. Frons on each side, with a single long posterior frontal seta and a single long seta in anterior angle. Dorso-epicranial seta one on each side with 1-2 microsensillae. Last antennal segment with four sensory spots. Clithra present. Scissorial area of left mandible with S_{1+2}, S_3 and S_4 and of right mandible with S_{1+2} and S_{3+4}. Lacinia of maxilla with two terminal unci fused at their bases, dorsal uncus larger. Maxillary stridulatory area with a row of 7-8 stridulatory teeth pointing anteriorly and a distal conical process.

Prothoracic spiracle .36-.44 mm. long and .32-.28 mm. wide. Spiracles of abdominal segments 1 to 8 similar in size.

Dorsa of abdominal segments nine and ten fused but covered with numerous short setae. Raster with a pair of palidia and a pair of tegilla. Each palidium consists of a single close-set row of 9-11 rather stout blunt pali. The two palidia join anteriorly and are parallel posteriorly or slightly diverging. Tegilla composed of short to long straight sharp pointed setae united anterior to palidia. Lower anal lip with tegillar setae. Claw cylindrical, rounded apically and bearing 8-9 short setae.

Heterorrhina smaragdina Voet

MATERIAL STUDIED: Three third-stage larvae and a cast skin of one third-stage larva were reared to the adult stage, collected from decaying part of *Kola nitida* tree at Agriculture Research Station, Umudike by M. L. Jerath on March 29, 1961.

DESCRIPTION: Maximum width of head capsule of third-stage larva 3.60-3.68 mm. Surface of cranium smooth and yellowish-brown in color. Frons on each side, with one long posterior frontal seta and a long seta in anterior angle, other frontal setae absent. Dorsoepicranial setae, one long and 2-3 short on each side. Last antennal segment with 9-11 sensory spots. Clithra present. Scissorial area of left mandible with S_1, S_2, S_3 and S_4 and of right mandible with S_{1+2}, S_3 and S_4. Lacinia of maxilla with two terminal unci, fused at their bases, dorsal uncus larger. Maxillary stridulatory area with five maxillary teeth pointing anteriorly and a distal conical process.

Prothoracic spiracle .48-.52 mm. long and .32-.36 mm. wide. Spiracles of abdominal segments 1-7 similar in size but those of abdominal segment 8 slightly smaller.

Dorsa of abdominal segments nine and ten fused, but covered with numerous short and long setae. Raster with a pair of palidia and a pair of tegilla. Each palidium consists of a single row of 12-13 stout and blunt pali, the two palidia join anteriorly and are parallel posteriorly. Septula about three times longer than broad. Tegilla composed of short to long straight sharp pointed setae united anterior to palidia; lower anal lip with tegillar setae. Claw cylindrical, rounded apically, bearing 14-15 short setae.

Pachnoda marginella F.

(FIGS. 2, 3, 5-8, 11 and 13)

MATERIAL STUDIED: Ten third-stage larvae and the cast skins of five third-stage larvae were reared to the adult stage. These larvae, together with several others, were collected from decaying raphia palms at Umudike, on July 6, 1962. The reared adults were determined by Mr. R. D. Pope of British Museum, London.

DESCRIPTION: Maximum width of the third-stage larva 4.43-4.74 mm. Surface of cranium smooth, faintly reticulate and orange brown in color. Frons with a shallow median, longitudinal depression which is forked anteriorly and extends forward from the epicranial stem. Frons on each side, with a single long posterior frontal seta and a single long seta in the anterior angle; other frontal setae absent. Dorso-epicranial setae one long and 8 to 9 short on each side. Last antennal segment with five sensory spots. Clithra present. Scissorial area of left mandible with S_1, S_2, S_3 and S_4 and of right mandible with S_{1+2}, S_3 and S_4. Lacinia of maxilla with two terminal unci fused at their bases, dorsal uncus much the larger. Maxillary stridulatory teeth pointing anteriorly and a small distal conical process.

Prothoracic spiracle 0.80-0.84 mm. in length and 0.56-0.64 mm. in width. Abdominal spiracles similar in size.

Dorsa of abdominal segments nine and ten fused and covered with numerous short and long setae. Raster with a pair of longitudinal palidia; each palidium set with 15-17 short, stout pali, septula elongate to sub-elliptical; tegilla composed of numerous short and long straight sharp pointed setae united anteriorly to the palidia. Lower anal lip with numerous short setae. Claw cylindrical, rounded apically, each with 14-15 setae borne on the sides and near the end of the claw.

The larvae of *P. marginella* can be separated from the larva of *P. impressa* (Oberholzer, 1959) as follows:

Raster with 15-17 pali in each palidium; claw with 14-15 setae------------MARGINELLA
Raster with 17-20 pali in each palidium; claw with 6-8 setae---------------IMPRESSA

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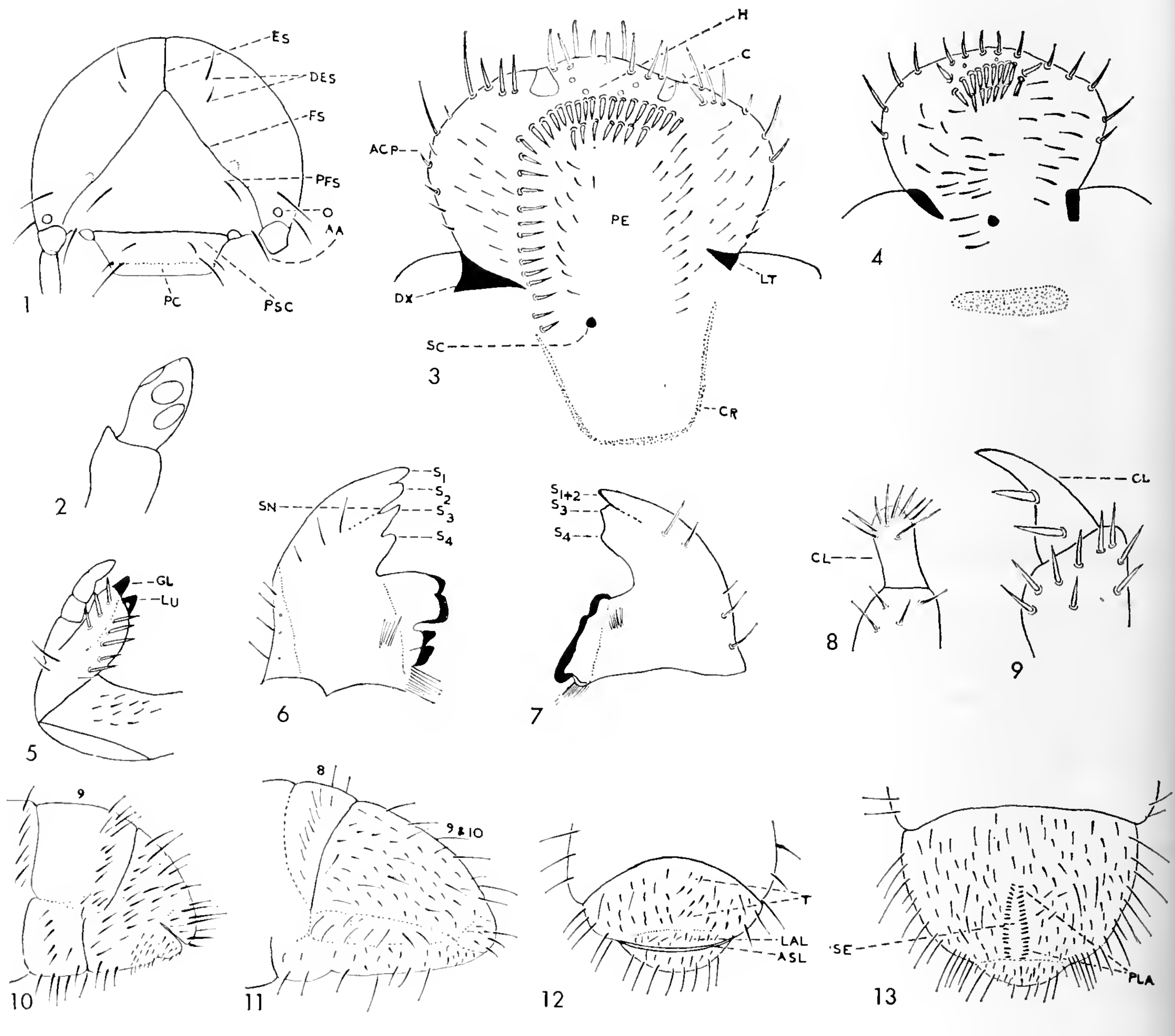

FIGURES 1-13, Larvae of Cetoniinae.

Clastocnemis quadrimaculatus. 1—Head capsule. 4—Epipharynx. 10—Lateral view of 8th to 10th abdominal segments. 12—Raster.

Pachnoda marginella. 2—Last antennal segment. 3—Epipharynx. 5—Maxilla, ventral view. 6—Left mandible, dorsal view. 7—Right mandible, dorsal view. 8—Claw. 11—Lateral view of 8th to 10th abdominal segment. 13—Raster.

Platygenia barbata. 9—Claw.

SYMBOLS. AA—Seta of anterior angle of frons. ACP—Acanthoparia. AFS—Anterior frontal seta. ASL—Anal slit. C—Clithrum. CL—Claw. CR—Crepis. DES—Dorso epicranial setae. DX—Dexiotorma. ES—Epicranial stem. FS—Frontal suture. GU—Uncus of galea. LAL—Lower anal lip. LT—Laeotorma. LU—Uncus of lacinia. O—Ocellus. PC—Preclypeus. PE—Pedium. PFS—Posterior frontal seta. PLA—Palidium. PSC—Postclypeus. S—Scissorial teeth. SE—Septula. SC—Sense cone. SN—Scissorial notch. T—Teges.

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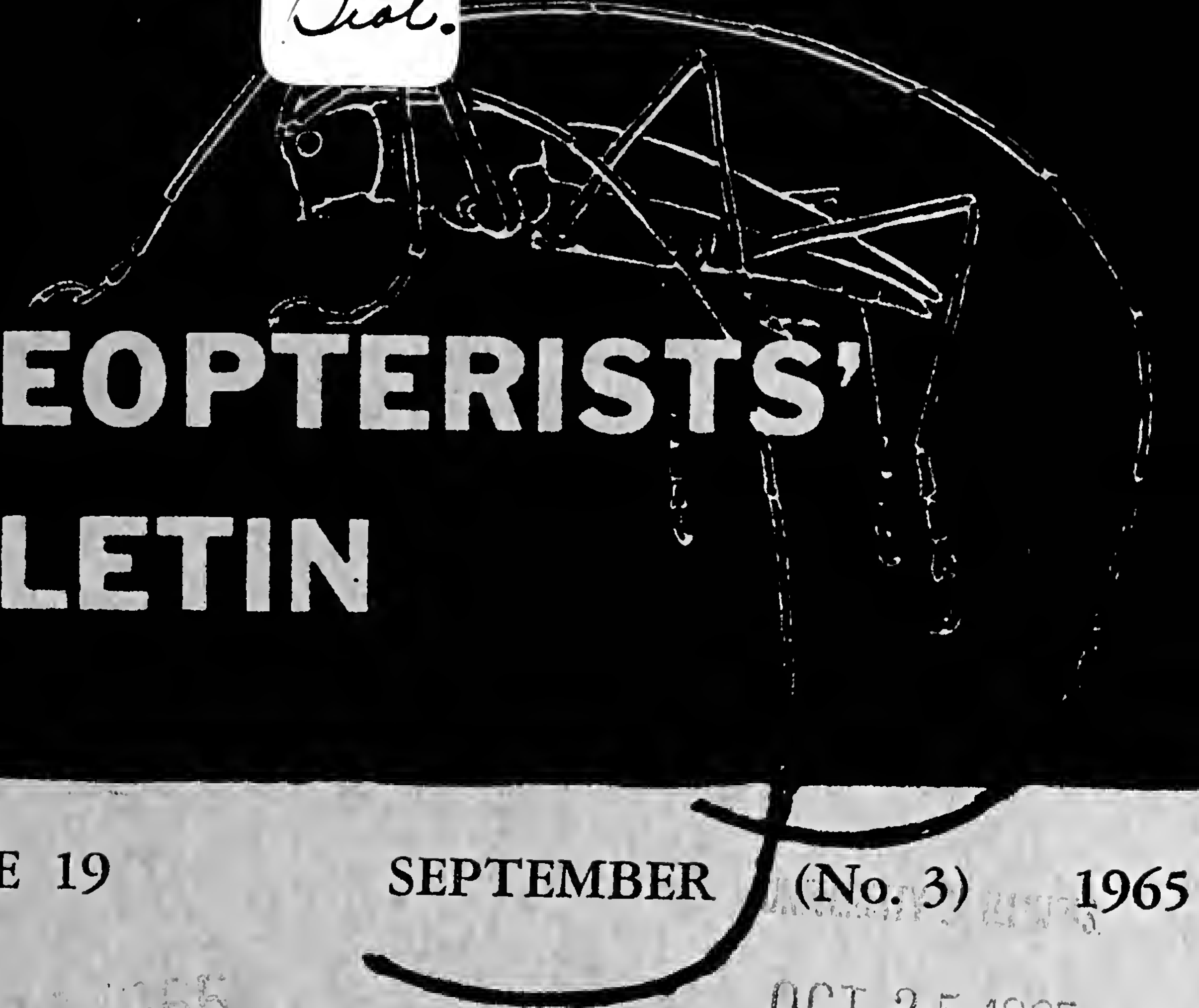

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A QUARTERLY PUBLICATION DEVOTED TO THE STUDY OF BEETLES

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A NEW CAVERNICOLOUS SPHODRINE FROM VERA-CRUZ, MEXICO (COLEOPTERA: CARABIDAE)[1]

By THOMAS C. BARR, JR.[2, 3]

The sphodrines are a group of carabid genera which are usually given tribal status in the subfamily Anchomeninae (e.g., Britton 1959) or subtribal status within the Agonini (=Anchomenini) of more restrictive classifications (e.g., Lindroth 1956). The best generic treatment of the group is that of Jeannel (1937). A distinction is sometimes made between *Calathus* and associated genera (*Calathus* group of Jeannel, *op. cit.*) and the "true" sphodrines (*Sphodrus* and *Laemosthenes* groups of Jeannel). Sphodrines are distinguished from other Agonini by the squarely truncate base of the intercoxal process of the prosternum and (usually) by the elongate, slender ("styloid") right paramere of the aedeagus. In *Calathus* and other genera of the *Calathus* group, the hind angles of the pronotum are decidedly rounded and the claws are strongly pectinate. Lindroth (1956) made several minor changes in classification of sphodrines, especially of the *Calathus* group, separating the subtribe Sphodri (=Sphodrina) from the Agoni (=Agonina) on the basis of the styloid right paramere. In Agonina the right paramere is conchoidal, similar to the left one but smaller. However, the right paramere is conchoidal in *Prosphodrus* Britton (1959) and in the genus described below, both of which should be placed among the true sphodrines because of other characters.

The "true" sphodrines range in size about 10-20 mm. and are predominantly black, ferrugineous, or rufotestaceous (a few species are dark violet). They are lucifugous and nocturnal, occurring in cellars, mammal burrows, caves, and other dark, cool microenvironments. Some species are

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[2] Department of Zoology, University of Kentucky, Lexington.

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apterous and a few are microphthalmous, although the eyes seem to be always faceted and are probably more or less functional. Cavernicole species occur in the genera *Sphodropsis, Antisphodrus, Ceuthosphodrus,* and *Prosphodrus*.

The known distribution of the "true" sphodrines was, until recently, strictly Palaearctic, from Mongolia to Spain, North Africa, and the Canary Islands. The discovery of *Prosphodrus* by Brenda May in caves of New Zealand (Britton 1959) extended the range of the group into the southern hemisphere. The recently described cavernicole species of *Jujiroa* and the monobasic *Jaana* from Japan were shown by Uéno (1955) to be Agonina rather than Sphodrina. The sphodroid *Rhadine* spp. of southern United States and northern Mexico (Barr 1960; Bolívar and Hendrichs 1964) are clearly Agonina.

In July, 1964, Mr. James R. Reddell sent me a series of carabids from caves in northeastern Mexico. In this material were 3 specimens of a wholly new and undescribed true sphodrine from a deep pit in the karst region south of Orizaba, in the state of Veracruz. This remarkable species, the type of a new and distinctive genus, is described below.

Mexisphodrus Barr, NEW GENUS

Sphodrina of large size, slender, depigmented, apterous, microphthalmous. Antenna with pubescence beginning on distal two-thirds of segment IV. Pronotum subquadrate, the margins sinuate and the hind angles prominent and sharp. Prosternum with intercoxal process compressed into a vertical, abruptly truncate ridge. Elytra elongate, depressed, broadly margined, with 3 or 4 minute discal punctures on each elytron. Mesosternum without distinct antecoxal tooth. Metatrochanters with apex bluntly rounded. Metepisterna not unusually elongate. Tarsi completely glabrous above, with a distinct lateral carina on each side and heavily pubescent beneath; 4th tarsomere deeply bilobate; claws simple, neither serrate nor toothed. Protarsi of male slightly enlarged, with two rows of small, adhesive brush hairs beneath. Profemur without a crest or tooth beneath. Metatibia without a distinct setose brush, but densely covered with short spines in apical half. Penis with basal bulb not appreciably swollen nor deflexed; apical orifice slightly to right of center; left paramere conchoidal, larger than right; right paramere conchoidal, about as long as left and one-third as wide. Type-species: *M. veraecrucis* Barr, sp. nov.

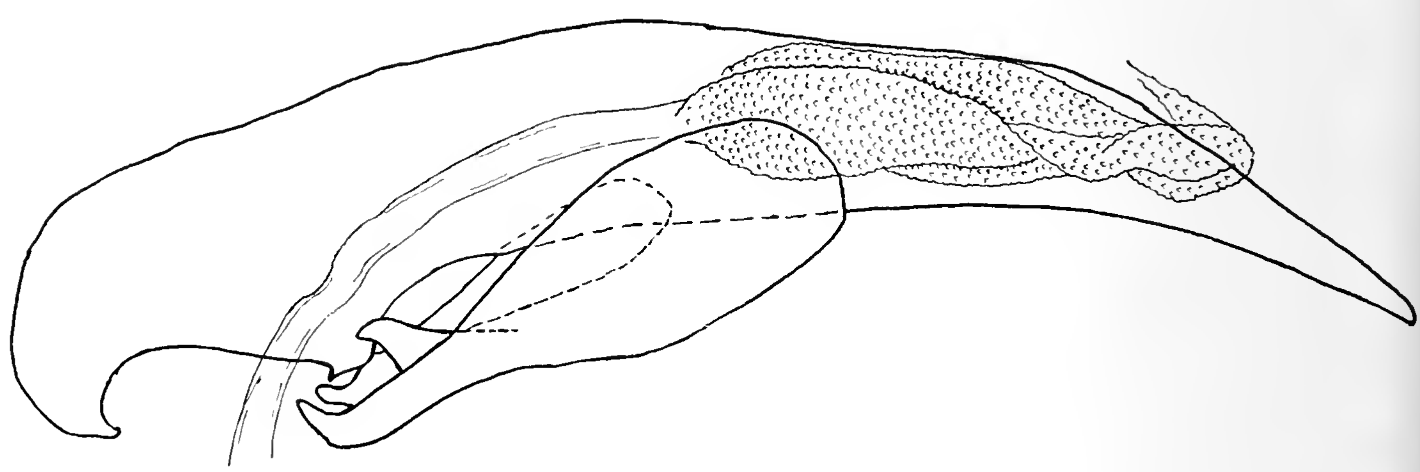
Mexisphodrus veraecrucis Barr, NEW SPECIES

(Fig. 1)

Length 16.8-18.1 mm. Body form elongate and slender; dark ferrugineous to rufotestaceous; head and pronotum polished, shining, elytra alutaceous. Microsculpture of head, pronotum, and venter a shallowly incised, transverse meshwork; elytral microsculpture a closely spaced isodiametric meshwork. *Head* 1.6 times longer than wide (length/width); labrum rectangular, 0.56 times as long as wide; clypeus with a seta on each side; 2 pairs of supraorbital setae; frontal grooves broad and shallow; with an irregular, narrow groove from base of antenna to anterior supraorbital seta, then curving down in back of eye; eye small (about 0.60 x 0.45 mm.), flat, oblong, unpigmented, but faceted (about 300-400 facets present); mandibles, galeae, and laciniae long and slender; maxillary palps glabrous, lengths of segments II, III, and IV in ratio 13:11:10, segment IV fusiform with diameter 0.25 its length and with apex evenly rounded; labial palps with segments III and IV subequal (each about as long as segment III of maxillary palp), glabrous, III bearing 2 long setae on anterior face, IV fusiform with diameter 0.19 length and with apex evenly rounded; glossa triangular, with 3 or 4 setae on anterior margin; paraglossae a little longer than glossa, hyaline, in form of oblique, tapered, truncate rods; mentum deeply

FIGURE 1. *Mexisphodrus veraecrucis* sp. nov., holotype ♂, Sotano del Profesor, Veracruz, Mexico.

emarginate, with short, bifid (grooved) tooth, 2 setae, and 2 small, forameniform punctures in shallow fossae; submentum with 4 setae. *Pronotum* subquadrate; length and maximum width subequal; apical width, maximum width, and basal width in ratio 12:17:14; margin broadly reflexed, disc feebly convex; anterior angles salient and rounded; posterior angles large, sharp, and rectangular; margin slightly curved in apical two-thirds, then shallowly sinuate to hind angles; with pair of marginal setae at apical one-third and pair in hind angles; antebasal foveae broad and deep. Intercoxal process of prosternum abruptly truncate. *Elytra* elongate-elliptic (length/width=1:80); humeri prominent but rounded, the marginal bead terminating at base of 3rd stria; margin not sinuate but simply oblique near apex; apices separately produced and slightly dehiscent, acuminate; disc subconvex, bilaterally deplanate near the base; longitudinal striae finely impressed and regular, intervals flat; scutellar stria short, and small scutellar puncture present; disc with 3 setiferous punctures, all small and inconspicuous, 2 on 2nd stria and an anterior one on 3rd stria; one puncture at apex of 6th stria and 2 small punctures near apex; 20-21 punctures on 9th interval bearing rather short macrosetae of variable length, longer setae on 5, 14/15, and 20. *Metathoracic wings* absent, without even a vestige remaining. *Metatrochanters* with apex rounded, not acuminate. *Mesosternum* with a low, oblique ridge anterolateral to each mesocoxa. *Metepisterna* rather short. *Antennae* long and slender, 0.6 total body length; pubescence beginning on segment IV; segment II 0.6 length of scape, segment III 1.3 length of scape, segment IV slightly shorter than III. *Tarsi* glabrous and smooth above and heavily pubescent beneath, with a single carina on each side; claws long and slender but not serrate and with no trace of basal tooth; segment IV deeply bilobate with long tufts of setae beneath each lobe; male protarsi slightly enlarged, with small adhesive hairs beneath, arranged in 2 rows. *Legs* long and slender; femora without crests, crenulations, or teeth of any sort, but with a few scattered macrosetae which are not arranged in well-defined rows; metatibia without subapical brush of fine setae on inner face, but with a dense subapical armature of small spines, especially thick on internal face. *Aedeagus* (figs. 2-3)



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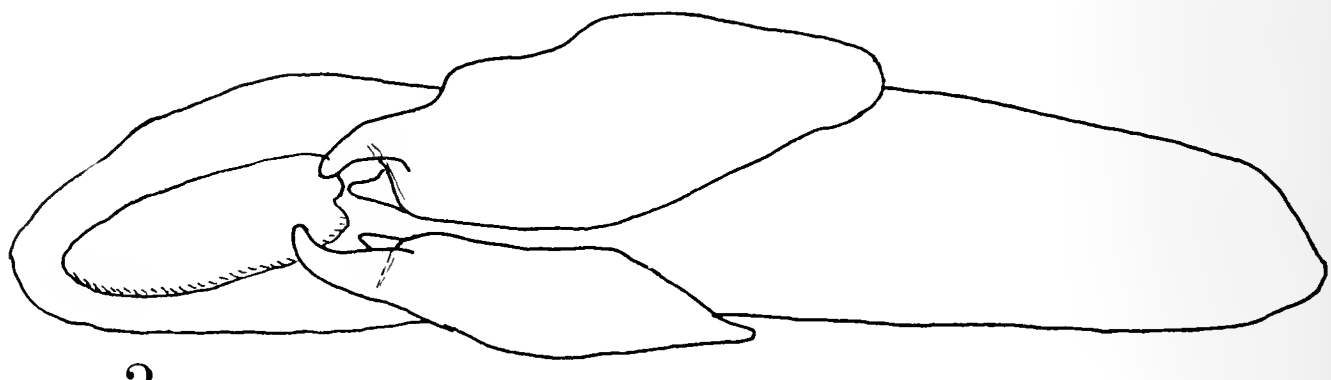

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FIGURES 2-3, Aedeagus of *Mexisphodrus veraecrucis,* holotype; length 3.3 mm. 2—Left lateral view. 3—Ventral view.

small (0.18 total body length in holotype) and slender; basal bulb only slightly larger than diameter of middle portion of penis; apex attenuate, the apical orifice displaced very slightly to the right of center; left paramere large and conchoid; right paramere subequal in length but only one-third as wide, conchoid with narrowed apex, not at all styloid and elongate as usual for the subtribe.

Holotype ♂ and 2 ♀♀ paratypes, Sotano del Profesor, near Tequila, Veracruz, Mexico, 2 June 1964 (Terry W. Raines and William D. Bell, III). Holotype deposited in Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; one paratype in the collection of Dr. C. Bolívar y Pieltain, Escuela Nacional de Ciencias Biologicas, I. P. N., Mexico, D. F., Mexico; remaining paratype in author's collection. Measurements of holotype (a late teneral): total length 18.1 mm.; head length 3.2 mm., width 2.0 mm.; pronotum length 3.4 mm., width 3.4 mm., apical width 2.4 mm., basal width 2.8 mm.; elytra length 10.0 mm., width 5.5 mm.; antenna length 10.6 mm.; eye length 0.60 mm., width 0.45 mm.; metatibia length 5.7 mm.; metatarsus length 4.5 mm., lengths of segments I-V with ratio 15:8:6:4:15; aedeagus length 3.3 mm.

The type locality is described as follows by Mr. Terry Raines (*in litt.*, Nov., 1964): "Sotano del Profesor is located some 30 feet from the Orizaba—Tequila road about 1 mile from Tequila. The entrance is 15 feet in diameter with the pit keeping this same dimension to its bottom, 354 feet below. No water runs into the cave and there are no streams in the area. The floor of the pit is composed of reddish-brown surface soil that has been washed in and many small rocks. Over this a layer of leaves, small sticks, and branches has recently fallen in. The walls and floor are moist but throughout the sotano there is no water, running or otherwise . . . the beetles I found on the floor." The pit is locally infamous for the death of a schoolteacher who fell into it in the spring of 1964. Although Mr. Raines, Mr. Reddell, and their associates have collected carabids in several other caves in the vicinity of Tequila, no other specimens of *Mexisphodrus* have yet been taken.

Mexisphodrus will key out near *Sphodropsis* in the generic key given by Jeannel (1937), because the tarsi are glabrous above, the metatrochanters are bluntly rounded, there are no mesosternal teeth, the first metatarsomeres are pubescent beneath, and there is no metatibial brush. It is readily distinguishable from *Sphodropsis,* however, because the tarsi are simply carinate on the sides instead of being wrinkled uniformly above, the 4th tarsomeres are deeply bilobate, the metatibiae are densely spinose and setose in the apical two-thirds, and the right paramere of the aedeagus is not styloid.

In his short but very useful paper of 1937, Jeannel arranged the true sphodrines in a *Sphodrus* group and a *Laemosthenes* group, distinguished by the tarsi being glabrous or hairy above, respectively. Apparently he did not consider these natural groups, because in the brief zoogeographic sketch at the end of the paper (Jeannel 1937:100), he established two phyletic lines on the basis of whether or not their constituent genera possess a subapical brush of setae on the metatibiae. This is a rather variable character, even within a genus. An examination of the literature and of the specimens of Sphodrina available to me suggests no wholly objective means to assess the phylogenetic weight of the various characters which, in different combinations, can be used to demarcate genera. Consequently I have adopted the following approach. This procedure does not give unequivocal answers if it is used to construct a phylogeny of the whole group, but it does prove revealing in the less ambitious task of learning something about the relative position of *Prosphodrus* and *Mexisphodrus*.

Table 1 lists 10 more or less diagnostic (for sphodrines) characters and their opposites. It is neither particularly difficult nor arbitrary to determine which are primitive and which are derivative. When in doubt I have guessed by the following rule of thumb: if a given character occurs in the majority of the Agonina, the most generalized of the subtribes of Agonini, I have placed it in the "Primitive" column. Table 2 lists genera of "true" sphodrines (following the scheme of Jeannel). For each primitive character I have assigned a — sign, and for each derivative character a + sign. The total number of + signs per genus is thus a crude measure of the degree of departure from a primitive condition.

Table 2 indicates that *Sphodrus, Eremosphodrus, Cryptotrichus,* and *Pristonychus* are the most highly differentiated genera. The two most primitive genera are the two geographically remote relicts—*Prosphodrus* in New Zealand and *Mexisphodrus* in Mexico—both of which have no + marks.

Both *Prosphodrus* and *Mexisphodrus* are cavernicoles. The former is comparatively robust, superficially rather like *Sphodrus,* but with far fewer macrosetae on the legs. *P. waltoni* is known only from deep parts of caves and is quite rare, a total of only 7 specimens having been taken during the past 7 years (B. M. May, *in litt.*). *Mexisphodrus,* on the other hand, has undergone the sort of structural reduction and adaptation seen in European cavernicoles—(a) the eyes are small, pale, and flat; (b) depigmentation has occurred; (c) the legs and antennae are unusually long and slender; and (d) the tibiae and tarsi are heavily setose/spinulose. Apterism is an additional characteristic of cavernicoles, but also occurs among certain epigean sphodrines. *Mexisphodrus* further differs from all the sphodrines I have seen in having all the tarsi longitudinally carinate on the sides, as in some Agonina and Synuchina. Some *Taphoxenus* spp. have a carina on the first segment of the meso- and metatarsi. An additional peculiarity of *Mexisphodrus* is that the 4th tarsomere is deeply bilobate and heavily setose beneath, as in many arboreal agonines (e.g. *Colpodes* spp.).

Prosphodrus and *Mexisphodrus* share the distinction of possessing an agonine right paramere (i.e., conchoidal and smaller than the left), rather than the styloid sphodrine type. However, their truncate prosternal process and their general habitus leave no doubt of their affinities. The conchoidal right paramere is almost certainly archaic (for sphodrines), and suggests that these 2 genera are relicts of an ancient wave of dispersal. The evolution of the styloid right paramere must have occurred later in other sphodrines, prior to dispersal of various groups westward across Europe.

It seems probable that the true sphodrines originated and dispersed from central Asia (Jeannel, 1937). *Prosphodrus* seems closer to *Sphodrus*

Table 1

SOME DIAGNOSTIC CHARACTERS OF GENERA OF TRUE SPHODRINES

	Primitive		*Derivative*
1.	Both parameres conchoidal	1.	Right paramere styloid
2.	No metatibial brush	2.	Subapical brush of setae on inner face of metatibia
3.	Tarsi glabrous	3.	Tarsi pubescent
4.	Tarsi smooth	4.	Tarsi strigose
5.	Claws simple	5.	Claws serrate or dentate
6.	Metatrochanters simple	6.	Metatrochanters apically acuminate
7.	Mesosternum unarmed	7.	Mesosternum with antecoxal tooth
8.	Profemora simple	8.	Profemora with setose crests
9.	Elytra with discal punctures	9.	No discal punctures on elytra
10.	Antennal pubescence beginning on segment IV	10.	Antennal pubescence beginning on segment III

Table 2

PRIMITIVE (—) AND DERIVATIVE (+) CHARACTERS OF SOME GENERA OF TRUE SPHODRINES

(Numbered columns follow same sequence as in Table 1)

	1	2	3	4	5	6	7	8	9	10	Total ++
Sphodrus	+	+	—	—	—	+	+	—	+	—	5
*Eremosphodrus**	+	+	—	+	—	+	+	—	+	—	6
Taphoxenus	+	+	—	(+)	—	—	—	—	+	—	3 or 4
Sphodropsis	+	—	—	+	—	—	—	—	+	—	3
Cryptotrichus	+	—	+	—	+	—	+	—	+	—	5
Antisphodrus	+	—	+	—	—	—	+	—	+	—	4
Laemosthenes	+	—	+	—	+	—	—	—	+	—	4
*Licinopsis**	+	—	+	—	(+)	—	—	—	—	+	3 or 4
Pristonychus	+	+	+	—	—	(+)	—	+	+	—	5 or 6
Ceuthosphodrus	+	+	+	—	(+)	—	—	—	+	—	4 or 5
*Calathidius**	+	+	+	—	+	—	—	—	+	+	6
Prosphodrus	—	—	—	—	—	—	—	—	—	—	0
Mexisphodrus	—	—	—	—	—	—	—	—	—	—	0

* These genera not seen; data from literature.
(+) indicates character present in one or more subgenera but not prevalent throughout entire genus.

than to any other of the known genera. Although *Sphodrus* itself has too many derivative characters to be a direct ancestor, it is perhaps worth noting that its species are winged and range widely across Europe to northern India. Despite its troglobic habits, *Prosphodrus* has a morphology which suggests it is not limited to caves. Perhaps a cave is only a convenient place to collect it. *Mexisphodrus* is morphologically most closely similar to *Taphoxenus* s.str., a subgenus whose species have a reduced metatibial brush, smooth tarsi, flattened elytra, and the sides of the pronotum explanate. The presence of *Taphoxenus* in eastern Asia is compatible with an hypothesis that sphodrines crossed a Bering land bridge into North America some time during the Tertiary and that *Mexisphodrus* is a relict of this early invasion.

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LITERATURE NOTICE

TENEBRIONIDAE BEETLES OF THE NEVADA TEST SITE. By V. M. Tanner and W. A. Packham. Brigham Young Univ. Sci. Bull., Biol. Ser. 6(1):1-44, 21 figs. 1965.—46 species in 31 genera are keyed and described. Some are illustrated. Perhaps the most helpful part of this study is the listing of plant communities in which each species is found. Seasonal activity of each species is discussed and shown graphically.

NOTICE

A new entomological magazine has arrived. QUAESTIONES ENTOMOLOGICAE is a quarterly record of entomological investigations published by the Department of Entomology, University of Alberta, Edmonton, Canada. QUAEST. ENT. (the World List abbreviation) is intended to provide prompt, low-cost publication for accounts of entomological research of greater than average length. Volume 1, Number 1, January 1965, 40 pp., is printed by an offset process and contains a 35-page article on mosquito behaviour, an editorial, and a book review. Subscription rates are the same for institutions, libraries, and individuals, $4.00 per volume of 4 issues, single issues $1.00. An abstract edition is available, printed on one side of paper and on one or both sides (according to length) of 3x5 inch index cards (at $1.00 per volume) or on 5x8 inch standard single row punched cards ($1.50 per volume). Subscriptions and enquiries should be sent to the address given above. The BULLETIN wishes QUAESTIONES ENTOMOLOGICAE a long, happy, and fruitful life.

REVISION OF ORUS. II. SUBGENERA ORUS, PYCNORUS AND NIVORUS (COLEOPTERA: STAPHYLINIDAE)

By LEE H. HERMAN, JR.[1]

The Paederinae genus *Orus* Casey, 1884, was erected to include ". . . the minute forms . . ." *Scopaeus exiguus* Erichson, *Orus picipes* Casey and *Orus punctatus* Casey. The species *Orus picipes* Casey and *Orus exiguus* (Erichson) were removed to a new genus, *Leptorus* Casey, 1886, now a junior synonym of *Scopaeus* Erichson. Five additional species, *Orus guatemalenus* Sharp, 1886, *Orus parallelus* Casey, 1886, and three by Fall in 1901, *Orus fraternus, Orus montanus* and *Orus femoratus,* increased the number of species to six. To this point, but for *Orus parallelus,* the species were described from at least one male. In 1905 Casey described six species, each from a female: *O. boreellus, O. longicollis, O. pugetanus, O. robustulus, O. pinalinus* and *O. deceptor;* six additional species were described from males: *O. sonamae, O. pallidus, O. filius, O. distinctus, O. shastanus* and *O. cervicula.* From a single female specimen, *O. provensis* Casey was described and *O. cervicula* was moved (Casey, 1910) to *Pseudorus* Casey, a new genus which is now a junior synonym of *Scopaeus* Erichson.

Described as new genera in 1905 were *Leucorus* Casey, treated by Herman (1965), and *Pycnorus* Casey. *Pycnorus* was erected to include *Scopaeus dentiger* LeConte, 1880, *Scopaeus armiger* Fall, 1902, and *Pycnorus iowanus,* a new species described from one female. Bernhauer and Schubert (1912) considered *Orus, Pycnorus,* and *Leucorus* as subgenera of *Scopaeus* which resulted in Scheerpeltz's renaming the preoccupied *Scopaeus (Orus) longicollis* (Casey) to *Scopaeus caseyianus.* Leng (1920) listed *Orus, Leucorus* and *Pycnorus* as separate genera; Blackwelder separated as genera *Scopaeus* and *Orus* including *Leucorus* and *Pycnorus* as subgenera of *Orus.* Blackwelder's (1939a) interpretation is followed here, using as a basis of separation of *Orus* and *Scopaeus* the thicker neck of *Orus.*

Two additional species, *Orus volans* and *Orus cameroni,* were described and included in the subgenus *Leucorus* by Blackwelder (1943); later these species were set aside in a separate subgenus *Nivorus* and *Orus guatemalenus* was placed in the subgenus *Leucorus* by Herman (1965).

The measurements used here were described previously by Herman (1965).

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[1] Department of Biology, Catholic University of America, Washington, D. C. 20017.

W. J. Brown, Canada Department of Agriculture; Dr. J. A. Powell, University of California; Mr. H. B. Leech, California Academy of Science; Dr. G. W. Byers, University of Kansas; Dr. L. L. Pechumen, Cornell University; Dr. P. J. Darlington, Museum of Comparative Zoology.

Genus *Orus* Casey

Orus Casey, 1884:136; 1885:315; 1886:221, 226-228; Fall, 1901:223-224; Casey 1905:191, 196-203; 1910:190; Bernhauer and Schubert 1912:245-251; Gibson and Treherne 1916:56; Treherne 1916:141-143; Leng 1920: 104; Scheerpeltz 1933:1265; Blackwelder 1936:52, 62, 91; 1939a:98, 105, 120; 1939b:24; 1943:230, 277-279; 1944:119; Clark 1949:21; Blackwelder 1952:278, 420; Hatch 1957:150, 159, 160, 343; Arnett 1961:244, 269; Herman 1965:112-121.

TYPE-SPECIES: *Orus punctatus* Casey, 1884. Fixed by Blackwelder (1939a) by subsequent designation.

Four subgenera, *Orus, Pycnorus, Leucorus,* and *Nivorus* are distinguished.

DESCRIPTION. Piceous, castaneous or testaceous, moderately pubescent. *Head:* quadrilateral to rectangular in dorsal aspect, sides broadly arcuate, truncate posteriorly, dorsum and venter punctate; gula with feeble to strong microrecticulate ground sculpturing; labrum edentate, bidentate or quadridentate, long setae on anterior portion, with median emargination; mandibular dentition variable; eye feebly to strongly tapered posteriorly; postorbital setigerous fovea or furrow present. *Thorax:* neck usually ¼ or more as wide as head[2]; prothorax longer than wide; profemur robust, with meso-ventrally directed ctenidia on one side; protibia with scopae; protarsus expanded; mesosternal fovea present or absent; elytra indistinctly punctate, epipleuron margined; metafemur modified or not; metatibia with ctenidia on inner side of apex. *Abdomen:* punctulate; sterna of female unmodified; last two visible sterna of male variously modified. *Aedeagus:* median lobe bulbous; parameres connate, attenuate; dorso-basal median foramen, ostium apical or subapical, dorsal or ventral; circoforamen present; postforamen present or absent.

DISTRIBUTION: UNITED STATES, CANADA, MEXICO, WEST INDIES, GUATEMALA, SURINAM.

Key to the Described Species of Orus and Pycnorus (Males)

1. Gular tubercle prominent on males, prominent to feeble on females; gula impressed, with strong microreticulate ground sculpturing present in both sexes-----**(PYCNORUS)** 2
   Gular tubercle absent in both sexes; gula not impressed (i.e. at same level as adjacent postgenae), microreticulate ground sculpturing absent or very feebly present in both sexes ---**(ORUS s. str.)** 3
2. Metatibia with row of spines on one side; metafemur usually with eleven denticles on the distal end; east of the Rocky Mountains------------------------**DENTIGER**
   Metatibia without row of spines; metafemur usually with seven denticles on distal end; Rocky Mountains --**PARALLELUS**
3. Last visible abdominal sternum shallowly incised (figs. 3, 8)------------------- 4
   Last visible abdominal sternum deeply incised (fig. 2)-------------------------- 5
4. Fifth visible abdominal sternum emarginate (fig. 8); neck ⅕ width of head----**MONTANUS**
   Fifth visible sternum sinuo-truncate (fig. 3); neck ¼ or more the width of the head ---**SHASTANUS**
5. Fifth visible abdominal sternum with strongly sinuate margin (fig. 7)----------**SINUATUS**
   Fifth visible abdominal sternum with margin lobed or emarginate---------------- 6

6. Fifth visible abdominal sternum with margin shallowly emarginate (fig. 11)----FRATERNUS
Fifth visible abdominal sternum with margin lobed--------------------------- 7
7. Fifth visible abdominal sternum with a tubercle----------------------------- 9
Fifth visible abdominal sternum without a tubercle-------------------------- 8
8. Parameres short, not extending beyond apex of median lobe, broad, with lateral margins straight in dorsal aspect (figs. 22, 23)----------------------HEMILOBATUS
Parameres long, extending beyond end of median lobe, slender, lateral margins sinuate in dorsal aspect (figs. 16, 29)------------------------------------PUNCTATUS
9. Abdominal tubercle well-developed, margined laterally by a carina (fig. 9); metafemur carinate ---FEMORATUS
Abdominal tubercle feeble, not margined laterally by a carina; metafemur not carinate ---DISTINCTUS

Subgenus *Orus* Casey

TYPE-SPECIES: *Orus punctatus* Casey, 1884. Fixed by Blackwelder (1939a) by subsequent designation.

DESCRIPTION. Orus: testaceous, castaneous or piceous. *Head:* quadrilateral in dorsal aspect; dorsum finely punctate; venter with sparse more distinct punctation, ground sculpture feeble, shining; gula with very feeble microreticulate ground sculpturing, not impressed; gular tubercle completely absent; gular sutures represented by increased pigmentation; labrum quadridentate; right mandible quadridentate, left mandible tridentate; setigerous postorbital fovea present, continuous with feeble to prominent supraorbital furrow. *Thorax:* anterior prothoracic angles evident; pronotal punctation distinct and umbilicate, median area impunctate; mesopleuron and mesosternum with reticulate ground sculpture; mesosternal fovea present; metafemur modified or not. *Abdomen:* last two visible sterna of male modified. *Aedeagus:* ostium beneath parameres; postforamen absent, median lobe membranous ventrally, ventral sclerite absent.

DISTRIBUTION. CANADA: British Columbia; UNITED STATES: Washington, Oregon, California, Arizona, Nevada, Idaho, Montana, Wyoming, Colorado.

DISCUSSION. Not discussed below are *Orus robustulus* Casey, 1905 (Lake Tahoe, California); *Orus pinalinus* Casey, 1905 (Pinal Mountains, Arizona); *Orus deceptor* Casey, 1905 (Humboldt Co., California); each was described from a single female specimen. Each may be distinguished from the others by size or facies but enough individual variation and overlap exist for these characters to make them unreliable. Association with a male has likewise been impossible. The only association possible, and that on distribution, is of *O. pinalinus* and *O. punctatus* both with representatives from Arizona.

Orus (Orus) punctatus Casey

FIGS. 2, 4-6, 16, 29, 33

Orus punctatus Casey, 1884:138; 1885:315, pl. 1, fig. 7-7c; Fall 1901:223; Casey 1905:200; Gibson 1916:205; Gibson and Treherne 1916:56; Treherne 1916:141-143; Leng 1920:104; Blackwelder 1936:52, 62, 91; 1939a:105, 120; 1939b:24; 1943:277; 1952:278; Clark 1949:21, Hatch 1957:159-160.

[2] The neck of *Orus montanus* is 1/5 the width of the head.

Scopaeus (Orus) punctatus (Casey), Bernhauer and Schubert 1912:251.
Orus filius Casey, 1905:200; Leng 1920:104; Blackwelder 1939a:105; 1939b:24. (NEW SYNONYMY).
Scopaeus (Orus) filius Casey, Bernhauer and Schubert 1912: 247.
Orus pallidus Casey, 1905:199; Leng 1920:104; Blackwelder 1939a:105; 1939b:24 (NEW SYNONYMY).
Scopaeus (Orus) pallidus (Casey), Bernhauer and Schubert 1912:250.
Orus sonomae Casey, 1905:198; Leng 1920:104; Blackwelder 1939a:105; 1939b:24. (NEW SYNONYMY).
Scopaeus (Orus) sonomae (Casey), Bernhauer and Schubert 1912:251.

HOLOTYPE of *Orus punctatus* Casey: California; U. S. National Museum; male. At the Museum of Comparative Zoology is a specimen of *Orus punctatus* labeled as "Type." In the Casey Collection of the U. S. National Museum are two specimens labeled as "?Type" and "Neotype." Each of the specimens fits the description of *Orus punctatus* but the original description is of one specimen from California. The neotypic designation is invalid and no evidence has been found that the holotype was deposited at M.C.Z.; I therefore accept the specimen in the Casey Collection labeled as "?Type" as the holotype.

HOLOTYPE of *Orus filius* Casey: Mokelumne Hill, California; U. S. National Museum; male.

HOLOTYPE of *Orus pallidus* Casey: California; U. S. National Museum; male. Paratypes: 5 males, 2 females.

HOLOTYPE of *Orus sonomae* Casey: California; U. S. National Museum; male.

DESCRIPTION OF THE HOLOTYPE. Orus; (Orus); piceous; appendages castaneous; male. *Head:* dorsum uniformly punctate; .49 mm. long, .43 mm. wide. *Thorax:* pronotum .48 mm. long, .42 mm. wide; elytra .63 mm. long, .54 mm. wide. *Abdomen:* fifth visible sternum with a lobed margin; lobe broad with the posterior margin arcuate; slightly impressed medially; last visible sternum deeply and broadly incised, mesal margins of apices parallel, convergent basally (fig. 2). *Aedeagus:* parameres in lateral aspect strongly acuminate, in dorsal aspect broad, lateral margins sinuate, attenuate distally; circoforamen well-developed (figs. 16, 29).

VARIATION. Body coloration may be castaneous, testaceous or piceous. Ground sculpturing of the head and pronotum may be feebly to strongly microreticulate or absent; the gula may be slightly impressed, but without a tubercle. Greatest variation is of the lobe of the penultimate sternum, examples of which are shown in figs. 2, 4-6; all degrees of intergradation of this character exist and from any one locality, in collections of the same date, several different lobed conditions may be found.

Size variation is as follows: head .50 mm.-.56 mm. long, .44 mm.-.47 mm. wide; pronotum. 50 mm.-.56 mm. long; .40 mm.-.45 mm. wide; elytra .58 mm.-.70 mm. long, .54 mm.-.66 mm. wide. The length of the parameters may vary slightly.

DISTRIBUTION (fig. 33). BRITISH COLUMBIA: Terrace (Nov. 24, 1923); CALIFORNIA: *Calveras Co.:* Mokelumne Hill (July 18, 1910); *San Diego Co.:* San Diego (June 5, 1950), Lakeside; *Alameda Co.:* Dimond (May 15, 1910), Oakland (Sept. 27, 1908, June 7, 1908); *Santa Cruz Co.:* Mount Hermon (July 28, 1922), Watsonville (July 3, 1936); *Sonoma Co.:* Duncan Mills (July 21, 1908); *Sacramento Co.:*

Folsom; *Los Angeles Co.:* Mount Wilson; *Fresno Co.:* Fresno; *Riverside Co.:* Palm Springs (May 30, 1905); *Mendocino Co.:* Rancheria Creek 5.5 miles SE Boonville (June 15, 1950), Ukiah (Sept. 30, 1906); *Marin Co.:* Taylorville (Dec. 28, 1919); *Santa Clara Co.:* Los Gatos (June 4, 7, 1910); *Humboldt Co.:* Willow Creek (June 14, 15, 1916); *Lake Co.:* Lakeport (June 4, 1922), McNeill's pond, 3 miles N. Lakeport (Aug. 3, 1955); Sugar Pine; Shasta Springs (July 6, 1904); *San Mateo Co.; Contra Costa Co.; Orange Co.:* Foster. MONTANA: *Hill Co.:* Bearpaw Mountain (Nov. 3, 4, 1917); *Flat Head Co.:* Kalispell (June 13, 1920). ARIZONA: *Coconino Co.:* Williams (June 9, 13), Flagstaff. OREGON: *Multnomah Co.:* Portland (July 12, 1898). WASHINGTON: *Thurston Co.:* Tenino; Spokane Falls; *Yakima Co.:* Yakima. COLORADO: *Summit Co.:* Breckenridge (July 15-18, 1896, at 9600-10,000 feet elevation). NEVADA: *Ormsby Co.:* Lake Tahoe.

BIOLOGY. This species has been reported as a predator of *Hylemya brassicae* (Bouché), the cabbage maggot; experiments showed 50-100% of the eggs and young maggots were eaten when offered. In captivity *Orus punctatus* lived for 3-87 days. (Gibson 1916, Gibson and Treherne 1916, Treherne 1916.)

"Wherever there is a rivulet or a pond this species may be gathered in multitudes amongst the rubbish along the bank" (Casey, 1886) at various times during May through December.

DISCUSSION. The variation of the sternal character (figs. 2, 4, 5, 6) makes it impossible to separate the specimens and the aedeagus is virtually identical in all the specimens examined. The holotypes of *O. filius, O. pallidus* and *O. sonomae* are represented within the range of variation and are considered to be variants of *Orus punctatus.*

Orus (Orus) shastanus Casey

Figs 3, 17, 30, 33

Orus shastanus Casey, 1905:201; Leng 1920:104; Blackwelder 1939a:105; 1939b:24.

Scopaeus (Orus) shastanus (Casey), Bernhauer and Schubert 1912:251.

Orus pugetanus Casey, 1905:198; Leng 1920:104; Blackwelder 1939a:105; 1939b:24. (NEW SYNONYMY)

Scopaeus (Orus) pugetanus (Casey), Bernhauer and Schubert 1912:250.

HOLOTYPE of *Orus shastanus* Casey: Siskiyou County, California; U. S. National Museum; male. Paratypes: 1 male, 2 females.

HOLOTYPE of *Orus Pugetanus* Casey: Spokane, Washington; U. S. National Museum; female.

DESCRIPTION OF THE HOLOTYPE. Orus; (Orus); castaneous, appendages paler; male. *Head:* dorsum with sparse and feeble punctation, dense microreticulate ground sculpturing; .50 mm. long, .44 mm. wide. *Thorax:* pronotum with sparse punctation, moderately distinct, with dense microreticulate ground sculpturing; pronotum .47 mm. long, .40 mm. wide; elytra .60 mm. long, .54 mm. wide. *Abdomen:* fifth visible sternum with margin sinuo-truncate, margin becoming acute at middle, sternum with broad, shallow, median impression; last visible sternum broadly and shallowly incised, anterior margin and apices of incision broadly rounded (fig. 3). *Aedeagus:* parameres in dorsal aspect attenuate, in lateral aspect base broad and becoming attenuate distally (figs. 17, 30).

VARIATION. Size: head .50 mm.-.54 mm. long, .44 mm.-.47 mm. wide; pronotum .47 mm.-.54 mm. long, .40 mm.-.45 mm. wide; elytra .68 mm.-.72 mm. long, .56 mm.-.67 mm. wide.

DISTRIBUTION (fig. 33). CALIFORNIA: *Siskiyou Co.:* Shasta Retreat (July, at 2416 feet elevation); *Shasta Co.:* Crag Castle (July 26, 1896). NEVADA: *Ormsby Co.:* Lake Tahoe.

Orus (Orus) sinuatus Herman, NEW SPECIES

Figs. 7, 19, 26, 33

HOLOTYPE: Duncan Mills, Sonoma County, California; F. E. Blaisdell collector; July 21, 1908; male; to be deposited in the California Academy of Science. Paratypes: 6 males, 4 deposited with the holotype, 2 in the Chicago Natural History Museum.

DESCRIPTION OF THE HOLOTYPE. Orus; (Orus); male; piceous. *Head:* dorsum with sparse, feeble punctation, ground sculpturing absent; .50 mm. long, .44 mm. wide. *Thorax:* pronotum with moderate, distinct punctation, ground sculpturing absent; pronotum .48 mm. long, .39 mm. wide; elytra .61 mm. long, .54 mm. wide. *Abdomen:* fifth visible sternum with posterior margin sinuate and with slight, median, oval depression; last visible sternum with broad, deep incision; mesal margins of incision convergent, not parallel at any portion (fig. 7). *Aedeagus:* apical third of parameres reduced to a carina, carina not triangular dorso-ventrally (figs. 19, 26).

VARIATION. Size: head .49 mm.-.54 mm. long, .42 mm.-.48 mm. wide; pronotum .47 mm.-.54 mm. long, .36 mm.-.46 mm. wide; elytra .61 mm.-68 mm. long, .54 mm.-.62 mm. wide.

DISTRIBUTION (fig. 33). CALIFORNIA: *Sonoma Co.:* Duncan Mills (July 21, 1908). WASHINGTON: *King Co.:* Baring (July).

Orus (Orus) montanus Fall

Figs. 8, 20, 27, 33

Orus montanus Fall, 1901:223; Casey 1905:198; Leng 1920: 104; Blackwelder 1939a:105, 1939b:24.
Scopaeus (Orus) montanus (Fall), Bernhauer and Schubert 1912:249.

HOLOTYPE: San Bernardino Mountains, California; Museum of Comparative Zoology; male. Paratype: 1 female.

DESCRIPTION OF THE HOLOTYPE. Orus; (Orus); piceous; male. *Head:* .57 mm. long; .57 mm. wide; neck 1/5 as wide as head. *Thorax:* pronotum .61 mm. long, .48 mm. wide; elytra .66 mm. long, .67 mm. wide. *Abdomen:* margin of fifth visible sternum with broad, shallowly v-shaped emargination; margin of last visible sternum shallowly incised (fig. 8). *Aedeagus:* parameres reduced to carina, carina dorso-ventrally triangular (figs. 20, 27).

One specimen examined. Distribution in fig. 33.

Orus (Orus) femoratus Fall

Figs. 9, 18, 21, 33

Orus femoratus Fall, 1901:224; Casey 1905:202; Leng 1920:104.
Scopaeus (Orus) femoratus (Fall), Bernhauer and Schubert 1912:247.

HOLOTYPE: Marin County, California; Museum of Comparative Zoology; male.

DESCRIPTION OF THE HOLOTYPE. Orus; (Orus); piceous; male. *Head:* dorsum with anterior median region impunctate, shining; .50 mm. long, .46 mm. wide; gula slightly depressed. *Thorax:* pronotum with distinct punctation, median area impunctate, shining, without ground sculpturing; pronotum .50 mm. long, .42 mm. wide; elytra .63 mm. long, .54 mm. wide; metafemur robust with a carina on dorsal, posterior edge. *Abdomen:* fifth visible sternum with lobed posterior margin, with a large median tubercle, deep depression before tubercle; tubercle with strong, arcuate carina laterad; last visible sternum deeply incised; incision with anterior margin broadly rounded, broader medially than apically; apices turned mesally (fig. 9). *Aedeagus:* parameres narrower basally than medially in dorsal aspect, not extending beyond posterior margin of median lobe; circoforamen large, well-developed (figs. 18, 21).

One specimen examined. Distribution in fig. 33.

Orus (Orus) hemilobatus Herman, NEW SPECIES

Figs. 10, 22, 23, 33

HOLOTYPE: Mokelumne Hill, Calaveras County, California; F. E. Blaisdell collector; male; to be deposited in the California Academy of Science. Paratypes: 15 males; 13 to be deposited with the holotype; 2 to be deposited at the U. S. National Museum.

DESCRIPTION OF THE HOLOTYPE. Orus; (Orus); piceous; male. *Head:* dorsum with dense, distinct punctation; ground sculpturing obscure; .50 mm. long, .45 mm. wide. *Thorax:* pronotum with distinct punctation; microreticulate ground sculpturing; pronotum .50 mm. long, .42 mm. wide; elytra .67 mm. long, .60 mm. wide. *Abdomen:* fifth visible sternum with margin feebly lobed and slightly sinuate, with a feeble median depression; last visible sternum with incision similar to that of *Orus punctatus* (fig. 10). *Aedeagus:* parameres short, not extending to posterior margin of median lobe, broad, side margins straight in dorsal aspect, apex directed dorsally; circoforamen u-shaped (figs. 22, 23).

VARIATION. Head .47 mm.-.54 mm. long, .40 mm.-.46 mm. wide; pronotum .47 mm.-.50 mm. long, .37 mm.-.45 mm. wide; elytra .60 mm.-.67 mm. long, .54 mm.-.67 mm. wide.

DISTRIBUTION (fig. 33). CALIFORNIA: *Calaveras Co.:* Mokelumne Hill (July 25, 27; Oct.); *Sacramento Co.:* Folsom; *Butte Co.:* Oroville (June 24, 1927); *Amador Co.:* Sutter Creek (Aug. 4, 1904); *Siskiyou Co.:* Sissons (June); *Fresno Co.:* Fresno.

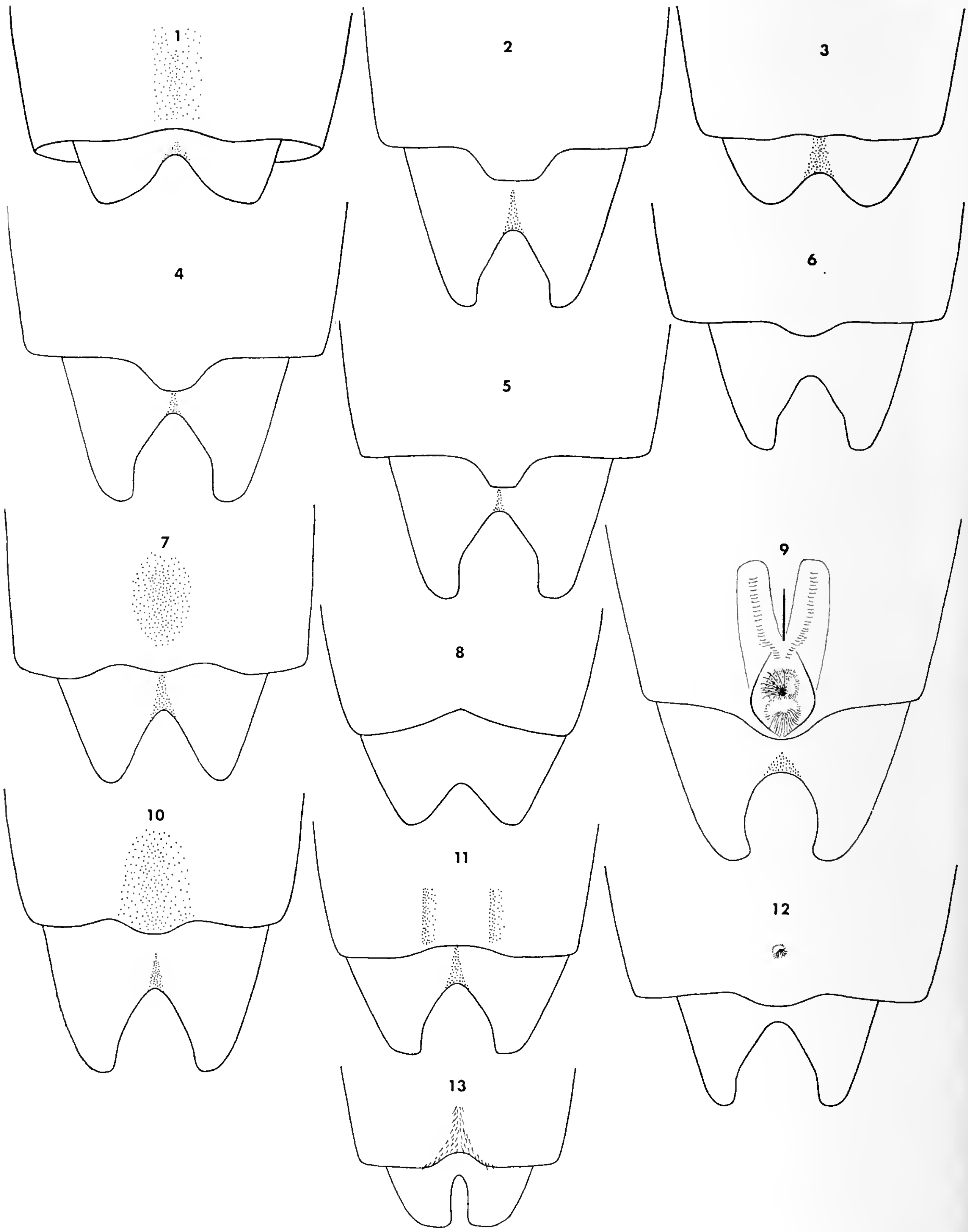
Orus (Orus) fraternus Fall

Figs. 11, 24, 32, 33

Orus fraternus Fall, 1901:223; Casey 1905:201; Leng 1920:104; Blackwelder 1939a:105; 1939b:24.
Scopaeus (Orus) fraternus (Fall), Bernhauer and Schubert 1912:247.

HOLOTYPE: Pomona, California; Museum of Comparative Zoology; male. Paratypes: 1 male, 5 females.

DESCRIPTION OF THE HOLOTYPE. Orus; (Orus); piceous; male. *Head:* dorsum with uniform punctation, with dense microreticulate ground sculpturing; .48 mm. long, .49 mm. wide. *Thorax:* pronotum with distinct, umbilicate punctation, with microreticulate ground sculpturing; pronotum .48 mm. long, .40 mm. wide; elytra



FIGURES 1-13, *Orus* spp., apical abdominal sterna of males. 1—*dentiger*. 2, 4, 5, 6—*punctatus*, variation of the lobe of the penultimate abdominal sternum. 3—*shastanus*. 7—*sinuatus*. 8—*montanus*. 9—*femoratus*. 10—*hemilobatus*. 11—*fraternus*. 12—*distinctus*. 13—*surinamensis*.

.56 mm. long, .52 mm. wide. *Abdomen:* fifth visible sternum with margin broadly and shallowly emarginate; sternum with median, longitudinal, shallow depression margined laterally by low broadly rounded ridges; last visible sternum incised as on *Orus punctatus* (fig. 11). *Aedeagus:* parameres broader medially than basally in dorsal aspect, attenuate distally, median lateral margins reflexed; circoformen large, well-developed (figs. 24, 32).

Distribution in fig. 33.

Orus (Orus) distinctus Casey

FIGS. 12, 33

Orus distinctus Casey, 1905:201, Leng 1920: 104; Blackwelder 1939a:105; 1939b:24.

Scopaeus (Orus) distinctus (Casey), Bernhauer and Schubert 1912:247.

HOLOTYPE: Santa Cruz Mountains, California; U. S. National Museum; male. Paratypes: 2 males, 3 females.

DESCRIPTION OF THE HOLOTYPE. Orus; (Orus); piceous; appendages castaneous; male. *Head:* dorsum with posterior portion uniformly and distinctly punctate, punctation becoming weak anteriorly, with very feeble microreticulate ground sculpturing; .52 mm. long, .46 mm. wide. *Thorax:* pronotum with feeble mircoreticulate ground sculpturing; pronotum .50 mm. long, .41 mm. wide; elytra .64 mm. long, .64 mm. wide. *Abdomen:* fifth visible sternum with feebly lobed margin, with slight tubercle at middle near apex (fig. 12). *Aedeagus:* similar to *O. punctatus* (see figs. 16, 29).

VARIATION. Head .50 mm.-.54 mm. wide, .44 mm.-.47 mm. wide; pronotum .49 mm.-.54 mm. long, .40 mm.-.43 mm. wide; elytra .62 mm.-.68 mm. long, .58 mm.-.67 mm. wide.

DISTRIBUTION (fig. 33). CALIFORNIA: *San Mateo Co.; Santa Cruz Co.:* Santa Cruz Mountains; *Humboldt Co.:* Willow Creek (June 15, 1916); *Marin Co.:* Fairfax (June 13, 1905). BRITISH COLUMBIA: Gale.

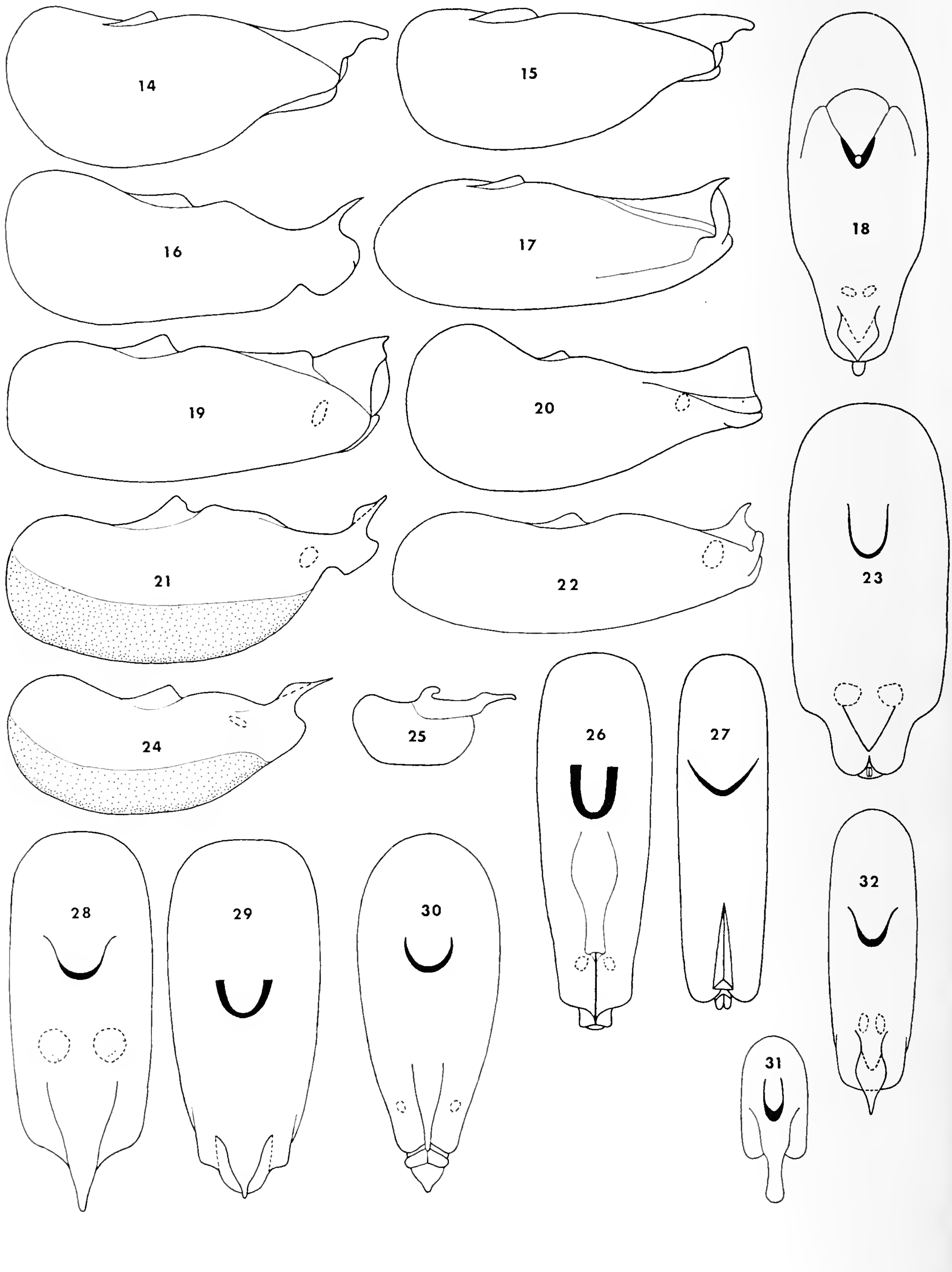
DISCUSSION. Though the lobing of the penultimate sternum of *O. punctatus* and the aedeagi of both species are virtually identical, the specimens are separable by the presence or absence of the small median tubercle. This tubercle was seen on 6 specimens.

Subgenus *Pycnorus* Casey

Pycnorus Casey, 1905:191, 192, 194; Blatchley 1910:433, 434. Bernhauer and Schubert 1912:245-248; Leng 1920:104; Blackwelder 1939a:98, 105, 121; 1939b:24; 1943:277; 1944:119; 1952:333, 420; Hatch 1957:159-160; Arnett 1961:245, 269; Herman 1965:112, 113.

TYPE-SPECIES: *Orus (Pycnorus) dentiger* (LeConte), 1880. Fixed by Blackwelder (1939a, p. 121) by subsequent designation.

DESCRIPTION. Orus; testaceous, castaneous or piceous. *Head:* rectangular in dorsal aspect; dorsum finely, uniformly punctate; venter with ground scupture obscured by dense, prominent punctation; gula with very strong, reticulate ground sculpturing; labrum quadridentate; right mandible tridentate, left mandible quadridentate in male; right mandible quadridentate, left tridentate in females; basal tooth on both mandibles of male largest and separated from next denticle by about twice the distance separating the other denticles; gula depressed, with prominent tubercle



FIGURES 14-32, *Orus* spp., aedeagi; in the following, the first figure is the lateral view, the second figure is the dorsal view. 14, 28—*dentiger*. 15—*parallelus*. 16, 29—*punctatus*. 17, 30—*shastanus*. 19, 26—*sinuatus*. 20, 27—*montanus*. 21, 18—*femoratus*. 22, 23—*hemilobatus*. 24, 32—*fraternus*. 25, 31—*surinamensis*.

on anterior portion in males, distinct to feeble in females; gular sutures well-developed; venter flat, not as convex as in *Orus* s. str.; eye slightly tapered posteriorly; postorbital fovea with setigerous tubercle continuous with prominent supraorbital furrow. *Thorax:* anterior prothoracic angles not evident or slightly so; pronotal punctation distinct and umbilicate, median area impunctate; mesopleuron and mesosternum with reticulate ground sculpturing; mesosternal fovea present; metafemur of male serrate on inner, posterior surface, concave on inner face, tuft of long, appressed setae arising near trochanter. *Abdomen:* first four visible sterna of male each with a depression forming a trough on the abdomen, the depression surrounded by and/or containing setae; posterior margin of fifth visible sternum broadly and shallowly emarginate; posterior margin of last visible sternum broadly and shallowly incised. *Aedeagus:* ostium beneath the parameres; postforamen absent; median lobe membranous ventrally, oval sclerite absent.

DISTRIBUTION. CANADA: Quebec, Manitoba, British Columbia. UNITED STATES: Massachusetts, New York, New Jersey, Michigan, California, Idaho, Washington, Iowa, Illinois, Georgia(?).

DISCUSSION. In studying *Pycnorus* and *Orus* it was found that the females were not adequately defined subgenerically.

All of the females of *Orus (Pycnorus) dentiger* examined have a feeble to prominent gular tubercle, microreticulate gular ground sculpturing, a depressed gula and well-defined gular sutures; the same is true for the males of both species of *Pycnorus* in addition to the invariably prominent gular tubercle. All 140 males of *Orus,* described or undescribed, have a shining gula (i.e. at best with very feebly microreticulate ground sculpture), are without evidence of a gular tubercle, have feeble gular sutures, which are better noted by increased pigmentation in the vicinity, and have the gula not depressed. The females from the Rocky Mountains, presumably representing those of *Orus (Pycnorus) parallelus* and *Orus* s. str., can be separated by the characters of the gula noted above for the males. The females with the tuberculate, microreticulate depressed gular with well defined gular sutures I place in the subgenus *Pycnorus.* The holotypes of *O. parallelus, O. boreellus, O. caseyianus,* and *O. provensis,* all females, exhibit the gular modifications as described for *Pycnorus;* the western forms of *Pycnorus* are all considered variations of *O. parallelus.*

Orus (Pycnorus) dentiger (LeConte)

FIGS. 1, 14, 28, 33

Scopaeus dentiger LeConte, 1880:179; Blatchley 1910:434.
Pycnorus dentiger (LeConte), Casey 1905:195, 196; Leng 1920:104.
Scopaeus (Pycnorus) dentiger (LeConte), Bernhauer and Schubert 1912:247.
Orus (Pycnorus) dentiger (LeConte), Blackwelder 1939a:105, 121; 1939b:24; 1952:333.
Pycnorus iowanus Casey, 1905:196; Leng 1920:104. (NEW SYNONYMY)
Scopaeus (Pycnorus) iowanus (Casey), Bernhauer and Schubert 1912:248.
Orus (Pycnorus) iowanus (Casey), Blackwelder 1939a:105; 1939b:24.

HOLOTYPE of *Scopaeus dentiger* LeConte: Massachusetts; Museum of Comparative Zoology; male.

HOLOTYPE of *Pycnorus iowanus* Casey: Iowa; U. S. National Museum; female.

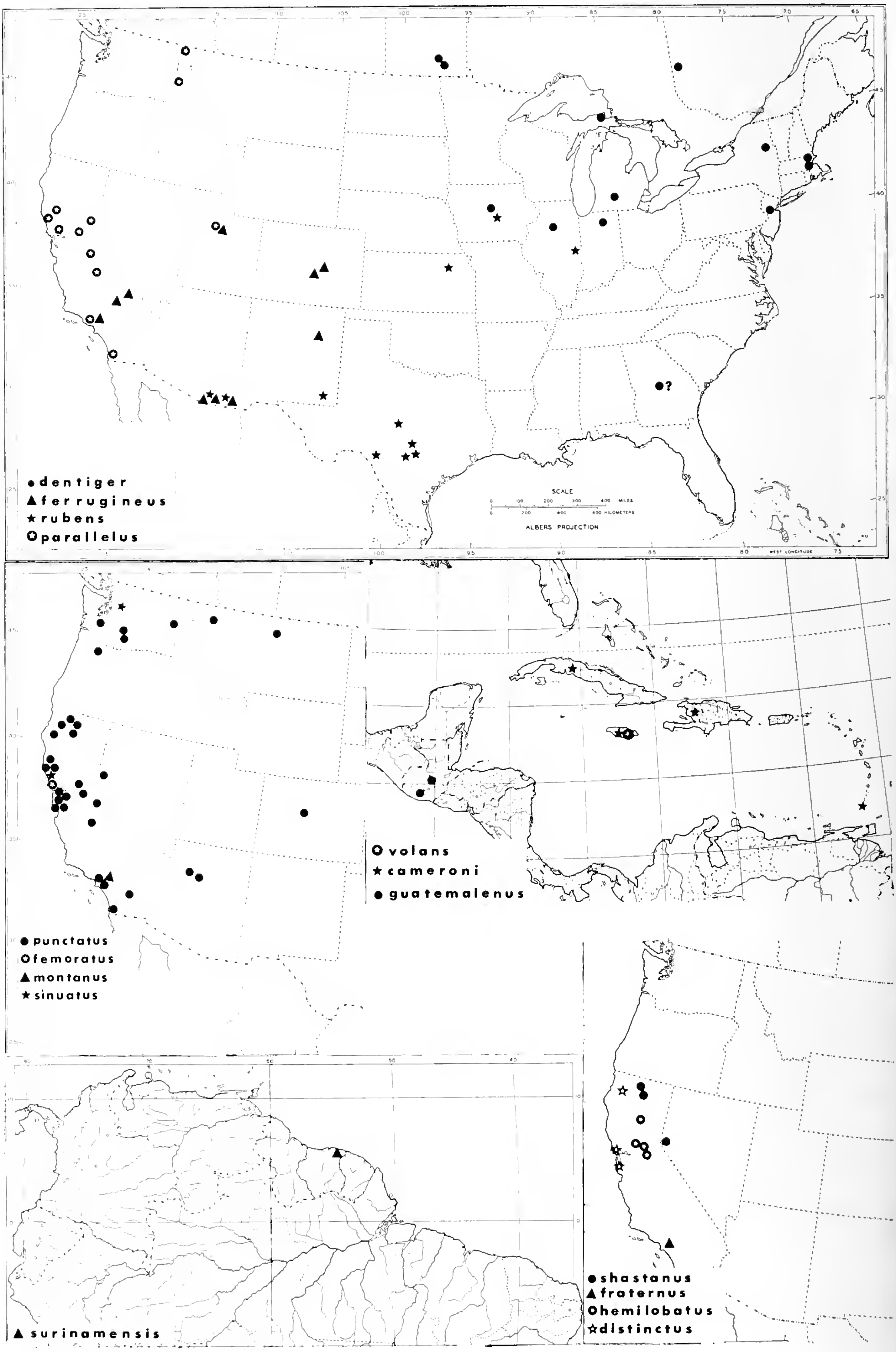


FIGURE 33, Distribution of *Orus* spp.

DESCRIPTION. Orus; (Pycnorus); piceous; male. *Head:* .61 mm. long, .54 mm. wide. *Thorax:* pronotum .67 mm. long, .53 mm. wide; elytra .59 mm. long, .64 mm. wide; metatibia deticulate mesally; metafemur with eleven denticles on distal portion. *Aedeagus:* apical portion of parameres slightly longer than in *O. parallelus* (fig. 14).

VARIATION. Head .58 mm.-.67 mm. long, .47 mm.-.57 mm. wide; pronotum .60 mm.-.72 mm. long, .47 mm.-.60 mm. wide; elytra .57 mm.-.67 mm. long, .57 mm.-.67 mm. wide.

DISTRIBUTION (fig. 33). MASSACHUSETTS: *Middlesex Co.:* Natick (May 30, 1930); Framingham (Mar. 25, 1944, Nov. 8, 1941); Cambridge; Tewksbury. NEW YORK: *Warren Co.:* Pike. NEW JERSEY: *Union Co.:* Roselle Park (Mar. 22, 1925); Elizabeth. MICHIGAN: *Wayne Co.:* Detroit; *Chippewa Co.:* White Fish Point. ILLINOIS; IOWA; GEORGIA(?)[3]. INDIANA: *Kosciusko Co.* (June 24, in Blatchley 1910:434). QUEBEC: Duparquet (Apr. 26, 1940, Sept. 15, 1935, May 10, 1936). MANITOBA: Stony Mountain (Apr. 21, 1916); Winnepeg.

BIOLOGY. This species has been collected from sphagnum moss at the edge of a Tamarack Marsh (Blatchley 1910:434), under stones, soil samples and on lake shores during March, April, May, June and November.

DISCUSSION. Casey's *Pycnorus iowanus,* described from one female specimen, is distinguished by the presence of a prominent gular tubercle. On examination of 41 females of *O. dentiger,* it was found that the holotype of *O. iowanus* is merely one end of the range of individual variation of the gular tubercle. Specimens from the eastern United States and eastern Canada generally have a feebly developed tubercle with more specimens from the West having a prominent tubercle.

Orus (Pycnorus) parallelus Casey

FIGS. 15, 33

Orus parallelus Casey, 1886:227; Fall 1901:223; Casey 1905:197; Leng 1920:104; Blackwelder 1939a:105; 1939b:24.
Scopaeus (Orus) parallelus (Casey), Bernhauer and Schubert 1912:250.
Scopaeus armiger Fall, 1901:225. (NEW SYNONYMY)
Pycnorus armiger (Fall), Casey 1905:195, 196; Leng 1920:104.
Scopaeus (Pycnorus) armiger Fall, Bernhauer and Schubert 1912:246.
Orus (Pycnorus) armiger (Fall), Blackwelder 1939a; Hatch 1957:160.
Orus boreellus Casey, 1905:197; Leng 1920:104; Blackwelder 1939a:105; 1939b:24. (NEW SYNONYMY)
Scopaeus (Orus) boreellus (Casey), Bernhauer and Schubert 1912:246.
Orus longicollis Casey, 1905:197; Leng 1920:104; Blackwelder 1939a:105. (NEW SYNONYMY)
Scopaeus (Orus) longicollis (Casey), Bernhauer and Schubert 1912:249.
Scopaeus (Orus) caseyianus Scheerpeltz, 1933:1265 (nom. nov. for *longicollis* (Casey), 1905, nom. preoccup. nec. Fauvel, 1874).
Orus caseyianus (Scheerpeltz), Blackwelder 1939b:24.

[3] One specimen from the Horn Collection bears the label "Ga." I have seen no other specimens from as far south.

Orus provensis Casey, 1910:190; Leng 1920:104; Blackwelder 1939a:105; 1939b:24 (NEW SYNONYMY).
Scopaeus (Orus) provensis (Casey), Bernhauer and Schubert 1912:250.

HOLOTYPE of *Orus parallelus* Casey: California; U. S. National Museum[4]; female.

HOLOTYPE of *Scopaeus armiger* Fall: Pomona, California; Museum of Comparative Zoology; female.

HOLOTYPE of *Scopaeus (Orus) caseyianus* Scheerpeltz: Lake Tahoe, California; U. S. National Museum; female.

HOLOTYPE of *Orus boreellus* Casey; Coeur d'Alène, Idaho; U. S. National Museum; female.

HOLOTYPE of *Orus provensis* Casey: Provo, Utah; U. S. National Museum; female.

DESCRIPTION. Orus; (Pycnorus); piceous; male. *Head:* .60 mm. long, .54 mm. wide. *Thorax:* pronotum .67 mm. long, .52 mm. wide; elytra .70 mm. long, .70 mm. wide; metatibia not denticulate on mesal surface; metafemur with seven denticles on distal portion. *Aedeagus:* apical portion of parameres slightly shorter than that of *O. dentiger* (fig. 15).

VARIATION. Size: head .54 mm.-.60 mm. long, .47 mm.-.54 mm. wide; pronotum .56 mm.-.67 mm. long; .44 mm.-.53 mm. wide; elytra .67 mm.-.74 mm. long, .60 mm.-.74 mm. wide.

DISTRIBUTION (fig. 33). CALIFORNIA: *Los Angeles Co.:* Redondo (March), Pomona, Pasadena (Aug., Nov. 6, 1909); *San Diego Co.:* San Diego; *Lake Co.:* Nice (June 8, 1940); *Calaveras Co.:* Murphys (May 23, 1936, at 2500 feet elevation); *Madera Co.:* Bass Lake (Aug. 2, 1934); *Tulare Co.:* Woodlake (June 23, 1936); *Sonoma Co.:* Guerneville (June 26, 1908); *Napa Co.:* St. Helena. IDAHO: *Bonner Co.:* Priest River (June 21); *Kootenai Co.:* Coeur d'Alène. UTAH: *Utah Co.:* Provo.

Subgenus *Nivorus* Herman

Since the recent publication (Herman, 1965) on the subgenus *Nivorus* additional specimens have been received. They represent a new species. A description of that new species and a new key are presented below.

Key to the Described Species of Nivorus

1. Postorbital furrow contiguous with eye------------------------------------ 2
   Postorbital furrow separated from eye-----------------------------------VOLANS
2. Second and third visible abdominal sterna with a transverse impression containing a ctenidium ---CAMERONI
   Second and third visible abdominal sterna without a transverse impression containing a ctenidium ---SURINAMENSIS

[4] In the original publication mention is made of three additional specimens from Napa and Sonoma Counties that are used for the description; only the holotype is in the Casey Collection.

Orus (Nivorus) surinamensis Herman, NEW SPECIES

FIGS. 13, 25, 31, 33

HOLOTYPE: Moengo, Cottica River, Surinam; collected by Boven on May 27, 1927; male; to be deposited with 2 paratypes, a male and female, at the Cornell University Museum.

DESCRIPTION OF THE HOLOTYPE. Orus; (Nivorus); testaceous; male. *Head:* rectangular in dorsal aspect; dorsum finely, indistinctly punctate, minutely sculptured; eye slightly tapered posteriorly; postorbital furrow distinct and contiguous with posterior margin of eye; .37 mm. long, .33 mm. wide. *Thorax:* pronotum finely punctate, .37 mm. long, .30 mm. wide; mesopleuron and mesosternum with microreticulate ground sculpturing; elytra .40 mm. long, .40 mm. wide. *Abdomen:* second and third visible sterna without a transverse impression containing a ctenidium; penultimate sternum emarginate, with a slight, median depression; depression with numerous short, stout setae; last visible sternum deeply and narrowly incised (fig. 13). *Aedeagus:* parameres obtusely attenuate in lateral aspect, broad in dorsal aspect; postforamen well-developed (figs. 25, 31).

DISCUSSION. Further differences between *O. surinamensis* and *O. cameroni* may be noted by reference to the description and illustrations Herman, 1965.

CATALOGUE OF ORUS

Orus Casey, 1884:136	
Orus s. str.	
punctatus Casey, 1884:138	B. C. Cal. Mont. Ariz. Or. Wash. Nev.
filius Casey, 1905:200	
pallidus Casey, 1905:109	
sonomae Casey, 1905:198	
shastanus Casey, 1905:201	Cal. Nev.
pugetanus Casey, 1905:198	
sinuatus Herman, 1965:000	Cal. Wash.
montanus Fall, 1901:223	Cal.
femoratus Fall, 1901:223	Cal.
hemilobatus Herman, 1965:000	Cal.
fraternus Fall, 1901:223	Cal.
distinctus Casey, 1905:201	B. C. Cal.
robustulus Casey, 1905:199[5]	Cal.
pinalinus Casey, 1905:199[5]	Ariz.
deceptor Casey, 1905:200[5]	Cal.
Pyncorus Casey, 1905:191	
dentiger (LeConte), 1880:179	Mass. N. Y. Mich. N. J. Ill. Ia. Ind. Ga.(?) Que. Man.
iowanus (Casey), 1905:196	

[5] Unidentified.

parallelus Casey, 1886:227	Cal. Ida. Ut.
armiger (Fall), 1901:225	
boreellus Casey, 1905:197	
provensis Casey, 1910:190	
caseyianus Scheerpeltz, 1933:1265	
Leucorus Casey, 1905:191	
rubens (Casey), 1905:194	Ill. Kan. Ia. Tex.[6] Ariz. N. Mex.[6]
ferrugineus (Casey), 1905:193	Colo. Ut. S.Cal. N.Mex. Ariz.
luridus (Casey), 1905:193	
ochrinus (Casey), 1905:193	
guatemalenus Sharp, 1886	Guat.
Nivorus Herman, 1965:119	
cameroni Blackwelder, 1943:278	W.I.
volans Blackwelder, 1943:277	W.I.
surinamensis Herman, 1965:000	Surinam

Addenda

I recently received 20 specimens of *Orus (Leucorus) rubens* (Casey) collected from caves in Texas and New Mexico by James Reddell, Bill Russell and David McKenzie. Collections were made from the following localities: TEXAS: Travis Co.: Ireland's Cave, 15 mi. SW Austin (B. Russell, Apr. 10, 1964); Tooth Cave, 15 mi. NW Austin (J. Reddell, D. McKenzie, Mar. 15, 1964); Kretschmarr Fluted Sink, 15 mi. NW Austin (J. Reddell, B. Russell, Sept. 15, 1963); Beckett's Cave, 1 mi. S. Oak Hill (B. Russell, Dec. 5, 1964). San Saba Co.: Gorman Cave, 6 mi. SE Bend, Colorado River (J. Reddell, D. McKenzie, Mar. 15, 1963, in organic debris several hundred feet from the entrance). Real Co.: Skeleton Cave, 15 mi. NW Leaky (J. Reddell, D. McKenzie, Aug. 18, 1963). Hays Co.: Morton's Cave 5 mi. N. San Marcos (B. Russell, D. McKenzie, Sept. 9, 1963). NEW MEXICO: Eddy Co.: Milliped Cave, 20 mi. N. Carlsbad (J. Reddell, B. Russell, Dec. 31, 1964, in organic debris).

Included on the distribution maps (fig. 33) are records for the species of *(Leucorus)* and *(Nivorus)*.

On a recent trip to California additional specimens and biological data were gathered including range extension for *Orus (Leucorus) ferrugineus* (Casey) and *Orus (Orus) sinuatus* Herman, locality data for an undescribed species of *Orus* and previously unknown habitat data for *Orus (Pycnorus) parallelus* Casey. Most significant is that *Orus punctatus* and *Orus sinuatus* may be collected along the same stream in apparently the same habitat (shore debris) and that *Orus (Pycnorus) parallelus* has been collected from fungus whereas *Orus (Pycnorus) dentiger* has been taken only in soil samples.

Orus (Pycnorus) parallelus Casey. CALIFORNIA: *Butte Co.:* Chico (March 12, 1960; from bracket and gill fungus, D. H. Kistner).

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[6] See addenda.

Orus (Pycnorus) dentiger (LeC.). INDIANA: *La Porte Co.:* Smith Station (May 23, 1953, May 5, 1956, D. H. Kistner).

Orus (Orus) punctatus Casey. WASHINGTON: *Spokane Co.:* Deep Creek Canyon (Aug. 12, 1956, in debris at edge of stream, R. A. Ward).

The following collections were made by the author.

Orus (Orus) sinuatus Herman. CALIFORNIA: *Tuolumne Co.:* 8 miles S.W. Dardanelle (in debris along shore of small stream intersecting Cal. rt. 108, July 13, 1965); *Mariposa Co.:* 0.5 miles N. Fish Camp at Big Creek (in debris along shore, elevation 4982 feet, July 14, 1965); *Madera Co.:* near Bass Lake on Pine Creek (debris along shore, elevation 3425 feet, July 16, 1965).

Orus (Leucorus) ferrugineus (Casey). CALIFORNIA: *Siskiyou Co.:* 5 miles E. McCloud (in flight between 6:50 and 7:30 P.M. PDT, June 29, 1965).

Orus (Orus) punctatus Casey. CALIFORNIA: *Siskiyou Co.:* 5 miles E. McCloud (in flight between 7:15 and 8:30 P.M. PDT, June 28, 1965); *Mariposa Co.:* 0.5 miles N. Fish Camp at Big Creek (in debris along shore, elevation 4982, July 14, 1965); *Madera Co.:* near Bass Lake on Pine Creek (under moss on rocks, elevation 3425, July 16, 1965); *Tulare Co.:* 5 miles S. Pine Flats at White River Camp on White River (under pine needle debris on shore, July 19, 1965, elevation 4146 feet).

Orus (Orus) n. sp. CALIFORNIA: *Siskiyou Co.:* McCloud (in debris along shore of stream, June 29, 1965).

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BEETLE TALK

The L. J. Bottimer collection of approximately 150,000 beetles was acquired in March 1965 by the Entomology Research Institute, Ottawa. Specimens of New World Bruchidae, about 40,000, are the outstanding feature.

ON CICINDELA TUBERCULATA: The Maori name is *kui,* the larvae being the personification of the mythical Kui who lived in the ground and was the original possessor of the land.—David Miller, 1955, Native Insects, Nature in New Zealand.

LARVAE OF SIX SPECIES OF GENUS APHODIUS FROM EASTERN NIGERIA (COLEOPTERA: SCARABAEIDAE)

By M. L. Jerath and K. L. Unny[1, 2]

The coprophagus beetles of the genus *Aphodius,* which has world-wide distribution, are represented in West Africa by many species. The larvae are completely unknown from West Africa.

In this paper larvae of six species of the genus *Aphodius* are described and keys presented for their identification. The larvae of five species were collected in small dung cells usually about 3-6 inches deep in the soil under dung. Larvae of one *Aphodius* species, however, were collected from a cabbage bed in Obudu Plateau (at an altitude of 6,000 ft.) where the larvae were feeding on the cabbage roots.

Aphodius larvae from Nigeria agree in essential characters with those of British *Aphodius* characterized by Van Emden (1941) and American and Australian species described by Jerath (1960). The Nigerian species, however, differ from those of America and Australia in having only one row of setae on the tenth abdominal segment. The terminology used in this work is the same as in the writer's earlier work on Aphodiinae (Jerath, 1960).

Aphodius Illiger

LARVAL DESCRIPTION: Frons, on each side, with two short posterior frontal setae and a microsensilla, a short anterior frontal seta and a microsensilla, a long exterior frontal seta and a microsensilla, and a long seta at the anterior angle. First antennal segment apparently subdivided. Clypeus marked into pre- and post-clypeus and with three setae on either side. Scissorial area of left mandible with S_{1+2}, S_3 and S_4 and of right mandible with S_{1+2} and S_{3+4}, Each mandible dorsally with two or three setae and ventrally with three or four setae. Galea dorsally with more than four setae. Abdominal segments 1-8, each with three dorsal annulets; dorsa of segments nine and ten not divided. Lower anal lobe emarginate.

Key to Known Larvae of Aphodius of Nigeria

1. Raster without palidia -- 2
   Raster with palidia; maxillary stridulatory area with 15-18 teeth; galea ventrally with 7 short and one long seta; raster with 23-25 tegillar setae -------- DETRUNCATUS
2. Third antennal segment with a flattened sensory area at apex ---------------- 3
   Third antennal segment with a conical sensory structure at apex ---------------- 4
3. Epipharynx with tormae unequal; maxillary stridulatory teeth absent on palpifer; galea ventrally with a row of 7 short setae; raster with 18-19 tegillar setae -- APHODIUS SP.
   Epipharynx with tormae more or less equal in size and shape; maxillary stridulatory teeth present on palpifer; galea ventrally with a row of 9-11 short setae; raster with 21-27 tegillar setae -- NOVUS

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[1] Agriculture Research Station, Umudike-Umuahia, Nigeria.

[2] Thanks are due to Dr. Paul O. Ritcher of Oregon State University and Mr. O. L. Cartwright of U.S.N.M. for reading this paper and making valuable criticisms.

4. Stridulatory area with nine or more conical teeth; galea ventrally with a row of 27 or more setae -- 5
Stridulatory area with 5-6 stridulatory teeth; galea ventrally with a row of 10-12 short setae; raster with 34-43 tegillar setae ---------------------------- VENALIS
5. Palpifer without teeth, galea ventrally with a row of 34-36 short setae; raster with 42-48 tegillar setae -- SENEGALENSIS
Palpifer with two teeth, galea ventrally with a row of 27-29 short setae, raster with 58-62 tegillar setae -- MACULICOLLIS

Aphodius (Blackburneus) detruncatus Schmidt

(FIG. 8)

MATERIAL STUDIED: Three third-instar larvae collected in soil at Obudu on May 28, 1962, by M. L. Jerath. Reared adults determined by Mr. R. D. Pope of Commonwealth Institute of Entomology, London.

DESCRIPTION: Maximum width of head capsule of third-stage larva 1.24-1.42 mm. Cranium yellowish-brown, surface smooth except for three depressions, on each side on the frons; 3-4 dorso-epicranial setae on each side. Second and third antennal segments subequal, first longer than second or third. Third antennal segment apically with a conical sensory process.

Epipharynx with protophoba bistichous on left and monostichous on right; protophoba with 19-20 microsensillae. Tormae similar in size and shape and both tormae produced cephalad and caudad. Crepide subcircular. Epitorma asymmetrical and short.

Maxillary stridulatory area with an irregular row of 9-11 conical teeth. Galea, ventrally with a long seta and a longitudinal row of seven setae, dorsally with four setae. Lacinia, dorsally with a row of five long setae near the mesal edge and one short seta posteriorly.

Dorsal annulets of abdominal segments 1-5 with setation as follows: each prescutum with six short setae, each scutum with 4-5 small and 3-4 long setae on each side, each scutellum with eight short setae. Each abdominal spiracle-bearing area with 1-2 setae dorsally.

Raster with two short, longitudinal palidia, surrounded on the sides by scattered 23-25 tegillar setae. Each palidium with 4-5 caudomesally directed spine-like setae.

Aphodius sp.

(FIGS. 1, 3, 4, 7, 9)

MATERIAL STUDIED: Ten third-instar larvae, being a part of several larvae collected in cabbage bed at Obudu on May 28, 1962, by M. L. Jerath. This is a new species and the adults will be described separately.

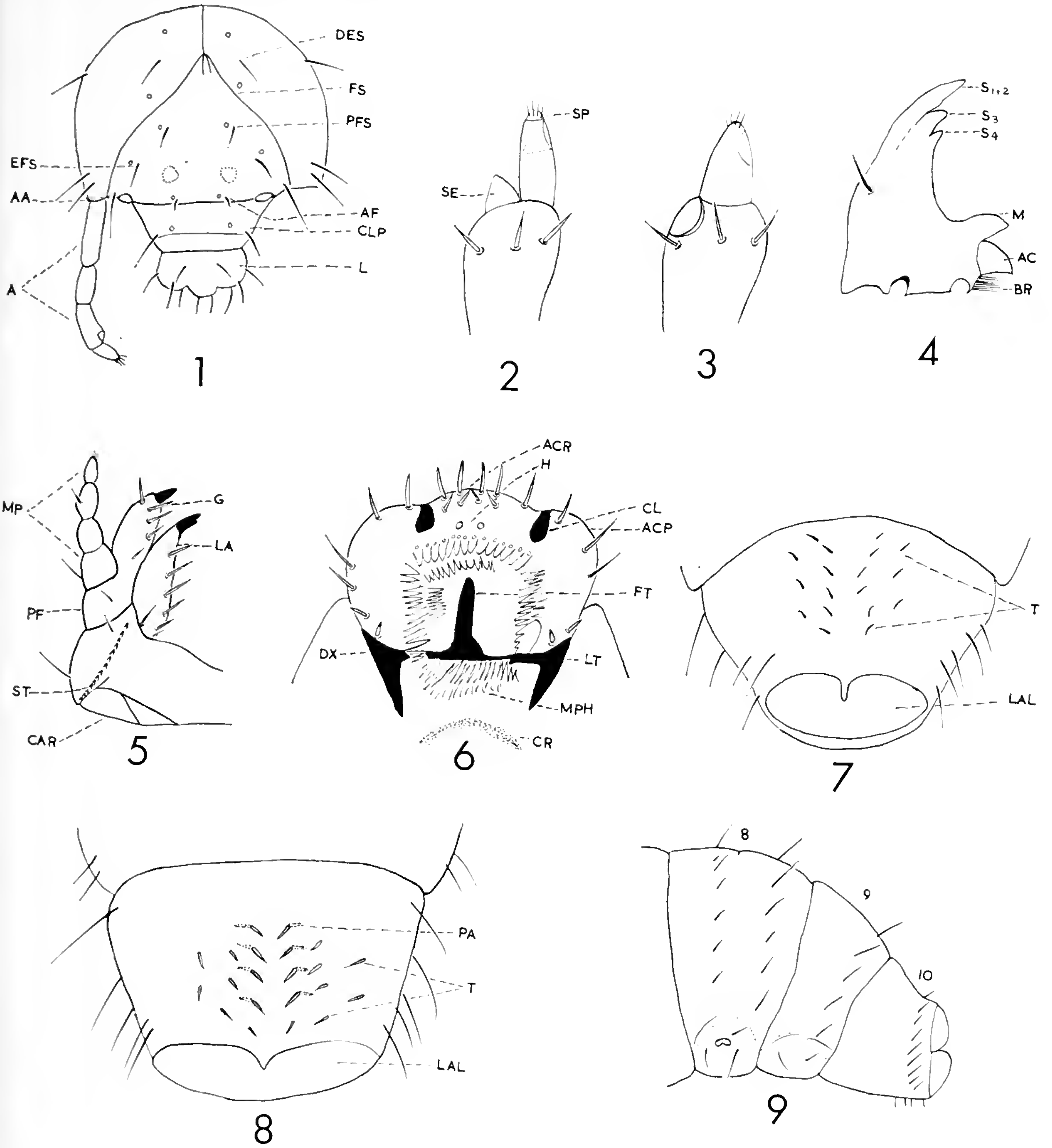
DESCRIPTION: Maximum width of head capsule of third-stage larva 1.04-1.24 mm. Cranium light-yellow, surface smooth except two depressions, on each side on frons. Second and third antennal segments subequal but each shorter than the first. Third antennal segment with a round sensory area apically.

Epipharynx with protophoba bistichous on left and monostichous on right; protophoba with 16-18 microsensillae. Tormae not similar in size and shape, dexiotorma produced cephalad and caudad; laeotorma only produced cephalad. Crepide small; epitorma asymmetrical, flattened apically and slightly bent towards laeophoba.

Maxillary stridulatory area with two irregular rows of 5-9 conical teeth; palpifer with teeth. Galea, ventrally with a long seta and a longitudinal row of 7 short setae, dorsally with 3-4 setae. Lacinia, dorsally with a row of five long setae near the mesal edge and one short seta posteriorly.

Abdominal segments 1-5, each with three dorsal annulets; each prescutum with 6-8 short setae; each scutum with 5-6 short setae and 1-2 long setae, on each side; and each scutellum with 10-12 short setae. Each abdominal spiracle-bearing area with 2-3 setae.

Raster with teges of 18-19 short setae arranged in four rows of 5-6 setae in inner rows and 3-4 setae in the outer rows.



FIGURES 1-9, Larvae of *Aphodius* spp.

Aphodius sp. 1—Head capsule. 3—Last antennal segment. 4—Left mandible, dorsal view. 7—Raster. 9—Lateral view of 8th to 10th abdominal segments.

A. senegalensis. 2—Last antennal segment. 5—Maxilla, ventral view.

A. maculicolis. 6—Epipharynx.

A. detruncatus. 8—Raster.

Symbols: A—Antenna. AA—Seta of anterior frontal angle. AC—Acia. ACP—Acanthoparia. ACR—Acroparia. AF—Anterior frontal seta. BR—Brustia. CAR—Cardo. CL—Clithrum. CLP—Clypeus. DES—Dorsoepicranial setae. DX—Dexiotorma. EPS—Exterior frontal seta. FS—Frontal suture. G—Galea. H—Hyptomerum. L—Labrum. LA—Lacinia. LAL— Lower anal lip. LT—Laeotorma. M—Molar area. MP—Maxillary palpus. MPH—Mesophoba. PA—Palidium. PFS—Posterior frontal seta. PLA—Pladium. S—Scissorial teeth. SE—Sensory organ. SP—Sensory pegs. ST—Maxillary stridulatory area. T—Teges.

Aphodius (Blackburneus) novus Schmidt

MATERIAL STUDIED: Five third-instar larvae, associated with adults, collected under dung at Obudu on May 28, 1962, by M. L. Jerath. The associated adults determined by Mr. R. D. Pope of Commonwealth Institute of Entomology, London.

DESCRIPTION: Maximum width of head capsule of third-stage larva 1.08-1.20 mm. Cranium light-yellow, surface smooth except for three depressions on either side. Second and third antennal segments subequal, first longer than second or third. Third antennal segment apically with a sensory spot.

Epipharynx with protophoba bistichous on left and monostichous on right, protophoba with 22-24 microsensillae. Tormae similar in size and shape and both produced cephalad and caudad. Crepide sub-triangular. Epitorma asymmetrical, slender and slightly flattened apically.

Maxillary stridulatory area with a row of 6-7 conical teeth, palpifer with 2-3 conical teeth. Galea, ventrally with a long seta and a longitudinal row of 9-11 short setae, dorsally with four setae. Lacinia, dorsally with a row of five long setae near the mesal edge and one short seta posteriorly.

Dorsal annulets of abdominal segments 1-5 with setation as follows: each prescutum with 6-8 short setae, each scutum with 4-5 short and 2 long setae on each side, each scutellum with 8-10 short setae. Each abdominal spiracle-bearing area with 1-2 setae dorsally.

Raster with teges of 21-27 short setae arranged irregularly in rows of 4-6 setae.

Aphodius (Nialus) venalis Schmidt

MATERIAL STUDIED: Fifteen third-instar larvae, associated with several larvae, reared to adult stage. Larvae collected under dung at Ajali Cashew Plantation on May 15, 1963, by M. L. Jerath.

DESCRIPTION: Maximum width of head capsule of third-stage larva 1.06-1.14 mm. Cranium light-yellow, surface smooth except for three depressions on each side on frons; 1-2 dorso-epicranial setae on each side. First and second antennal segments subequal, third slightly shorter than first or second. Third antennal segment apically with sensory conical process.

Epipharynx with protophoba bistichous on left and monostichous on right. Protophoba with 15-17 microsensillae. Tormae more or less similar in size and shape, and both produced cephalad and caudad. Crepide subtriangular. Epitorma asymmetrically flattened and bent towards the laeophoba.

Maxillary stridulatory area with a row of 5-6 conical teeth, palpifer with one tooth. Galea ventrally with a long setae and a longitudinal row of 10-12 short setae, dorsally with five setae. Lacinia dorsally with a row of five long setae near the mesal edge and one short seta posteriorly.

Dorsal annulets of abdominal segments 1-5 with setation as follows: each prescutum with 6 short setae, each scutum with 4-5 short setae and 2-3 long setae on each side, each scutellum with 10 short setae. Setae are very minute and insignificant. Each abdominal spiracle-bearing area with one seta dorsally and 1-2 setae ventrally.

Raster with teges of 34-43 short setae scattered irregularly on the venter of 10th abdominal segment.

Aphodius (Colobopterus) senegalensis Klug

(Figs. 2, 5)

MATERIAL STUDIED: Three third-instar larvae collected with adults at School of Agriculture, Umudike, under cow dung, during April 1961, by M. L. Jerath. Associated adults determined by Mr. R. D. Pope of Commonwealth Institute of Entomology, London.

DESCRIPTION: Maximum width of head capsule of third-stage larva 2.42-2.83 mm. Cranium light-yellow, surface smooth except two depressions on each side on the frons, with 3-4 dorso-epicranial setae and three microsensillae on each side. Second and third antennal segments subequal but each shorter than first. Third antennal segment apically bears a conical sensory process.

Epipharynx with protophoba bistichous and with 21-23 microsensillae. Tormae similar in shape, both produced cephalad and caudad. Crepide semicircular. Epitorma asymmetrical, short and membranous apically.

Maxillary stridulatory area with 15-18 conical teeth arranged in a row; palpifer without teeth. Galea, ventrally with a long seta and a longitudinal row of 34-36 closely placed setae, dorsally with 4-5 long and 1-2 short setae. Lacinia, dorsally with a row of 5-6 long setae near the mesal edge and one short seta posteriorly.

Abdominal segments 1-5, each with three dorsal annulets; each prescutum with 11-13 short setae, each scutum with 14-16 short setae and 2-3 long setae on each side, each scutellum with 14-15 setae. Each abdominal spiracle-bearing area with 1-2 short setae dorsally.

Raster with teges of 42-48 short setae arranged in two groups, one on either side.

Aphodius (Colobopterus) maculicollis Reiche

(FIG. 6)

MATERIAL STUDIED: Three third-instar larvae and cast skins of two third-instar larvae reared to the adult stage. Larvae collected under cow manure at School of Agriculture, Umudike, by M. L. Jerath, during July, 1962. Reared adults determined by Mr. R. D. Pope of Commonwealth Institute of Entomology, London.

DESCRIPTION: Maximum width of head capsule of third-stage larva 1.77-1.94 mm. Cranium light-yellow, surface smooth except for two depressions on each side on frons. Second and third antennal segments subequal, first segment longer than second or third. Third antennal segment with a conical sensory process.

Epipharynx with protophoba bistichous and with 14-15 microsensillae. Tormae similar in size and shape both produced cephalad and caudad. Crepide semicircular; epitorma with a flattened base but conical apically.

Maxillary stridulatory area with a row of 11-13 conical teeth and two near the base of palpifer. Galea, ventrally with a long seta and a longitudinal row of 27-29 closely pressed short setae, dorsally with five long and one short setae. Lacinia, dorsally with a row of five long and one short setae near the mesal edge and one short seta posteriorly.

Dorsal annulets of abdominal segments 1-5 with setation as follows: each prescutum with 8-10 short setae, each scutum with 10-11 short setae and 4-5 long setae on each side, and each scutellum with 10-13 setae. Each abdominal spiracle-bearing area with 2-3 setae ventrally and 2 setae dorsally.

Raster with teges of 58-62 short setae arranged more or less in two groups of 29-32 setae; each group of more or less irregular rows.

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LITERATURE NOTICE

A REVISION OF THE GENUS ZARHIPIS LECONTE (COLEOPTERA:PHENGODIDAE). By D. D. Linsdale. Wasmann Jour. Biol. 22(2):225-260, 3 figs. 1964.—The number of species is reduced from eight to three. All occur in western North America. The revision is based on males.

SEXUAL BEHAVIOR IN BLISTER BEETLES (COLEOPTERA:MELOIDAE). I. THE GENUS PYROTA. By R. B. Selander. Canadian Ent. 96(8):1037-1082, 31 figs. 1964.—Courtship patterns and methods of coupling are rarely studied in the Coleoptera. Here they are described and used in the classification of both higher and lower taxa.

A COMPARATIVE ACCOUNT OF THE FEEDING METHODS OF THE BEETLES NEBRIA BREVICOLLIS (F.) (CARABIDAE) AND PHILONTHUS DECORUS (GRAV.) (STAPHYLINIDAE). By M. E. G. Evans. Trans. Roy. Soc. Edinburgh 66(5):91-109, 18 figs. 1964. THE FEEDING METHOD OF CICINDELA HYBRIDA L. (COLEOPTERA:CICINDELIDAE). By M. E. G. Evans, Proc. Ent. Soc. London 40(4-6):61-66, 6 figs. 1965.—These are detailed accounts of chewing, swallowing, filtering, regurgitation, and internal and external digestion; only the parts anterior to the mid-gut are discussed. The works are 'musts' for students of predaceous beetles. They are morphology at its finest.

THE TYPE MATERIAL OF I. C. FABRICIUS. By Ella Zimsen. Munksgaard, Copenhagen. 656 pp., 1 pl. 1964.—Includes 4112 beetle species names with literature citations, number of specimens, their museum locations, and occasionally other notations. A good introduction on the life of Fabricius, the Fabrician collection, and other collections are most helpful.

KLUCZE DO OZNACZANIA OWAKOW POLSKI, XIX—COLEOPTERA, 98a—CURCULIONIDAE: APIONINAE. By S. Smreczynski. Polski Zwiazek Entomologiczny, Nr. 45 serii kluczy, pp. 1-80, 157 figs. 1965.—This is the latest in the series of keys to the insects of Poland. It contains a key to the subfamilies of the Curculionidae, a description of the subfamily Apioninae, keys to the subgenera and species of *Apion,* and short notes on the habits and distribution of each species. Previously published parts in this Polish series treated the beetle families Catopidae, Silphidae, Bostrichidae, Lyctidae, Lymexylonidae, Byrrhidae, Nosodendridae, Dermestidae, Coccinellidae, Pyrochroidae, Scolytidae, and Platypodidae.

A REVISION OF THE GENUS TRICORYNUS OF NORTH AMERICA (COLEOPTERA: ANOBIIDAE). By R. E. White. Misc. Publ. Ent. Soc. Amer. 4(7):283-368, 153 figs. 1965.—This genus, formerly known as *Catorama,* now contains in North America 82 species, with 25 of them being new. Almost all species are placed in 15 species groups. Keys, descriptions, illustrations, and biological notes make up this long needed revision.

ILLUSTRATED INSECT LARVAE OF JAPAN. Edited by T. Esaki, T. Kawada, N. Yuasa, N. Ishii, and T. Motoki. Hokuryukan Co. Ltd., Tokyo. 774 pp., 1307 figs., 4 pls. 1959.—This manual is seldom cited in literature even though it has been in existence for six years. It consists of good illustrations of whole larvae and often parts of larvae with a description of each in Japanese. The section on Coleoptera, pages 392-545, is authored by A. Fukuda, K. Kurosa, and N. Hayashi. Larvae of 298 species of beetles are treated, some for the first time.

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A QUARTERLY PUBLICATION DEVOTED TO THE STUDY OF BEETLES

The Coleopterists' Bulletin

Volume 19 December (No. 4) 1965

THE GENERA OF THE STAPHYLININAE OF AMERICA NORTH OF MEXICO (COLEOPTERA: STAPHYLINIDAE)

By Ian Moore[1]

The subfamily Staphylininae is treated in this paper in the restricted sense recently suggested by Moore, 1964. It includes only those genera grouped in the old tribe Staphylinini.

In the following key certain characters are employed in the Nearctic literature for the first time. Sharp (1885: 395) stated concerning Philonthus, "The European species are numerous and have recently been studied by C. J. Thomson and C. L. Rey, as well as by Fauvel, and a result of their studies has been that no European species in which the longer lateral seta of the prothorax is distant from the margin remains in the genus. This character is certainly of great importance, for the seta, remaining as a fixed point at the outer side of the thorax, serves as a mark to indicate whether the lateral raised margin is deflexed to the underside of the thorax or not." Cameron (1932:55) and others have utilized this character. This is an entirely satisfactory character for the separation of *Cafius* from *Philonthus* and its allies, those characters used by Horn (1884) and subsequent American authors being illusory.

The separation of *Gabrius* and *Gabronthus* from *Philonthus* follows recent European usage, but the key characters used differ from those of some other students.

Key to the Genera of the Nearctic Staphylininae

1. Superior lateral line of pronotum not deflexed in front, the large lateral setigerous puncture on it or separated from it at most by little more than the width of the puncture (fig. 1)-- 2
 Superior lateral line of pronotum deflexed in front so that the large setigerous puncture is distant from it by at least three times the width of the puncture (fig. 2) 4
2. Last segment of labial palpi not or very little narrower than penultimate, subfusiform or aciculate (fig. 3); anterior tarsi usually with pale spatulate setae beneath ---PHILONTHUS Curtis
 Last segment of labial palpi narrower than penultimate, cylindrical (fig. 4); tempora longer than eyes, subparallel; pronotum elongate--------------------------- 3
3. Anterior tarsi dilated, with dense pale spatulate setae beneath; pronotum with a series of four discal punctures on each side--------------------GABRONTHUS Tottenham
 Anterior tarsi slender, without pale spatulate setae beneath; pronotum with a series of five discal punctures on each side-----------------------------GABRIUS Curtis

[1] Associate in Entomology, San Diego Natural History Museum.

4. Prosterum strongly, longitudinally carinate ---------------------------------- 9
   Prosternum not carinate -- 5

5. Basal impressions of anterior tergites much more coarsely punctured than rest of tergite -- **NEOBISNIUS** Ganglbauer
   Basal impressions of tergites not more coarsely punctured than rest of tergite ------ 6

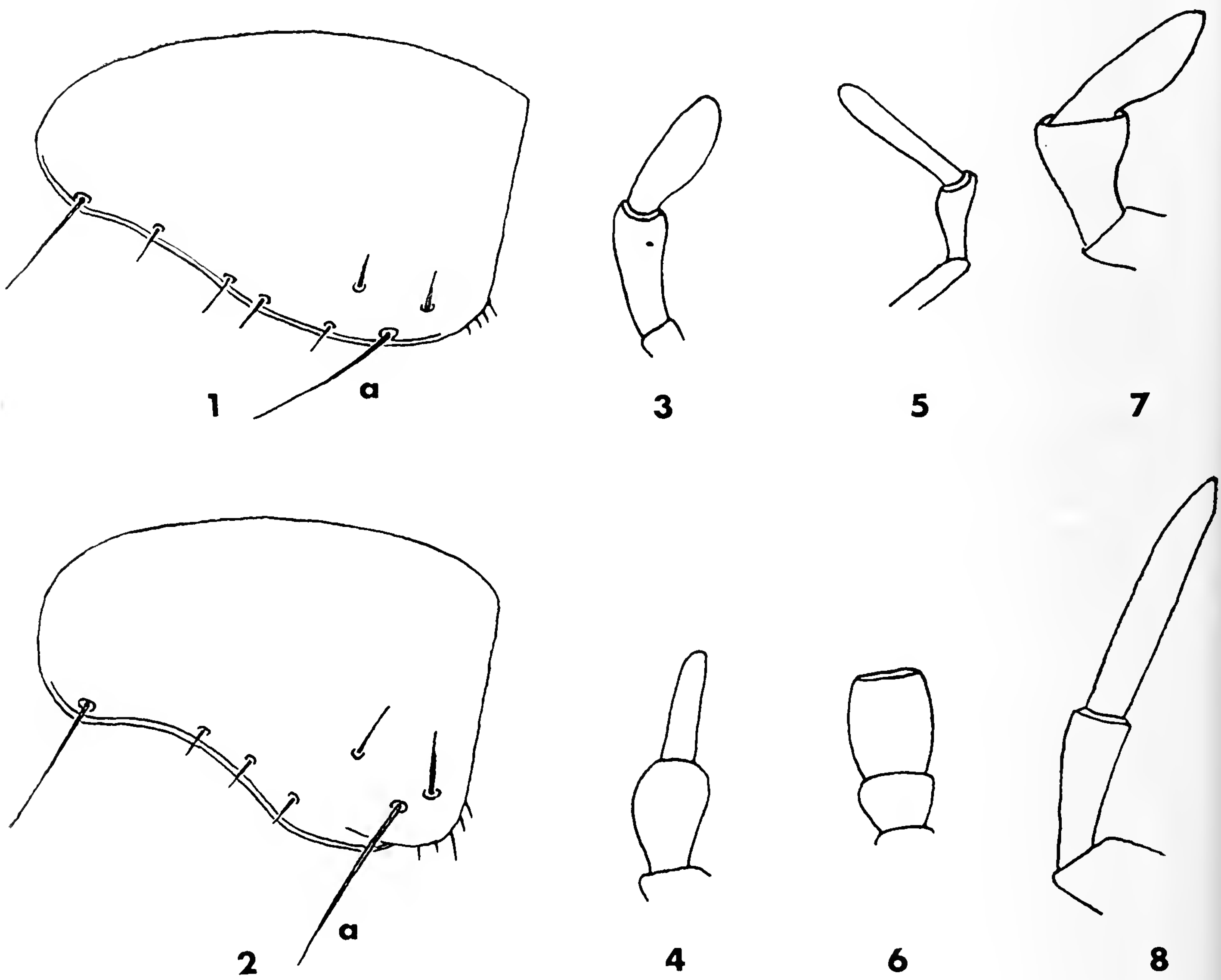
6. First segment of posterior tarsi shorter than last ----------------- **ERICHSONIUS** Fauvel
   First segment of posterior tarsi as long as last ---------------------------- 7

7. Anterior tarsi dilated, second segment wider than long, with dense, pale, spatulate setae beneath -- 8
   Anterior tarsi slender, second segment longer than wide, without pale, spatulate setae beneath; posterior femora of male usually spinose beneath ------ **BELONUCHUS** Nordman

8. Last segment of maxillary palpi not more than three times as long as wide (fig. 7) -- **CAFIUS** Curtis
   Last segment of maxillary palpi more than four times as long as wide (fig. 8) ------ -- **HESPERUS** Fauvel

9. Mesosternum longitudinally carinate ---------------------- **ONTHOLESTES** Ganglbauer
   Mesosternum not carinate --- 10

10. Last segment of labial palpi subfusiform (fig. 5); head and pronotum densely, umbilicately punctured ----------------------------------- **STAPHYLINUS** Linne
    Last segment of labial palpi securiform (fig. 6); head and pronotum not densely, umbilicately punctured -- **OCYPUS** Leach



FIGURES 1-2, Pronota, lateral view; a, large lateral setigerous puncture. 1—*Philonthus politus politus* (Linné). 2—*Belonuchus punctiventris* Casey.

FIGURES 3-6, Apices of labial palpi. 3—*Philonthus politus* (Linné). 4—*Gabrius nigritulus* (Gravenhorst). 5—*Staphylinus virdanus* Horn. 6—*Ocypus olens* (Müller).

FIGURES 7-8, Apices of maxillary palpi. 7—*Cafius seminitens* Horn. 8—*Hesperus baltimorensis* (Gravenhorst).

Notes

Philonthus. Members of *Philonthus, Gabrius* and *Gabronthus* have the superior lateral line of the prothorax not deflected in front, so that the large anterior lateral puncture is on or very near the superior lateral line. In other members of this subfamily, the puncture is removed from the superior lateral line by at least three times its diameter. The first segment of the posterior tarsi is as long as or longer than the last segment. Members of this genus range from small to moderately large. They are usually somber in color, although a few are marked with blue, red or yellow.

After removing those species listed here under *Gabrius* and *Gabronthus*, this is still a very large genus in America north of Mexico. The Leng catalogue and its supplements list most of these. Hatch (1947) has added a number of species from the Pacific Northwest. Species of this genus are abundantly distributed throughout the world.

Fall (1916:13) described an insect from the sea-beach at Seattle, Washington, under the name *Cafius johnsoni*. Koch (1936:72) reduced this to a subspecies of the Japanese *Cafius nudus* Sharp. I have examined series of specimens from both Japan and Washington and find that this species is a true *Philonthus*. The superior lateral line is not deflexed in front, so that the large anterior lateral puncture is removed from it by less than the width of the puncture; the disc of the pronotum is polished and impunctate except for a series of four punctures on each side. Koch's differentiation of the two subspecies was based on a single specimen from Washington and some Japanese material. He separated *johnsoni* from *nudus* by the fact that the former was supposed to have the abdomen more sparsely punctured. I am unable to make this distinction in my material. This species should be listed as *Philonthus nudus* Sharp (NEW COMBINATION), synonym *johnsoni* Fall (NEW SYNONYM).

New keys to the species of America north of Mexico are needed, as Horn's keys (1884) are not easy to use and new species have been described.

Gabronthus. The last segment of the labial palpi is narrower than the penultimate and subcylindrical. The head is quadrate-elongate with small eyes. The pronotum is nearly parallel-sided, with a discal series of four punctures on each side. The anterior tarsi are dilated, with a dense mat of pale setae beneath. The species are small, dark and very similar in appearance.

Twenty-three species are at present placed in this genus, sixteen from Africa and seven from Asia. Two species are reported as being nearly cosmopolitan. Members of the genus are rare in American collections.

Tottenham (1955:178) erected this genus for a small group of species formerly placed in *Philonthus*. The type species is *maritimus* (Motschulsky). The only record from America north of Mexico is *"thermarum* Aubé" by Horn (1884:198). Tottenham (1955:178) stated, "There has been much confusion amongst species of this group; many different species have been confused under the names *thermarum* Aubé and *maritimus* Motschulsky. . . ." In his revision, Tottenham indicated that it is necessary to study the male genitalia in order to make identifications. This has not been done with Nearctic material, consequently Horn's record is in doubt.

Gabrius. The penultimate segment of the labial palpi is swollen so that the last segment, which is subcylindrical, is narrower. The head is elongate —oval with long tempora. The pronotum is elongate, parallel-sided, with five discal punctures on each side. The anterior tarsi are slender and spinous beneath, without pale spatulate setae. The species are moderately small and of somber color.

The type species, *G. nigritulus* (Gravenhorst), is nearly cosmopolitan. Including *nigritulus,* twenty-six species are known from America north of Mexico.

This group has usually been treated as a subgenus of *Philonthus*. In recent years, some students have given it generic rank (see Smetana, 1958:134, and Tottenham, 1959:178). Because of the large number of species involved, separation of the two genera is desirable.

The following species have been listed in the Nearctic literature under the name *Philonthus;* all these, except *nigritulus,* are now NEW COMBINATIONS: *Gabrius approximatus* (Hatch), *bernardensis* (Fall), *bidentatus* (Horn), *cephalicus* (Casey), *clunalis* (Horn), *cushmani* (Hatch), *decipiens* (Horn), *downei* (Hatch), *femineus* (Hatch), *fenderi* (Hatch), *horni* (Bernhauer & Schubert), *linearis* (Casey), *lopezi* (Hatch), *malkini* (Hatch), *microphthalmus* (Horn), *nanellus* (Casey), *nigritulus* (Gravenhorst), *oceanus* (Hatch), *ottawaensis* (Hatch), *ovaliceps* (Fall), *picipennis* (Mäklin), *punctatellus* (Horn), *seattlensis* (Hatch), *shulli* (Hatch), *virilis* (Horn), and *wawawai* (Hatch).

Neobisnius. The bases of the anterior abdominal tergites are deeply impressed and strongly sculptured with large deep punctures separated by intermediate ridges. The second antennomere is not wider than the third. As in *Erichsonius,* the first segment of the posterior tarsi is shorter than the last. The species are medium sized, active insects found near water. Some are dark, but others have colored sections of bright ferrugineus or yellow.

Sixteen species are known from America north of Mexico, nearly twice as many from America south of the United States, and a few from other parts of the world.

Most of the Nearctic species, as well as those of *Erichsonius,* are treated in Horn's key (1884:223) under the name *Actobius*.

Erichsonius. Members of this genus are unique among members of the subfamily in that the apex of the second antennal segment is dilated. It is about one-third wider than the third segment. This character is not striking, but appears to be constant. The first segment of the posterior tarsi is shorter than the last. The species resemble members of *Neobisnius* but differ in the fine uniform puncturation of the basal abdominal tergites. They are moderately small insects of somber color and rather uniform appearance.

Nine species are known from America north of Mexico, and three or four times that number from other parts of the world. No species are known from Australia or the Neotropics.

The only key which treats all of the American species is that of Horn (1884:323). Horn included both *Erichsonius* and *Neobisnius* in one genus under the name *Actobius*. New keys to the species of these two genera would be useful.

Belonuchus. The presence of a single or double row of spines on the femora of the male (particularly the posterior femora) has generally been used to distinguish members of this genus from other staphilininids. However, in some species the spines are absent. The species are mostly medium sized to large. The body is usually marked in well-defined sections of black and ferrugineus.

Several species are known from the southwestern United States, and one from the Atlantic coast. Many species have been described from the American tropics and from other tropical regions.

The genus needs revision.

Cafius. The deflexed superior lateral line of the prothorax easily separates members of this genus from those of *Philonthus*. The form of the maxillary palpi differs little from that of certain large species of *Philonthus*. The species are medium sized.

Species of *Cafius* are found throughout the world. They are confined to the seashores and the margins of rivers near the sea. Two species are known from the Atlantic coast of the United States and eight from the Pacific. On the Pacific coast, these insects are found in masses of decaying seaweed, sometimes in large numbers.

Cafius nudus Sharp is removed in this paper to *Philonthus*. (See notes under that genus.)

Hesperus. This genus is quite distinct from *Philonthus,* not only in the strongly deflexed superior lateral line of the prothorax, but in the very elongate palpi. The species, moderately large for members of this family, are sometimes brightly colored.

There are four Nearctic species.

The Nearctic species were revised by Moore, 1958.

Ontholestes. Members of this genus are distinctive in having the anterior angles of the pronotum produced well ahead of the central anterior margin. The species are large and colorful.

Two species are found in the eastern United States and Canada. A few other species are known from the Palaearctic and Asiatic regions. The Nearctic species, very active predators, are found near dung.

Staphylinus. The punctures of the head and pronotum are large, umbilicate and crowded, with the interspaces generally very narrow so that the surface has a rough appearance. The abdomen is often very densely pubescent. Most species are somberly colored in black and shades of brown, but a few are brilliantly marked.

Specimens are found under cover in a variety of situations and may sometimes be taken in flight. These large insects are distributed throughout the world.

This name is used here in the same sense that it was used in the Leng catalogue. Blackwelder (1952:357) demonstrated that under a strict application of the rules, because of previously unrecognized type designation, this genus should be called *Platydracus*. However, in 1959 the International Commission on Zoological Nomenclature, in Opinion #546, set aside all previous type designations and designated *erythropterus* Linné the type. This action conserved the name in the sense that it had been used for more than 200 years. Thus the correct name is *Staphylinus* with *Platydracus* as a subgenus.

Ocypus. The last segment of the labial palpi is said to be securiform. This character is not pronounced in some species, but the last segment is shorter and blunter than that of *Staphylinus*. The punctures of the head and pronotum are small, simple and relatively sparse, with the interspaces generally much wider than the punctures, and shining. These are all large, dark insects.

A large number of species has been described from Europe and a few from other parts of the world. No member of this genus is known to be indigenous to the Western Hemisphere. The following have been introduced into the Nearctic region: *O. aeneocephalus* (DeGeer), *ater* (Gravenhorst), *globulifer* Fourcroy and *olens* (Müller).

The only key to the Nearctic species, that of Hatch (1957:173), includes three of these species as well as the members of *Staphylinus* of the Pacific Northwest.

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LITERATURE NOTICE

A REVISION OF THE NODINI AND A KEY TO THE GENERA OF EUMOLPIDAE OF AFRICA (COLEOPTERA: EUMOLPIDAE). By B. J. Selman. Bull. Brit. Mus. (N. H.) Ent. 16(3):143-174, 27 figs. 1965.—Tribes and genera of Nodini are described. 64 genera of these chrysomeloids are keyed.

INSECTS OF MICRONESIA, COLEOPTERA: COCCINELLIDAE. By E. A. Chapin. Vol. 16, No. 5, pp. 189-254, 49 figs. 1965.—COLEOPTERA: ANTHICIDAE. By F. G. Werner. Vol. 16, No. 5, pp. 255-269, 5 figs.—48 species of coccinellids and only 9 species of anthicids occur in Micronesia. Up to this date 17 families of beetles have been reported on in this series.

TWO NEW SUBGENERA OF PTEROSTICHUS BONELLI FROM WESTERN UNITED STATES, WITH NOTES ON CHARACTERISTICS AND RELATIONSHIPS OF THE SUBGENERA PARAFERONIA CASEY AND FERONINA CASEY (COLEOPTERA: CARABIDAE)

By George E. Ball[1]

Introduction

The North American fauna of the tribe Pterostichini is varied and taxonomically complex. Consequently, the relationships of the various elements are hardly understood. As knowledge of this tribe increases, many of the genus-group taxa presently recognized will be modified in composition, and many will be differently ranked. In particular, the organization of the largest genus of the tribe, *Pterostichus* Bonelli, will be altered.

In the course of a revision of the North American species of the subgenus *Cryobius* Chaudoir, I had occasion to examine groups which contained species similar to those included in *Cryobius*. Among these were the subgenera *Paraferonia* Casey and *Feronina* Casey. This paper deals with the composition of these groups and their relationships, judged on the basis of external morphology of the adults, and, in particular, on the basis of the structure of the male genitalia.

This study is a contribution to the task of defining the North American subgenera of *Pterostichus*.

For purposes of discussion, I will refer to these groups collectively as the "*Feronina* complex," and add to this the species *Pterostichus shulli* Hatch.

Acknowledgements

The material on which this study is based was loaned to me by Philip J. Darlington, Jr. (Museum of Comparative Zoology, Cambridge, Massachusetts), Hugh B. Leech (California Academy of Sciences, San Francisco, California), and Donald R. Whitehead (University of Alberta).

The manuscript was read and criticized by Brian Hocking, Richard Freitag, Donald R. Whitehead, and Carl H. Lindroth.

The final copy of the manuscript was typed by Miss Joan C. Shore, Secretary of the Department of Entomology, University of Alberta. I am grateful to those whose names are listed above for their assistance.

Classification and Descriptions

The "*Feronina* complex." The species included share the following characteristics: generic characteristics of *Pterostichus;* size small (total length less than 11.5 mm); articles 1 and 2 of middle and hind tarsus

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[1] Department of Entomology, University of Alberta, Edmonton, Alberta, Canada.

with a longitudinal ridge on outer side, article 5 with ventral surface glabrous; plica of elytron normally developed; scutellar stria present, interval 3 with two or three setigerous punctures; metepisternum with anterior margin as long as lateral margin, hind wings reduced to short stubs. The male genitalia are varied, but the internal sac does not possess large, band-like sclerites. All of the species inhabit forested, montane regions, and are found in damp situations. They do not occur in the alpine zone, nor are they northern: for example, none are known from Canada or Alaska. They are rarely encountered by collectors.

The species of *Cryobius* are distinguished from the members of this complex by the setae on the ventro-lateral margins of the claw-bearing articles of the tarsi, and by the band-like sclerite or sclerites of the internal sac of the male genitalia. The species are arctic-alpine in distribution.

Historical aspects. LeConte (1873:306) placed the species *lubricus* LeConte, 1852, in a group by itself (division 3A), within the genus *Pterostichus,* thereby showing implicitly that this species was without close relatives.

Schaeffer (1910: 393-394) described the species *palmi* from North Carolina, declaring it to be very similar to *lubricus,* but because of a difference in number of elytral punctures, he implicitly erected a new group for *palmi.*

Casey erected the genus *Feronina* for *palmi* (1918: 365), and the genus *Paraferonia* for *lubricus* (1918:376), recognizing formally the distinctiveness of these species.

Van Dyke (1926) described the species *Pterostichus* (*Cryobius*) *pacificus,* and *P.* (*C.*) *lanei.* Subsequently (1943:23), he changed the name of *pacificus* to *humidulus,* and placed this species and *lanei* in the subgenus *Feronina.*

Csiki (1930: 675 and 677) changed the status of *Feronina* and *Paraferonia* to that of a section of the subgenus *Pterostichus.*

Hatch (1949: 81) described the species *Platysma* (*Cryobius*) *shulli.* In his treatment of *Pterostichus* (1953:114), Hatch returned *humidulus* Van Dyke to *Cryobius,* but retained *lanei* in *Feronina.* This arrangement was made on the basis of form of the posterior lateral impressions of the pronotum: single and narrow in *Feronina,* double in *Cryobius.* However, both conditions occur in *Cryobius,* so this difference is hardly diagnostic.

In summary, the arrangement of these species in 1953 was:

Subgenus *Pterostichus* Bonelli, 1809
  Section *Paraferonia* Casey, 1918
    lubricus LeConte, 1852
Subgenus *Feronina* Casey, 1918
    palmi Schaffer, 1910
    lanei Van Dyke, 1926
Subgenus *Cryobius* Chaudoir, 1838
    humidulus Van Dyke, 1943
    shulli Hatch, 1949

Ball (1960:124) following Van Dyke, included *lanei* and *humidulus* in *Feronina,* and changed the rank of *Paraferonia* to subgenus, but neglected to consider *shulli.* Now, these classifications are in part supported by genitalic and other characteristics, but in the main the genitalic characteristics suggest a different arrangement.

The eastern species, *lubricus* and *palmi,* although more similar to one another than to any other member of the complex, seem to be too different to be included in the same subgenus. The western species, *lanei* and *humidulus,* are also similar to one another in structure of the male genitalia, but they are radically different from *palmi* (type species of *Feronina*), and from the species of *Cryobius.* They cannot be included in any subgenus known to me, so a new one will be proposed.

The species *shulli* Hatch, superficially similar to the above western species and to the species of *Cryobius,* cannot be placed with either group on the basis of genitalic characteristics, so I will propose a new subgenus for this species. These groups, *Paraferonia,* and *Feronina* are characterized below.

Subgenus *Paraferonia* Casey

This subgenus includes the species *P. lubricus* LeConte, 1852.

External characteristics. A member of the *"Feronia* complex." Eyes rather small (length of temple/length of eye: 0.31-0.43). Mandibles modified: left mandible with a dorsal protuberance, scrobe extending to ventral surface anteriorly; right mandible with a transversely directed groove in dorsal surface. Pronotum with posterior lateral impressions on each side single, more or less linear, and deep; posterior-lateral setigerous punctures on lateral bead; prosternum between front coxae with apex finely margined. Dorsal surface of elytra strongly iridescent; striae shallow, 5 faint, 6 and 7 almost effaced, except at apex; interval 3 with three setigerous punctures. Abdominal sternum 6 of male with a prominent projection medio-ventrally.

Male genitalia. Median lobe cylindrical, basal portion forming an acute angle with shaft (fig. 1A), apical portion in ventral aspect abruptly narrowed before apex (fig. 1B), apex a narrow lobe. Left paramere very broad, apex rounded (fig. 1C). Right paramere about one-half the length of median lobe, with apical portion sharply recurved, apex broadly rounded (fig. 1D). Internal sac emerging on left side of median lobe, extended dorsally when everted; two medial sclerites (figs. 1E and F), gonopore terminal.

Material examined. Three males, five females of *Pterostichus lubricus* from the following localities: NORTH CAROLINA. Balsam Gap, Balsam Mts.; Highlands; Linville; and Tryon (Museum of Comparative Zoology); Devil's Courthouse, Balsam Mts., Haywood Co. (G. E. Ball Coll.). TENNESSEE. Monroe Co.; Unaka Mts. (Museum of Comparative Zoology). "SOUTHERN STATES." A single male from the LeConte Collection, labelled as follows: orange disc; *lubricus* 2.

Subgenus *Feronina* Casey

This subgenus includes a single species, *Pterostichus palmi* Schaeffer, 1910.

External characteristics. A member of the *"Feronina* complex." Eyes markedly reduced (length of temple/length of eye: 0.60-0.74). Mandibles average for *Pterostichus,* without special grooves or protuberances, scrobe of left mandible completely separated from ventral surface by a distinct ridge. Pronotum with posterior-lateral impressions on each side single, narrow, linear; posterior lateral setigerous punctures on lateral bead; tip of prosternum between front coxae margined or not. Elytra iridescent, striae of moderate depth, all equally impressed; interval 3 with two setigerous punctures. Male with sternum 6 of abdomen without a median ventral protuberance.

Male genitalia. Median lobe cylindrical, with basal portion meeting shaft at an obtuse angle (fig. 2A); apical portion in ventral aspect tapering gradually, apex broadly rounded (fig. 2B). Left paramere broad, apex subtruncate (fig. 2C). Right paramere slender, elongate, with parallel sides, over one half the length of median lobe (fig. 2D). Internal sac extended dorsally when everted, with two sclerites near gonopore (fig. 2E); gonopore terminal.

Material examined. One male, three females of *Pterostichus palmi* from the following localities: VIRGINIA. Stone Creek, Lee Co.; and Pennington Gap (Museum of Comparative Zoology). NORTH CAROLINA. Mt. Mitchell (Museum of Comparative Zoology); Fork Ridge, BRP 445 (D. R. Whitehead Coll.).

Subgenus *Pseudoferonina* Ball, NEW SUBGENUS

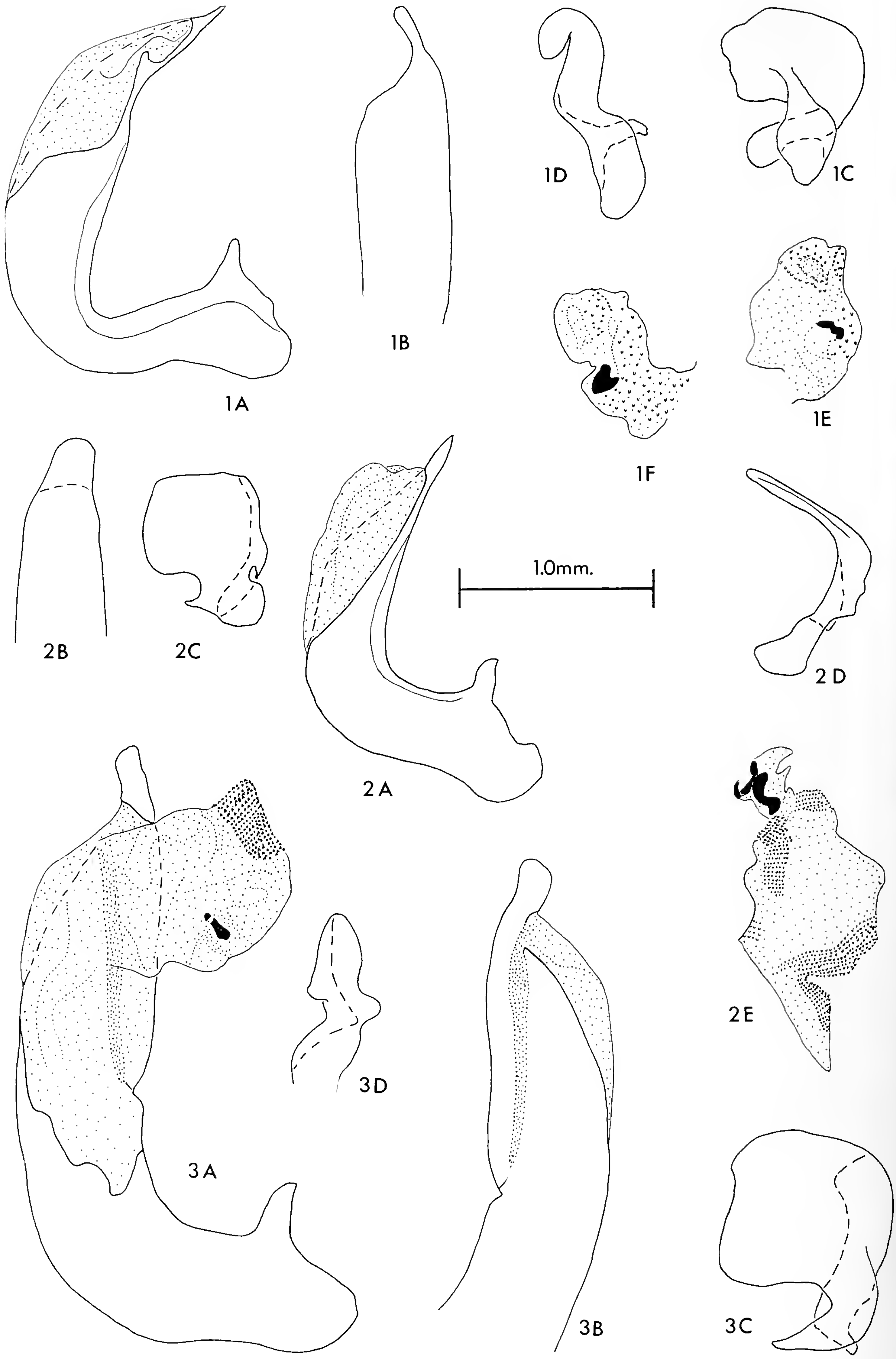
This subgenus includes *humidulus* Van Dyke; and *lanei* Van Dyke, here designated as TYPE-SPECIES. The derivation of the name is obvious.

External characteristics. Member of the "*Feronina* complex." Eyes of about average size (length of temple/length of eye: 0.20-0.30). Mandibles average for *Pterostichus,* without special grooves or protuberances; scrobe of left mandible completely separated from ventral surface by a ridge. Pronotum with posterior-lateral impressions on each side basin-like, single, and impunctate *(lanei),* or double and punctate *(humidulus);* posterior lateral setigerous punctures not on lateral bead; tip of prosternum between front coxae not margined. Elytra feebly iridescent, striae of moderate depth *(lanei)* or shallow *(humidulus),* all of about equal depth for a given specimen; interval 3 with two setigerous punctures. Sternum 6 of male without a median ventral protuberance.

Male genitalia. Median lobe compressed, basal portion forming an obtuse angle with shaft (figs. 3A and 4A); shaft with apical portion separated from basal portion by a lightly sclerotized or membranous diagonal strip (figs. 3B and 4B); apex broad *(lanei)* or narrow *(humidulus).* Left paramere broad, apex rounded, more *(humidulus,* fig. 4C) or less *(lanei,* fig. 3C). Right paramere short, about one-third of the length of median lobe (figs. 3D and 4D—note, both damaged in dissection). Internal sac (studied in detail for *lanei* only) protruding ventrally when everted, with a single sclerite near gonopore; gonopore basal, with a large membranous lobe apically (fig. 3A); internal sac ventro-apically with a large microtrichial field.

Notes. The characteristics of the internal sac and median lobe of this subgenus are most peculiar. Usually, in carabids, the gonopore is terminal in position, not basal, and in the everted position, the internal sac is directed dorsad rather than ventrad. The shaft of the median lobe in carabids is usually completely sclerotized on the ventral surface.

In *lanei,* the membranous strip seems to serve as a hinge, the apical part of the shaft moving on the basal portion. I am not prepared to speculate on the functional aspects of these interesting modifications, but will point out that a rudimentary joint in the form of a deep notch toward the apex and on the right side of the median lobe is present in *Pterostichus (Pherypes) tarsalis* LeConte. Perhaps, then, *Pherypes* and *Pseudoferonina* are more closely related than we have suspected previously.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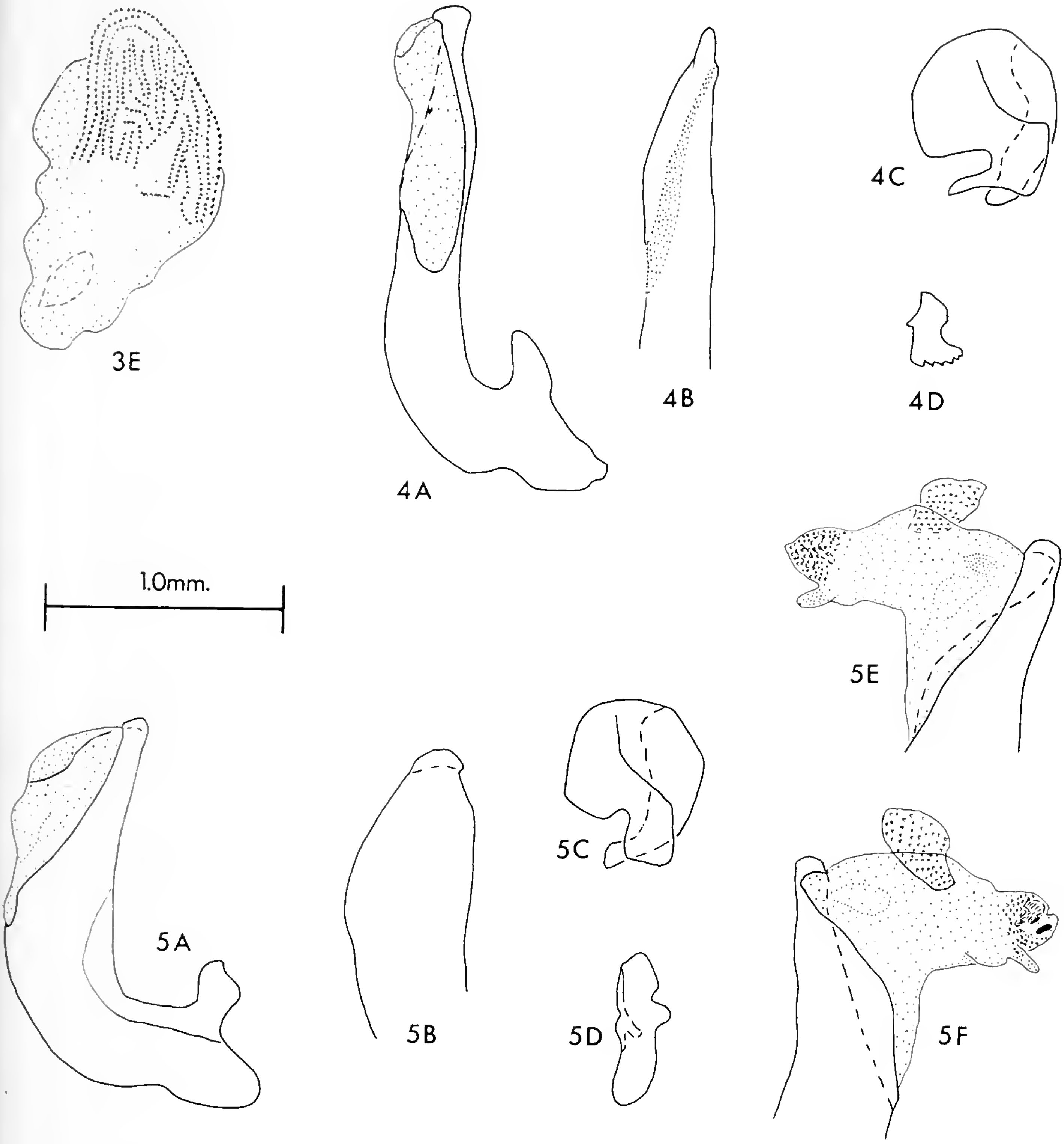

FIGURE 1, Male genitalia of *Pterostichus lubricus* LeConte, Tryon, North Carolina (MCZ). A—Median lobe, left lateral aspect. B—Median lobe, apical portion, ventral aspect. C—Left paramere, ventral aspect. D—Right paramere, ventral aspect. E—Internal sac, everted, left lateral aspect. F—Internal sac, everted, ventral aspect.

FIGURE 2, Male genitalia of *Pterostichus palmi* Schaeffer, Fork Ridge, North Carolina (Whitehead). A—Median lobe, left lateral aspect. B—Median lobe, apical portion, ventral aspect. C—Left paramere, ventral aspect. D—Right paramere, ventral aspect. E—Internal sac, right lateral aspect.

FIGURE 3, Male genitalia of *Pterostichus lanei* Van Dyke. A—Median lobe, left lateral aspect, with internal sac everted. B—Median lobe, right lateral aspect. C—Left paramere, ventral aspect. D—Right paramere, ventral aspect. E—Internal sac, everted, ventral aspect.

FIGURE 4, Male genitalia of *Pterostichus humidulus* Van Dyke. A—Median lobe, left lateral aspect. B—Median lobe, apical portion, ventral aspect. C—Left paramere, ventral aspect. D—Right paramere, apical portion, ventral aspect.

FIGURE 5, Male genitalia of *Pterostichus shulli* Hatch. A—Median lobe, left lateral aspect. B—Median lobe, apical portion, ventral aspect. C—Left paramere, ventral aspect. D—Right paramere, ventral aspect. E—Internal sac, everted, left lateral aspect. F—Internal sac everted, right lateral aspect.

Material examined. Pterostichus lanei Van Dyke, male, holotype, Wawawai, Washington. *Pterostichus humidulus* Van Dyke, one male, Cannon Beach, Oregon. Both specimens are in the collection of the California Academy of Sciences.

Subgenus *Melvilleus* Ball, NEW SUBGENUS

This group contains the single species, *Pterostichus shulli* Hatch, 1949, which is here designated as TYPE-SPECIES.

The name of the subgenus is derived from the given name of the describer of *shulli,* Melville H. Hatch.

External characteristics. Member of the "*Feronina* complex." Eyes of average size (length of temple/length of eye: 0.25). Mandibles average for *Pterostichus,* without special grooves or protuberances, scrobe of left mandible completely separated from ventral surface by a ridge. Pronotum with posterior lateral impressions on each side double; posterior lateral setigerous punctures not on lateral bead; apex of prosternum between front coxae not margined. Elytra iridescent, striae shallow, all about equally impressed, interval 3 with two setigerous punctures; sternum 6 of abdomen of male without a protuberance.

Male genitalia. Median lobe more or less cylindrical, not compressed, basal portion short, forming with shaft an obtuse angle (fig. 5A); apex in ventral aspect broadly rounded, asymmetrical (fig. 5B). Left paramere with apex broadly rounded (fig. 5C). Right paramere short, apical margin subtruncate, less than half the length of the median lobe (fig. 5D). Internal sac extended dorsally in everted position, with a large lobe toward apical margin, and a finger-like projection and two small sclerites near gonopore (figs. 5E and F).

The species *shulli* is most similar to the species of *Pseudoferonina,* but the males are readily separated on the basis of the genitalic characteristics described above. The diagnostic external characteristics are: *shulli,* palpi and antennae rufous, posterior lateral impressions of pronotum punctate, posterior lateral angles of pronotum obtuse, sides curving out almost directly from base, total length less than 10 mm.; *humidulus,* palpi and antennae rufous, posterior-lateral impressions of pronotum punctate, hind angles of pronotum acute, sides sinuate in front of hind angles, total length less than 10 mm.; *lanei,* palpi and antennae black, posterior-lateral impressions of pronotum impunctate, total length greater than 10.5 mm.

Material examined. One male of *Pterostichus shulli* from Harvard, Idaho (California Academy of Sciences).

Key to Nine North American Subgenera of Pterostichus Bonelli
(Modified from Ball, 1960:78)

15 (14). Left mandible swollen toward apex; right mandible with a transverse groove in dorsal surface; apex of prosternum between front coxae margined; elytra with dorsal surface iridescent ---------- PARAFERONIA

Left mandible not swollen toward apex; right mandible without a transverse groove in dorsal surface ---------- 16

16 (15). Pronotum almost rectangular (slightly wider at base than at apex), sides not sinuate posteriorly ---------- ABACIDUS

Pronotum subcordate, at least narrowed posteriorly, base and apex subequal in width ---------- 17

17 (16). Fifth article of hind tarsus with a row of setae on each ventro-lateral margin -- 18
Fifth article of hind tarsus without setae on each ventro-lateral margin ------ 18A
18 (17). Total length less than 10.0 mm. ---------------------------- CRYOBIUS (Part)
Total length greater than 10.5 mm. -------------------------- EUFERONIA (Part)
18A (17). Range—western North America, west of Montana ------------------------ 18B
Range—North America, east of Montana -------------------------------- 18D
18B (18A). Palpi and antennae black, posterior-lateral impressions of pronotum impunctate, total length 10.5 mm., or more ---------------------- PSEUDOFERONINA (Part)
Palpi and antennae rufous, pronotum with posterior-lateral impressions punctate, total length less than 10.0 mm. ------------------------------------ 18C
18C (18B). Pronotum with hind angles obtuse, sides curving out almost directly from base -- MELVILLEUS
Pronotum with hind angles acute, sides subparallel in front of hind angles ---- -- PSEUDOFERONINA (Part)
18D (18B). Pronotum with sides coarsely margined, posterior-lateral impressions on each side broad -- 18E
Pronotum with sides finely margined, posterior-lateral impressions on each side linear -- 18F
18E (18D). Elytron with two or three setigerous punctures on disc ----------- EUFERONIA (Part)
Elytron with four setigerous punctures on disc -------------------------- REFONIA
18F (18D). Eyes small, temples prominent ------------------------------------ FERONINA
Eyes normal, temples small ------------------------------- MONOFERONIA (Part)

Relationships

The eastern subgenera, *Paraferonia* and *Feronina,* are more closely related to one another than they are to the western groups. Further, the presence of a long right paramere allies them with other eastern subgenera, and suggests that they are derived from an eastern ancestor.

As mentioned previously, the subgenus *Pseudoferonina* shows some affinity with the western *Pherypes. Melvilleus,* on the other hand, does not appear to be closely related to any other subgenus of *Pterostichus.*

If the facts are correctly interpreted, the similarities shared by the eastern and western species of the "*Feronina* complex" are the result of parallelism, or convergence, or of the retention of characteristics from a remote common ancestry—characteristics that are at most indicative of patristic rather than cladistic affinity (Cain and Harrison, 1960).

Finally, I want to consider in a general way the relationships of the flightless, montane subgenera of *Pterostichus* of temperate eastern and western North America. There are no such subgenera occurring in both areas. (Lindroth has indicated in a personal communication that the species *P. adoxus* Say, 1825, assigned to the subgenus *Hypherpes,* is not related to the western members of this group.) This suggests that there has been no recent interchange. The east is very rich in distinct, endemic subgenera, while the west has a less diverse fauna. Probably the history of these groups is intimately tied to that of the Arcto-Tertiary flora. However, more data on relationships of the subgenera of *Pterostichus* are required before it will be profitable to pursue this question futrher.

Summary

1. Two new subgenera of *Pterostichus* are proposed for species from western United States, and are characterized: *Pseudoferonia,* type-species *Pterostichus lanei* Van Dyke; and *Melvilleus,* type-species *Pterostichus shulli* Hatch.

2. The species of the monotypic subgenera *Paraferonia* Casey and *Feronina* Casey are characterized.

3. The male genitalia of the species of the subgenera mentioned above are illustrated.

4. The relationships of these subgenera are discussed, and it is concluded that the similarities among these groups are not the result of direct common ancestry.

5. The relationships of the montane, flightless *Pterostichus* faunas of eastern and western North America are discussed briefly. No subgenera are shared, so it is concluded that the relationships are at least pre-Pleistocene.

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TAXONOMIC AND DISTRIBUTION NOTES ON ANOBIIDAE (COLEOPTERA)

By Richard E. White[1]

The nomenclatural changes and extensions of known ranges offered below result from my recent work on the Anobiidae.

Hemicoelus LeConte

Hemicoelus LeConte, 1861:204.
Cacotemnus LeConte, 1861:204. (NEW SYNONYMY.)

The genus *Hadrobregmus* Thomson was synonymized with *Coelostethus* LeConte by Knutson (1963:178). The North American species formerly placed in *Hadrobregmus* were assigned by Knutson to *Hemicoelus, Cacotemnus* (both previously ranked as synonyms of *Hadrobregmus*), and *Desmatogaster* (described as new). The differences given by the above author for the separation of *Hemicoelus* and *Cacotemnus* do not stand up. The primary character (gibbosity of the pronotal disk) I find unreliable. In reference to this character, the species *Cacotemnus defectus* (Fall) clearly fits *Hemicoelus,* as can be seen from examining Knutson's description of the species. Some specimens of *C. defectus* exhibit the pronotal gibbosity to an even greater extent than does *Hemicoelus pusillus* (Fall). In addition, there exists no sharp dividing line between those species with the pronotum gibbous and those in which the pronotum is supposedly not gibbous. The additional wing and genital characters given are not of sufficient strength to serve as a base for generic separation. These internal characters are in marked contrast to the generally strong external characters serving to distinguish other anobiid genera.

The generic names *Hemicoelus* and *Cacotemnus* first appeared in print on the same page of LeConte's "Classification of the Coleoptera." The morphological distinction presented by LeConte (whether the antennae are 10- or 11-segmented) is unreliable as has been indicated by Knutson. The name *Hemicoelus* appears earlier on the page and should now be accepted as the correct name for the genus.

Lioolius Gorham

Lioolius Gorham, 1883:203 (type, *L. punctatus* Gorham, by present designation).

Nevermannus Fisher, 1927:116; 1927:49 (type, N. *dorcatomoides* Fisher, by monotypy). (NEW SYNONYMY.)

A comparison of the types representing these two generic names shows them to be congeneric but specifically distinct. *L. dorcatomoides*

[1] Entomology Research Division, Agr. Res. Serv., U. S. Department of Agriculture, Washington, D.C.

differs from *punctatus* in having the dorsal surface very dark reddish black (steely blue in *punctatus*) and in lacking elytral striae (two present at apical half on each side in *punctatus*).

Dorcatoma falli White, NEW SPECIES

Dorcatoma dresdensis Fall, 1905:262, (*nec* Herbst).

The European *D. dresdensis* Herbst (1792:104) does not occur in North America. The species designated under this name by Fall is actually unnamed. I hereby propose the name *falli* for this species in honor of one of our greatest coleopterists. Fall's description and key to species of the genus occur on the above page, and a figure can be found in White (1962:49).

D. dresdensis Herbst (*vide* Dominick) differs from *falli* in that the metasternum is deeply foveate anteriorly, not longitudinally sulcate as in *falli*. Also, the 8th and 9th antennal segments of the male of *dresdensis* Herbst are distinctly triangular, not branched as in *falli*. *D. dresdensis* Herbst resembles *D. pallicornis* LeConte in the metasternal characters, but the male of the latter bears branched 8th and 9th antennal segments similar to those of *falli*.

The holotype of *falli* (male) was collected at Plummers Island, Maryland, on April 26, 1910, by H. S. Barber. It is deposited in the U. S. National Museum and bears type number 68109. The allotype and three paratypes (all females) bear the same data and are also in the U. S. National Museum.

Actenobius pleuralis (Casey)

Euceratocerus pleuralis Casey, 1898:65; *Actenobius pleuralis,* Fall, 1905:156.

Euceratocerus macer Casey, 1898:65; *Actenobius macer,* Fall, 1905:156. (NEW SYNONYMY.)

Euceratocerus saginatus Casey, 1898:65; *Actenobius saginatus,* Fall, 1905:157. (NEW SYNONYMY.)

Examination of the respective type series in the Casey collection has shown that the above names apply to a single species as suspected by Fall (1905:156). The characters selected by Casey for distinguishing his categories, that is, depth of the pleural sulcus, proportion of elytral length to width, and proportion of eye width to distance separating eyes, are of little or no taxonomic value. The series of 16 individuals before me exhibit a nearly continuous range from one extreme to the other regarding these characters. Casey's types represent extremes of these ranges with one exception. The type and single individual of *A. saginatus* bears elytra distinctly shorter than those of any other individual. However, the noticeably undulating elytral surfaces and poorly fitting median sutures indicate a malformed individual.

All three of Casey's species were described on the same page; the name *E. pleuralis* appears first so I select it as the name for this species due to its precedence of position. The specimen in Casey's series bearing the data "Sta Cruz Mts Cal," USNM type label 48851, and Casey's determination label is hereby designated as the lectotype of this species.

Tricorynus lepesmei White, NEW NAME

Catorama estriatus Lepesme 1947:228, (*nec* Horn.)

C. estriatus Lepesme is preoccupied by *Hemiptychus estriatus* Horn (1895:390). *Tricorynus, Catorama,* and *Hemiptychus* are synonymic (White, 1965:300). I propose the name *lepesmei* as a substitute for the preoccupied name *Catorama estriatus* Lepesme in honor of the original describer of the species.

Distribution Data

Identification of anobiids from various collections have provided locality records representing marked or notable expansion of known ranges. These are as follows:

Euceratocerus gibbifrons White. This species was collected at Florence, South Carolina, on May 12, 1959, by V. M. Kirk. This is a new State record.

Desmatogaster subconnatus (Fall). I have seen a single individual taken at Greenville, Maine, on July 22, 1943, by Rita Conley. This is a new record for the United States.

Ozognathus floridanus LeConte. Three individuals taken at Kentucky Lake State Park, Kentucky, on May 28, 1957, by Robert E. Woodruff have been examined. This is a new State record and is a marked expansion of the known range.

Euvrilletta brevis White. This was taken at Poinsett State Park, South Carolina on June 3, 1962, by V. M. Kirk. In addition, I have seen a series of 41 individuals taken at Brookings, Fort Thompson, Elk Point, Hills City, Vermillion, Hecla, and Spearfish, South Dakota during June, July, and August in the years of 1942 to 1946. H. C. Severin collected most of these, some were taken by N. P. Larson, and one by D. T. Murdock. Both of these are new State records; the species was previously known only from Ohio.

Eutylistus incomptus (LeConte). I collected this species in Franklin Co., Ohio, on July 4, 1962, and it was taken in Tuscarawas Co., Ohio, in June and July of 1962, by Bob Giles. These constitute a new State record.

Caenocara lateralis LeConte. Two males which I collected in Ohio are new State records and the most northerly records to date. One is from Scioto Co., May 11, 1963, and the other from Hocking Co., May 24, 1963. They agree well with males from Florida except that the antennae are slightly shorter, with the seventh segment less produced.

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LITERATURE NOTICE

GENERA INSECTORUM. COLEOPTERA. FAM. COPTONOTIDAE. By K. E. Schedl. Fasc. 215e, 13 pp., 1 pl. 1962.—The three included genera are keyed, described, and illustrated. Citations to the four species are given; all are from Latin America.

OBSERVATIONS ON THE ECOLOGY, BEHAVIOR AND LIFE CYCLE OF THE FUNGUS-FEEDING BEETLE, CYPHEROTYLUS CALIFORNICUS, WITH A DESCRIPTION OF THE PUPA (COLEOPTERA: EROTYLIDAE).

By Robert C. Graves[1]

Little is known concerning the habits of *Cypherotylus californicus* (Lacordaire, 1842), the only species of Erotylinae known from America north of Mexico. The larva is described and illustrated (as *C. boisduvali* Chev.) in Peterson (1951), who also notes: "Larvae associated with fungi on fallen logs from Arizona." Smyth (1934), as quoted by Boyle (1956), comments as follows: "I at one time collected a very large number of them in one day, grouped around fungi on the undersides of decayed logs in a damp, shady spot among pine and alder trees in Oak Creek Canyon, south of Flagstaff, Arizona in August, 1904." Boyle (1956) observed this species in southern Arizona, "its range apparently correlating well with that of . . . *Pinus ponderosa*." He further states that "the gut content of a dissected specimen consisted of bits of fungus-riddled, apparently coniferous wood."

On August 7, 1964, I discovered several hundred larvae and pupae of *Cypherotylus californicus* at Black Canyon Campground (U. S. Forest Service camp adjoining Hyde State Park), Santa Fe National Forest, Santa Fe County, New Mexico. The elevation is 8,500 feet. The host fungus was *Polyporus adustus* Willd. ex Fries.

Both larvae and pupae were suspended from the underside of a fallen aspen log about 25 feet long. The larvae and pupae were grouped into clumps of 4, 35, 46, 60, etc. individuals each. One such clump is shown by fig. 1. This log was held roughly 1 foot above the forest floor by its branches.

Larvae and pupae which hang freely in the air may be a modification associated with high rainfall of the habitat. During my stay at Black Canyon it rained daily and the weather was damp and cold at that altitude. On Aug. 6 there was a severe hailstorm. Under such conditions pupae sheltered by the underside of a log and roofed by shelf fungi would be reasonably well protected. Excess water drains from pendulous pupae and they dry more rapidly as air circulates on all sides. This may be of advantage in reducing growth of molds.

No adults were found at the site, but one was captured crawling on a pile of firewood in another part of the campground. This individual had striking blue elytra which faded to grey after death. All reared specimens were grey. Perhaps unnatural conditions in my rearing cartons prevented the normal development of the blue color. Boyle (1956) mentions a "purplish" color of living specimens.

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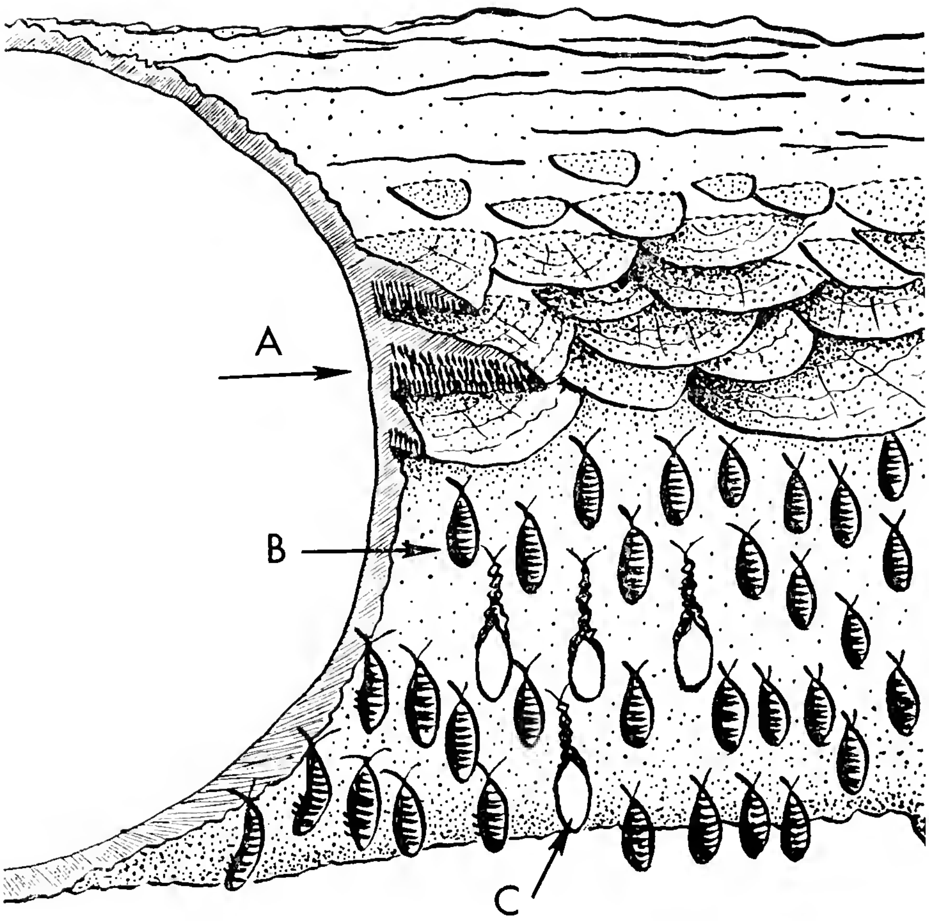
[1] Department of Biology, Flint Community College, Flint, Michigan 48503.



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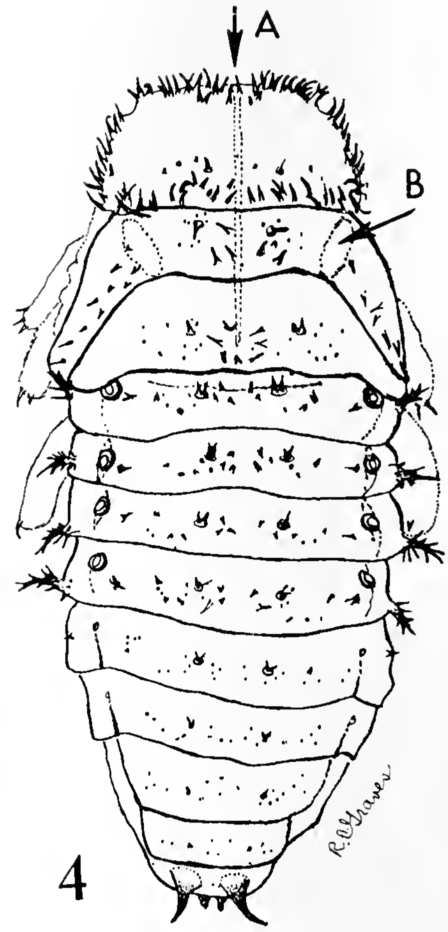

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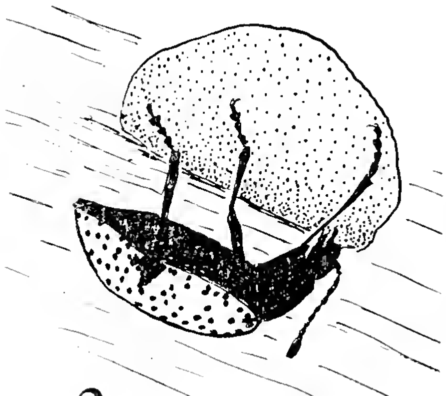

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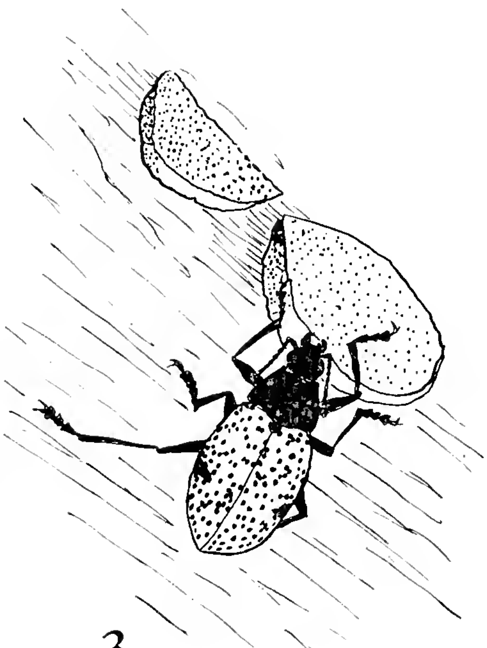

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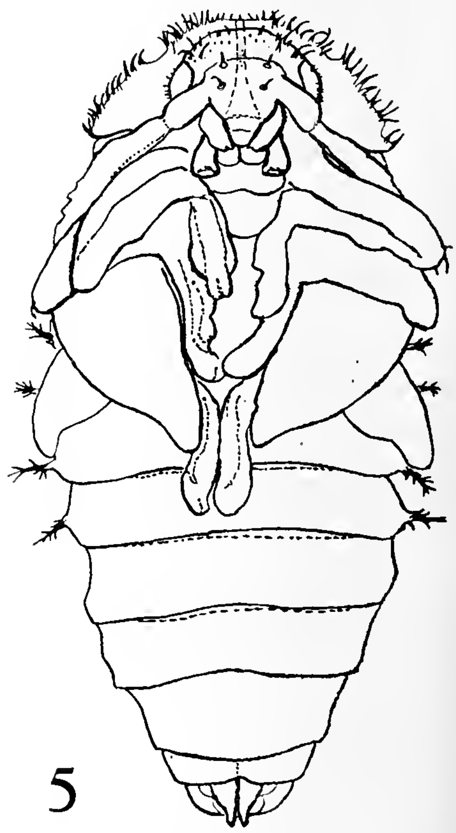

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FIGURE 1, Section of aspen log showing (A) roof-like layer of *Polyporus adustus,* (B) larvae ready to pupate, and (C) newly-emerged pupae. Several similar clumps of *C. californicus* larvae and pupae were located on both sides of the log. Pupae are suspended by the cast larval exuvium.

FIGURE 2, Adult *Cypherotylus californicus* feeding (in typical upside-down position) beneath a fruiting-body of *Polyporus versicolor.*

FIGURE 3, Adult *Cypherotylus californicus* feeding on fresh, growing edge of *Polyporus versicolor.* The beetles almost always assumed a position beneath the spore-fruit.

FIGURES 4 and 5, Dorsum and venter of the pupa of *Cypherotylus californicus* (Lacordaire). (A) mid-dorsal white line; (B) yellow humeral spot.

Methods and Materials

Larvae and pupae were freed carefully from the log to which they were firmly attached apparently by some sort of anal secretion. Fifty larvae and pupae were collected for rearing and placed in paper ice-cream cartons with tight-fitting lids. A few small holes were punched in these for ventilation and pieces of fungus from the original log were enclosed and moistened daily to prevent desiccation. All larvae were nearly ready to pupate, and all had pupated by the following day (August 8). There were no fatalities during pupation.

Specimens of larvae and pupae were also collected and preserved in 95% ethanol. These served for the description of the pupa (see below).

Adults all emerged on August 15 (none had emerged by evening of August 14). Although four individuals had malformed elytra, there was 100% emergence, even in the abnormal situation of the bottom of an ice-cream carton. None had any difficulty in freeing themselves from the pupal exuvium. (At the time of emergence I was located at Moab, Utah.)

The newly emerged adults soon devoured the original fungus and this was replaced by other fungi collected at intervals along the route.

Five adults had died by the time of my return to Flint, Michigan, on September 10. The remaining beetles were then housed in a large terrarium and provided with decaying logs covered with fresh *Polyporus versicolor* L. ex Fries. Feeding continued (see below) but the individuals gradually died; the last survived until November 27, 1964.

Behavior of Adults

The adults were observed regularly from August 15 to September 10 in the ice-cream cartons, and from September 10 to November 27, 1964 in the terrarium. It was not possible to observe normal activity in the cartons without disturbing the beetles but the terrarium was most satisfactory.

Non-feeding behavior. Tenerals were quiescent for about two days following emergence, but, as the cuticle hardened, they became more active, walking about in a methodical, mechanical fashion if disturbed. If not disturbed, resting, feeding activity (see below), and slow movements were the only behavior. *C. californicus* is not an active species but individuals can crawl rather rapidly when irritated. The long ungainly-appearing legs are beautifully adapted for carrying the animals over the rough bark of logs and fungus fruiting-bodies which form their habitat. When walking, the body is held well away from the substrate; when resting upright or in a crevice, the legs are drawn up and the body is appressed closely to the substrate.

These beetles spend a great portion of their time on the dark, undersides of logs. There, whether feeding or resting, they hang in a characteristic upside-down position (fig. 2). In this common posture they frequently hang by only three or four legs. Again the long legs serve the purpose well, allowing air to circulate freely around the body. As is the case with larvae and pupae, this may be an adaptation to the rainy climate, allowing water to drain and permitting more rapid drying.

No mating activity was observed. None of the individuals were seen to fly. Rarely, during the day, one would crawl to the top of the log, elevate the elytra and stretch the metathoracic wings as if to take off. The wings appear perfectly capable of flight which undoubtedly occurs under the correct conditions.

On numerous occasions in the terrarium, smaller arthropods such as ants, spiders, isopods, etc. crawled over *Cypherotylus* individuals without eliciting any noticeable response. Once a small spider ran up a leg and onto the elytra; it was wiped off by leg action. The body is frequently scraped clean by the long legs and the legs are rubbed together during cleaning activity.

Most activity consisted of feeding (see below) and resting motionless for long periods. General activity lessened progressively with age.

Feeding activity. In no case was there cannibalism, nor were there any attacks on one another and no appendages were lost. Even in the crowded ice-cream cartons, individuals lived in complete peace, crawling over each other with no sign of aggressive behavior. Dead or moribund beetles were not molested.

Feeding was limited to soft polypores (Basidiomycetes: Polyporaceae) similar to those found in such abundance on the original log. Soft agarics were presented but refused after inspection with the antennae. The beetles fed first on the tender young "nubbins" ("stage I" of Graves, 1960), next on the fresh, growing edges of the older conks (always feeding from the underside of the shelf-fungus, fig. 3). Young sporocarps were completely devoured down to the bark of the tree; in the case of older conks the pore layers were completely destroyed but the tough, leathery caps were not eaten.

Feeding was voracious and the colony consumed an enormous amount of fungi. *C. californicus* may be of some value in the control of wood-damaging fungi as they rapidly destroy the sporocarps *before* spore production occurs. I know of no other polypore feeder which is effective in this manner (Graves, 1960). It is still difficult to believe that such an inactive species should require so much food. Perhaps the fungi are of little nutritional value or the beetles' digestion is not efficient. Large amounts of feces were produced, identical in color to the conk and quite fine and dry, resembling sawdust. Dry or hard fungi were not eaten, nor was wood.

Life Cycle

C. californicus, like other erotylids, is closely associated with fungi, and must be termed a "mycetobiont" or "obligative mycetocole" (see Graves, 1960). I did not observe oviposition, nor find early larval stages although I took the log apart. When sifted over hardware cloth onto a sheet, the fungi yielded Collembola, Cisidae and several beetle larvae, but no *Cypherotylus*. It seems apparent that this species does not have overlapping broods.

The life cycle may be reconstructed from the available data. Eggs are laid on or near the host fungi and the larvae feed on these fungi throughout their development. The black, mature larvae leave the fungi, attach to the underside of the log and pupate. The larval exuvium splits dorsally but is not completely shed, remaining attached to the posterior end of the pupa. The pupa is thus suspended freely from the log by the old larval exuvium, and, therefore, hangs lower than the larvae. In all cases, both larvae and pupae hang with the ventral side facing the log, presenting the dark dorsal side to view.

The pupal stage of the Black Canyon specimens lasted one week but the time undoubtedly varies with local conditions. The adults emerge, move into the fungus, mate, oviposit and the life cycle is repeated. The close timing of emergence indicates that all developed from eggs laid at approximately the same time. This would ensure no difficulty in finding mates. After mating, a number of females probably fly to oviposit on suitable fungi in other parts of the forest.

Had it been possible to provide the original conditions, the captured beetles probably would have oviposited in late August or September. The young larvae probably hibernate in the fungus and develop rapidly during the following spring and early summer, pupating in early August. Adults emerge in mid-August. Although the captured adults fed readily, none survived November, so it is likely that the adults do not hibernate.

Description of Pupa

(Figs. 4 and 5)

Total length 15 mm.; width 6 mm. With numerous stiff spines or styli (sometimes branched) which bear a small seta at tip. Color: white (with dark brown styli) in recently pupated specimens, becoming dark brown with age, except for sternites, a distinct white line from clypeus onto mesonotum (fig. 4), and two elliptical yellow humeral spots (fig. 4).

Head with two pairs of large styli between eyes, two pairs of large supraorbital styli (somewhat variable), a number of scattered medium and small styli on vertex. Small styli border lateral margins of eyes.

Pronotum bordered with numerous large styli which are often curved and sometimes branched. Mesonotum with a few large styli on disc and others along elytral buds. Metanotum with large and small styli scattered on disc. Thoracic and abdominal tergites with pairs of "central styli" on discs; these are usually (but not always) larger than surrounding discal styli and are often bifid or trifid; they can be identified by their position, forming two distinct dorsal rows.

Abdomen with first four visible tergites having prominent papillate spiracles and very large laterally-projecting dendritic styli. Posterior segments with greatly reduced, scarcely visible spiracles, without dendritic styli. Last segment with two urogomphi (much shorter than those of larva, which are almost half body length).

Legs and antennae flattened against body. Legs with a few styli at femoro-tibial joint. Venter glabrous.

While all the abdominal spiracles are prominent in the larva and adult, only the first four appear to be functional in the pupa. Also the large dendritic spines laterad to the spiracles are present on abdominal segments 1-8 in the larva but only on segments 1-4 in the pupa. Are these protective to the spiracles, perhaps keeping them separated from foreign surfaces?

The last larval exuvium continues to cover the posterior half of the abdomen, so it is doubtful that the posterior abdominal spiracles, even if functional, would be of much use.

Acknowledgement

I wish to thank Dr. Josiah L. Lowe of the State University College of Forestry, Syracuse, N. Y., for his determinations of the host fungi.

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LITERATURE NOTICE

LOWER CALIFORNIA GUIDEBOOK. By Peter Gerhard and Howard E. Gulick. Arthur H. Clark Co., Glendale, California. 3rd edition. 243 pp., 21 maps, illus. 1964. —Baja California has always been of interest to entomologists, and that interest seems to be increasing recently. Therefore, this book could be of value to many. It is a descriptive traveler's guide, composed mostly of short descriptions of places along all roads, with consecutive mileage marked for each place. It is not a scientific description of the peninsula—only 11 pages are devoted to descriptions of some game animals and distinctive plants—but interested scientists will make good use of it as a guide and gazetteer; more than 800 localities are listed. A good index and very good maps round out the contents; taxonomists with difficult locality labels from Baja will like that.

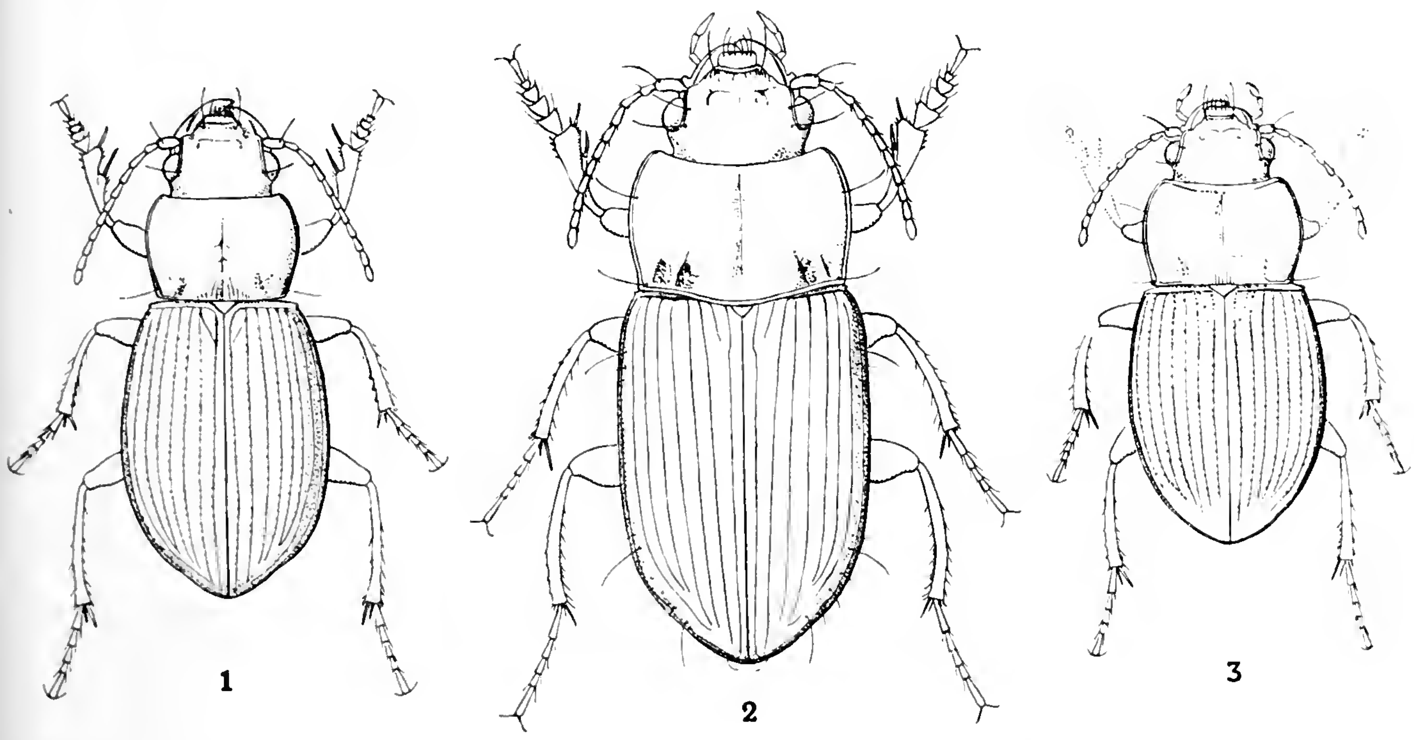
ILLUSTRATIONS OF THREE HIMALAYAN AMARA (COLEOPTERA: CARABIDAE)

By Elwood C. Zimmerman[1]

Many years ago, I acquired part of the library of the late H. E. Andrewes, former specialist on the Carabidae at the British Museum (Natural History). Amongst the literature were a number of original illustrations of Carabidae, including those used by Andrewes in his contributions to *The Fauna Of British India.* Most of the illustrations have been published, but the material includes an envelope containing three drawings of *Amara* from Tibet and Sikkim, and on which there is the following note by Andrewes:

"They represent 3 species of *Amara* (all unique) described by me in Trans. Ent. Soc. Lond. 1930, pp. 25 [and 28], & were prepared in order to assist Mr. A. Baliani in preparing his paper on the Himalayan species (Mem. Soc. Ent. Ital. XII. 1933 [1934], pp. 187-208). It was supposed that he would prepare a key to the species, & publish these figures, but he did neither. It is my intention at some future date to try and prepare a key myself, & at the same time publish these drawings, but I may never succeed in doing this. Feb. 15, 1934."

It is unfortunate that Andrewes, who had such an expert knowledge of the Oriental Carabidae, was unable to prepare his proposed illustrated key to the Himalayan *Amara,* and I believe that the drawings under discussion should be rescued from oblivion and made available to science.



Figures 1-3. Holotypes of Himalayan Carabidae. 1—*Amara alecto* Andrewes; length: 6.0 mm. 2—*Amara (Bradytus) mitis* Andrewes; length: 7.5 mm. 3—*Amara histrio* Andrewes; length: 5.3 mm. Drawn by O. F. Tassart.

[1] Bishop Museum, Honolulu, Hawaii.

Herewith, therefore, the illustrations are reproduced. These drawings were made in 1933 at the British Museum (Natural History) by the late Miss O. F. Tassart. Each of them represents the holotype which is stored in the Museum. The specimens were collected by Major R. W. G. Hingston during the British Third Mount Everest Expedition in 1924. The species are as follows:

1. *Amara alecto* Andrewes (fig. 1). Kampa Dzong, Tibet; holotype male.

2. *Amara (Bradytus) mitis* Andrewes (fig. 2). Rongshar Valley, Tibet; holotype male. It is stated in the original description that the length is "8 mm.," but the artist has stated that the length is 7.5 mm.

3. *Amara histrio* Andrewes (fig. 3). Deutang, Sikkim; holotype male. The length given in the original description is "5.5 mm.," but the artist's measurement is 5.3 mm.

These drawings, together with other Andrewes' illustrations, are to be deposited in the library of the Entomology Department of the British Museum.

BEETLE TALK

Boundaries of political divisions, usually Territories, in the western United States before 1865 were very different from the present boundaries of the States. This often creates problems or misleads when one tries to interpret type localities of species described or collected before 1865. For example, a specimen collected between 1854 and 1861 and having the locality label Nebraska might have come from the far northwestern corner of the present state of Montana. Also, between 1850 and 1861 the locality Utah included all of the present States of Nevada and Utah and the western half of the present State of Colorado. These facts can be important to coleopterists because LeConte described many of his western species in those early days; half of his articles were published before 1865. A special effort to correlate early localities and boundaries with present boundaries on the basis of dates should be made in critical cases. Several books on the territorial growth of the United States are available. Very detailed accounts are given in "Boundaries, areas, geographic centers and altitudes of the United States and the several states with a brief record of important changes in their territory and government," by Edward M. Douglass, United States Geological Survey Bulletin 817, 265 pp., 12 pls., 26 figs., 1932.

ON THE GENUS ABUTILONEUS BRIDWELL (COLEOPTERA: BRUCHIDAE)

By John M. Kingsolver[1]

The *genus Abutiloneus* Bridwell was erected in 1946 for the new species *idoneus* Bridwell described in the same paper. The generic description was indicated only by collective key couplets and a very short description of the species. No illustrations were included.

Bridwell was apparently uncertain whether *idoneus* was the same as a species described from Mexico by Sharp (1885) as *Bruchus flavicornis*. Recent comparison of a male and a female from the type series of *flavicornis* with the holotype of *idoneus* confirmed that the two species are identical, thus *idoneus* becomes a junior synonym of *flavicornis.*

The purpose of this paper is to give an extended description of the type-species with illustrations of diagnostic characters. This should assist future workers in the identification of the species and genus, and in its placement in the classification of the Bruchidae.

Genus *Abutiloneus* Bridwell

Abutiloneus Bridwell, 1946:55

Type-species: *Abutiloneus idoneus* Bridwell, 1946:55 (By monotypy.)

= *Buchus flavicornis* Sharp, 1885:480.

Since only the one known species is representative of the genus, a description of the species will also serve as a description of the genus at this time.

Abutiloneus flavicornis (Sharp), NEW COMBINATION

Bruchus flavicornis Sharp, 1885:480; Schaeffer, 1907:296.
Acanthoscelides flavicornis (Sharp): Blackwelder, 1946:759.
Abutiloneus idoneus Bridwell, 1946:55. (NEW SYNONYMY.)

Color.—Body black, densely clothed above with glossy, hairlike, ochreous scales, below and on pygidium with similar silvery gray scales. Antennae, labrum, labial and maxillary appendages, and all legs bright yellow.

Head (fig. 1).—Short and broad; interocular distance equal to width of eye; frons densely, finely punctate, sparsely clothed with gray hairs; frontal carina obsolete but marked by an impunctate line; vague transverse sulcus between upper limits of eyes; frontoclypeal suture arcuate, depressed; clypeolabral suture nearly straight; labrum subtriangular; eyes deeply cleft by setose vertical sulcus above bases of antennae; postocular lobe represented by narrow fringe of setae; antennae similar in the two sexes (fig. 5).

Prothorax (fig. 2).—Disk campanulate, sparsely punctate, each puncture bearing a recumbent seta, surface densely punctulate between punctures; basal margin with median lobe covering base of scutellum; prosternum triangular; front coxae contiguous apically; front legs not modified.

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[1] Entomology Research Division, Agric. Res. Serv., U. S. Department of Agriculture, Washington, D. C.

Meso- and metathorax.—Elytra (fig. 2) short and broad, arcuate laterally; striae well marked, obscurely punctate, nearly evenly spaced throughout length; first and second striae slightly bent laterad at bases; striae 2 to 5 each with small, black, setiferous tubercle at base; scutellum rectangular, slightly longer than wide; mesepimeron reduced to small, triangular, dorsal sclerite by posterior margin of mesepisternum; mesepimeron and mesepisternum finely punctulate; posterior legs (fig. 10, a & b) with femora attenuate basally, expanded medially and constricted apically, ventral margin devoid of carinae or serrulations, sometimes with minute denticle at ¼ distance from apex (fig. 10b); tibia bent basally, apex with 4 to 5 teeth externally, ventral spur short, slender and acute, tarsi normal.

Abdomen.—First ventral segment not modified, nearly twice length of remaining 4 segments in male, 1½ times as long in female; fifth ventral segment in male nearly divided by apex of pygidium, only shallowly emarginate in female; pygidium (figs. 3 & 4) convex in both sexes, strongly bent under in male.

Male genitalia (figs. 6, 7, 8, 9).—Parameres flattened, usually crossed apically, apex with slender fleshy lobe arising from inner margin (fig. 9); ventral strut sinuate; median lobe clavate in ventral view, deeply emarginate at apex, lateral apical processes enclosing base of ogival ventral valve; aedeagal apodemes expanded into hoodlike, thinly sclerotized basal lobe; internal sac armed with paired clusters of fine spicules near apex of median lobe, a pair of dark spines at middle and a pair of longer spines near base; median lobe in lateral view arcuate, slightly expanded near apex; ventral valve falcate in lateral view.

Female genitalia without discernible diagnostic characteristics.

Length of body, 1.5 to 1.8 mm.; width, 1.0 to 1.2 mm.

Type specimens of *idoneus* in collection of the U.S.N.M. Type specimens of *flavicornis* in the British Museum.

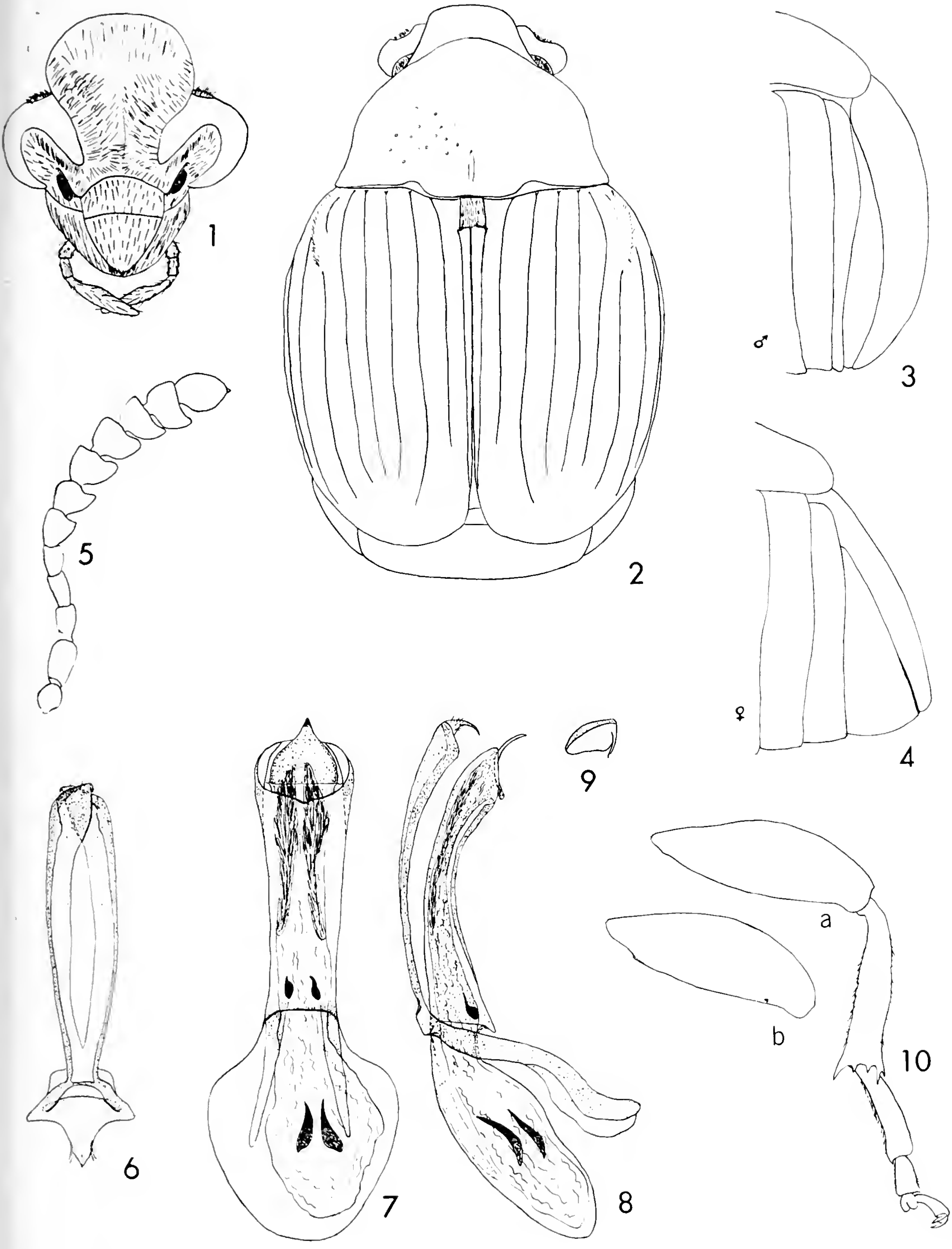
Discussion

The key characteristics leading to the genus and the species description of *idoneus* may be found in Bridwell's paper (1946). The type locality of *idoneus* is Brownsville, Texas, and additional paratype localities are San Diego and Corpus Christi, Texas, and Guerrero, Coahuila, and Reynosa, Tamaulipas, Mexico. The type locality of *flavicornis* is Guanajuato, Guanajuato, Mexico. The specimens Schaeffer correctly listed as *flavicornis* from Brownsville and San Diego, Texas, are probably the same as those designated by Bridwell as paratypes of *idoneus* from the same localities.

Two of the final three key characters which Bridwell used to distinguish *Abutiloneus,* "elytra with striae 5 and 6 abbreviate at apex, hind femora entirely without carinae or denticles beneath," are variable. The striae in *Abutiloneus* are *all* abbreviated to some extent (fig. 2) and are variable in their comparative lengths. Differences are noted in this character even in the right and left elytra of several paratype specimens of *idoneus*.

While the hind femora of *Abutiloneus* are entirely without carinae, several specimens examined (including the specimens of *flavicornis*), contrary to the statement in the key, do possess a minute denticle (fig. 10b) visible with 120X magnification, but others are devoid of any armature.

In the 7 paratype males of *idoneus* dissected, and in the specimen of *flavicornis* examined, no variation in the form or placement of genital armature was detected. Apparently, in this species, as in most of the Bruchidae, the male genitalia will provide the most reliable characters for identification at the species level. Whether genitalia will be critical in generic delimitation remains to be seen. In external appearance,



FIGURES 1-10, *Abutiloneus flavicornis* (Sharp). 1—Head, cephalic aspect. 2—Body, dorsal aspect. 3—Pygidium, male, lateral aspect. 4—Pygidium, female, lateral aspect. 5—Left antenna. 6—Parameres, dorsal aspect. 7—Median lobe, ventral aspect. 8—Median lobe and tegmen, lateral aspect. 9—Right paramere, caudal aspect. 10—Posterior leg; a, left leg, lateral aspect; b, right femur, inner face.

flavicornis resembles the members of a large complex of very small acanthoscelidine Bruchidae which includes *Acanthoscelides aequalis* (Sharp), *A. schrankiae* (Horn), *A. griseolus* (Fall), and many other described and undescribed American species. The armature of the hind femora in this group usually consists of one short acute spine and 2 denticles on the inner ventral margin. The condition found in *flavicornis* probably represents a reduction of this combination. No other species I have seen can be placed near *flavicornis* on the basis of genitalia or on the femoral armature. For these reasons, I believe that *Abutiloneus* should retain generic status until further studies can be made at the generic level.

I wish to thank Dr. R. T. Thompson of the British Museum staff for arranging the loan of specimens of *flavicornis*.

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Literature Notice

NAVAHO INDIAN ETHNOENTOMOLOGY. By L. C. Wyman and F. L. Bailey. Univ. New Mexico Publ. Anthropology No. 12, 158 pp., illus. 1964.—An interesting account of the importance and use of insects in Navaho mythology, medicine, and daily life. The Navaho system of insect classification and nomenclature is presented and explained. Some names are very odd; among the beetles are ear traveler for carabid, rain beetle for cerambycid, corn louse for coccinellid, fire bug for lampyrid, big rock beaver for scarabaeid, fast running bug for cicindelid, soil blower for curculionid, and urine squirter for tenebrionid.

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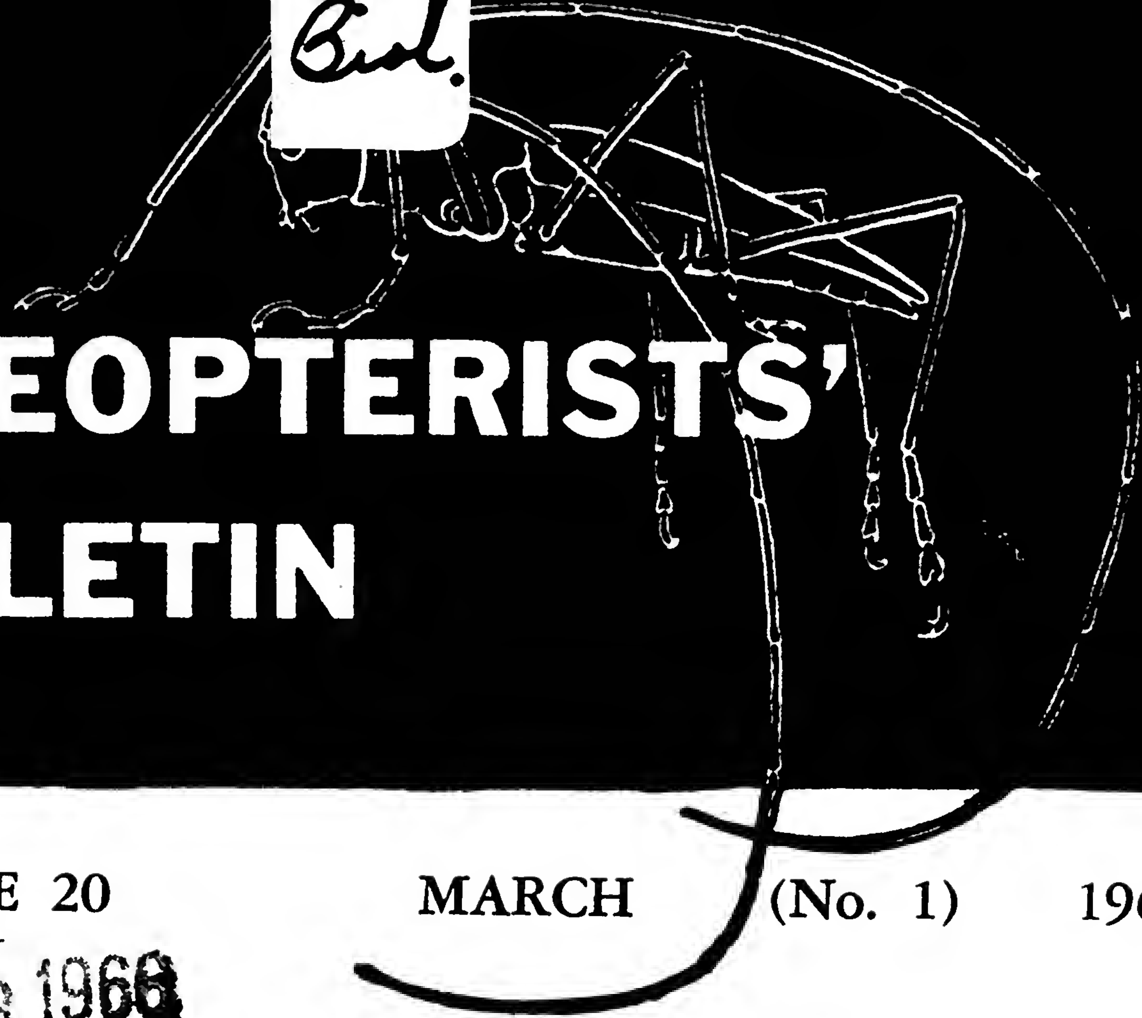

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A Quarterly Publication Devoted to the Study of Beetles

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A QUARTERLY PUBLICATION DEVOTED TO THE STUDY OF BEETLES

The Coleopterists' Bulletin

Volume 20 March (No. 1) 1966

TWO REMARKABLE NEW SOUTH AMERICAN SPECIES OF SCHIZOGENIUS PUTZEYS (COLEOPTERA: CARABIDAE).

By Donald R. Whitehead[1]

Neotropical members of the scaritine genus *Schizogenius* are very poorly understood, and, indeed, it is impossible to recognize many of the described species from their descriptions. Because of inadequate material, to revise them now would be impractical; and isolated descriptions of new taxa without a firm basis for classification certainly would be undesirable. In a proposed revision of North American *Schizogenius,* however, I plan to develop a classification of the genus. Consequently I wish now to provide names for two very aberrant and highly distinctive new species for future reference. These two unrelated South American species are unique in their lack of discal setae on the elytra coupled with possession of short but conspicuous paramedian pronotal sulci.

Measurements were made with an eyepiece micrometer mounted in a stereoscopic microscope at 50 and 150 magnifications, as follows. TL—total length, represented as the sum of the head length from base of eye to antero-lateral angle of clypeus, plus pronotal length (LP) along midline, plus length of left elytron (LE) along suture from base of sutural tubercle to apex. (The LE measurement is the most convenient indication of size.) WH—maximum width of head through eyes. WF—minimum width of frons between eyes. PS—distance from apex of paramedian pronotal sulcus to base of pronotum. WP—maximum width of pronotum. WE—maximum width across both elytra. Ta—length of hind tarsus, excluding claws. Ti—length of hind tibia. The length of the aedoeagus (LA) is the straight line distince from the dorsal margin of the basal orifice to the apex.

The habitus drawings were made with the aid of a camera lucida. An ocular grid was used in preparation of the other drawings.

Material used in this study was provided through the kindness of Dr. Philip J. Darlington, Jr. (Museum of Comparative Zoology), Mr. Hugh B. Leech (California Academy of Sciences) and Dr. Paul J. Spangler (United States National Museum). I am also grateful to Dr. George E. Ball of the University of Alberta for reading and criticising the manuscript.

[1] Department of Entomology, University of Alberta, Edmonton, Alberta, Canada.

Schizogenius carinatus Whitehead, NEW SPECIES

(FIGS. 1, 3-7)

The carinate intervals and lack of discal setae on the elytra and the well developed submarginal carinae of the pronotum are sufficient to distinguish this species from all other known *Schizogenius.*

HOLOTYPE. "BRAZIL: Matto Grosso side of Rio Araguaia, Santa Isabel" and "VIII-10 to 20-57, Borys Malkin." To be deposited in the California Academy of Sciences.

DESCRIPTION OF HOLOTYPE. Male (fig. 1). Body cylindrical. Color dark piceus, without metallic luster; antennae, maxillae, labial palpi, legs, apical margin of elytra and apical fourth of sternum six dark testaceus.

Integument. Smooth, shiny. Coarse isodiametric microsculpture limited to median and paramedian fields of clypeus, median field and all paramedian sulci of frons, genae, mentum, submentum and a pair of small paralateral patches on sternum two. Finer microsculpture on the anterior part of gula, a small median patch on prosternum, front legs except posterior surfaces of femora, middle legs, hind legs except coxae and anterior surfaces of femora, sternum one, most of sternum two including median field, sternum three in part and sternum six.

Head. Labrum weakly biemarginate, fringed with six pairs of lateral setae. Clypeus strongly tridentate apically; paramedian carinae straight, convergent on and attaining median tooth; median field triangular, slightly wider at base than greatest width of median field of frons. Clypeal suture deep and sharp behind median field of clypeus. Frons with median field bisected by a low, partly broken, longitudinal carina, not limited in front by a transverse carina; paramedian sulci subequal in width, narrower than median field; frons with five pairs of straight longitudinal carinae, all narrow at base, the first (paramedian) and fourth broader and more strongly elevated, the fifth short but well developed. Eyes large (WF/WH, 0.60), globose, coarsely faceted, the facets all subequal in size. Neck densely and coarsely punctate. Genae strongly rugose. Gula at narrowest point approximately 0.23 width of mentum. Submentum lacking numerous, scattered setae. Mentum deeply incised at middle and with antero-lateral angles of epilobes acutely produced; median tooth small, slender, sharp. Labial palpi with penultimate article bisetose. Antennae (fig. 3) with articles four to ten moderately elongate; scape with a single subapical dorsal seta, ecarinate, lacking a dorsal tubercle; pedicel with a single subapical ventral seta; articles three to eleven pubescent.

Pronotum. Very convex, transverse (LP/WP, 0.87), greatest width near middle. Sides broadly rounded into base, hind angles completely obsolete; sides with only the two standard pairs of setae. Submarginal carinae strongly developed, parallel to sides, extending from apex of pronotum to level of posterior setae. Basal carina strongly elevated above and distant from margin, basal transverse impression sharply discontinuous with marginal grooves. Paramedian sulci short (PS/LP, 0.46), shallow apically, deep and broadly hooked basally where terminated abruptly by forward extensions of basal carina; paralateral sulci absent. Anterior transverse impression punctate.

Legs. Front tarsi strongly dilated and with dense ventral pubescence; middle tarsi moderately dilated; hind tarsi slender, short (Ta/Ti, 0.68). Paronychia conspicuous, about half as long as tarsal claws. Front tibiae (fig. 4) with four evident external teeth, distal tooth nearly straight, penultimate tooth slender and elongate (seta subapical); apical and subapical spurs straight and slender, subequal in length, both shorter than penultimate tooth; front tibiae narrowed evenly to base, where much narrower than at level of subapical spur; posterior ventral margin with three setae proximad to subapical spur. Middle and hind tibiae with apical spurs very slender, very little thicker than other setae.

Elytra. Discal setigerous punctures absent, except one near base of interval three. Striae deep and sharply engraved throughout, finely punctate in basal 2/3. Intervals three to eight conspicuously carinate, the second less so; intervals two to eight all free at apex, interval one attaining margin of elytron. Lateral channel lacking conspicuous subapical pits.

Hind wings. Macropterous, wings probably functional.

Abdomen. Sternum two with median field delimited by a pair of straight, diverging paramedian carinae. Sterna three, four and five each with a single pair of paramedian ambulatory setae. Sternum six with a pair of paramedian ambulatory setae and two pairs of equidistant marginal setae. Pygidium with apical margin entire.

Male genitalia. See figs. 5-7. Median lobe markedly asymmetric (fig. 5), apex of the shaft forming a flange at approximately 45 degrees to left of center; in lateral view (fig. 6) median lobe appears arcuate, apical third not abruptly bent downward. Internal sac (fig. 7) with apical brush large and complex, with distinct but short and slender basal collar spines, and with a well developed and possibly articulated, weakly sclerotized dorsal cap sclerite (which in repose forms a cap over the brush).

Measurements. TL, 3.85 mm. LE, 2.38 mm. WH, 0.81 mm. WP, 1.12 mm. WE, 1.32 mm. LA, 0.73 mm.

VARIATION. Unknown. Female will probably be found to lack paramedian ambulatory setae of sternum six, front tarsi should be more slender and less densely pubescent, and margin of pygidium may be either crenulate or entire.

DISTRIBUTION. *S. carinatus* is known only from the holotype, from central Brazil.

REMARKS. Some characteristics of *S. carinatus* which are absent or infrequent elsewhere in the genus are as follows. 1. The median longitudinal carina and coarse microsculpture of the median field of the frons (found also in certain species of the *riparius-darlingtoni* complex). 2. The strongly raised submarginal carinae of the pronotum (these carinae are also well developed in *S. strigicollis* Putzeys, less so in a few others). 3. The complete loss of hind angles of the pronotum. 4. The carinate elytral intervals (said to pertain also to *S. impressicollis* Putzeys, a species I haven't seen), all of which terminate independently at the apex. 5. The lack of discal setae on the elytra (this condition occurs also in some members of the *optimus-clivinosides-dyschirioides complex,* and in *S. grossus,* n. sp.).

I am unable to deduce any reasonable interpretation of relationships from these data. I suspect that all of these characteristics are specializations which have probably evolved, independently, more than once. Clearly, however, *S. carinatus* belongs in a group by itself.

Schizogenius grossus Whitehead, NEW SPECIES

(Figs. 2, 8-13)

The very large size and maculate elytra, the shallow striae and lack of discal setae on the elytra, the presence of ten or more pairs of laterally fringing setae on the labrum, and the reduced pubescence of antennal articles three and four will all serve to separate this species from other known *Schizogenius.*

HOLOTYPE. "Rio Madeira, Brazil. Mann & Baker" and "BROOKLYN MUSEUM COLL 1929." To be deposited in the United States National Museum, USNM 68012.

DESCRIPTION OF HOLOTYPE. Male (fig. 2). Body very stout, subcylindrical. Color dark castaneus, without metallic luster; legs paler; antennae, maxillae, labial palpi and elytra (except for a large, dark castaneus medio-sutural maculation) dark testaceus.

Integument. Smooth, slightly dulled by very weak, imperfectly isodiametric microsculpture. Genae, elytra and abdomen with distinct isodiametric microsculpture, their surfaces strongly dulled. Coarse microsculpture absent from paramedian frontal sulci, and absent from small paralateral patches on sternum two.

Head. Labrum weakly biemarginate, fringed with ten pairs of lateral setae. Clypeus with lateral apical teeth strong and blunt, median tooth subobsolete, margin thus bisinuate; paramedian carinae nearly straight, convergent toward median tooth, obsolete in apical half; median field triangular, width at base more than 1.5 greatest width of median field of frons. Clypeal suture obsolete. Frons with median field smooth, lacking median carina, closed in front by a transverse carina; paramedian sulci decreasing in width outward from median field, the broadest only slightly narrower than median field; frons with four pairs of well-developed longitudinal carinae between eyes, fourth (outer) broader and more strongly elevated, fifth nearly obsolete, second and third bowed outwards at middle, all narrow and somewhat abbreviated at base. Eyes small (WF/WH, 0.75), subglobose, facets all small and equal in size. Neck finely and sparsely punctate at middle, obliquely rugose, and rugae convergent basally. Genae finely rugose in front, smooth behind. Gula at narrowest point approximately 0.09 width of mentum. Submentum lacking numerous, scattered setae. Mentum shallowly incised at middle and with anterolateral angles of epilobes acutely produced; median tooth short, blunt, broad. Labial palpi with penultimate article bisetose. Antennae (fig. 8) with articles four to ten moniliform, slightly transverse; scape with a single subapical dorsal seta, carinate dorsally beyond seta, lacking a dorsal tubercle; pedicel short, with a single submedian ventral seta; articles three and four plurisetose (not pubescent), most of setae short and fringing around apex; articles five to eleven pubescent.

Pronotum. Very convex and transverse (LP/WP, 0.74), greatest width near middle. Hind angles short but sharp, interrupting lateral grooves; side margins broad, sharply emarginate at anterior seta, lobate in front; sides with only the two standard pairs of setae. Submarginal carinae absent. Basal carina moderately elevated above margin, basal transverse impression not continuous with posterior marginal grooves. Paramedian sulci rather short (PS/LP, 0.62), shallow apically, deep and broadly hooked basally where terminated abruptly by forward extensions of basal carina; paralateral sulci absent. Anterior transverse impression shallow and impunctate, but somewhat irregular due to slight rugosity of pronotal disc.

Legs. Front and middle tarsi slender, lacking dense ventral pubescence; hind tarsi slender, very elongate (Ta/Ti, 1.10). Paronychia very short and inconspicuous, subequal in length to basal width of tarsal claws. Front tibiae (fig. 9) with three evident external teeth, distal tooth broadly curved, penultimate tooth short and stout (seta subbasal); apical and subapical spurs straight and slender, both longer than penultimate tooth, subapical spur much longer and subequal in length to distal tooth; front tibiae narrowed evenly to base, where much narrower than at level of subapical spur; posterior ventral margin with four setae proximad to subapical spur. Middle and hind tibiae with apical spurs much thicker than and distinct from other setae.

Elytra. Discal setigerous punctures lacking, except one near base of interval three. Striae shallowly engraved (especially toward apex), finely punctate in basal 2/3. Intervals two to seven moderately convex, eighth narrow but carinate only toward apex; intervals three and five broadly joined with interval seven at apex, interval one attaining margin of elytron. Lateral channel lacking conspicuous subapical pits.

Hind wings. Sternum two with median field limited by a pair of straight, diverging paramedian carinae. Sterna three, four and five each with a single pair of paramedian ambulatory setae. Pygidium with apical margin entire.

Male genitalia. See figs. 10-13. Median lobe nearly symmetric (fig. 10); apical portion of shaft compressed and abruptly bent downward (fig. 12), with paired carinate margins ventro-laterally (figs. 10-11). Internal sac (fig. 13) with apical brush markedly reduced, lacking collar spines or any other evidently enlarged sclerites or enlarged spine-like structures, and also apparently lacking dorsal cap sclerite. (I am not perfectly certain, however, that the internal sac was properly everted; because of very considerable reduction in visibly sclerotized structures, no satisfactory reference point was found.)

Measurements. TL, 7.02 mm. LE, 4.32 mm. WH, 1.80 mm. WP, 2.48 mm. WE, 2.55 mm. LA, 1.32 mm.

ALLOTYPE. "Bolivia Prov. Sara Steinbach" (handwritten) and "Museum of Comparative Zoology." Te be deposited in the Museum of Comparative Zoology.

DESCRIPTION OF ALLOTYPE. Female. Specimen lacks outer three articles of left antenna and outer article of right antenna, shows wear or loss of tarsal claws, and is somewhat darkened (due probably to immersion in some fluid). Secondary sexual characters lacking in *S. grossus,* so allotype differs appreciably from the holotype only in mensural characters. Eyes slightly larger (WF/WH, 0.72), pronotum slightly less transverse (LP/WP, 0.75), paramedian pronotal sulci proportionately shorter (PS/LP, 0.60), and hind tarsi slightly shorter (Ta/Ti, 1.07).

Measurements. TL, 6.66 mm. LE, 4.18 mm. WH, 1.62 mm. WP, 2.26 mm. WE, 2.52 mm.

PARATYPES. BOLIVIA: Comatindi (one female); Tiguipa (one female). BRAZIL: Rio Madeira (one male). All of these will be deposited in the United States National Museum.

VARIATION. The chief observed variations are in size (LE, 3.90-4.90, mean 4.44 mm.) and, to a lesser degree, in proportions (WF/WH, 0.69-0.75, mean 0.72; LP/WP, 0.73-0.75, mean 0.74; PS/LP, 0.60-0.68, mean 0.63; Ta/Ti, 1.07-1.12, mean 1.09). Some other variations worthy of record are: male genitalia (see figs. 10-11); size of sutural macula (extends to interval three in male paratype, to interval four in other specimens); fringing setae of labrum (thirteen pairs in the Comatindi specimen); and rugosity of pronotum (quite rugose in allotype and male paratype). Certain secondary sexual characters which frequently are present in other species are not found in *S. grossus;* thus, male front tarsi unmodified, female pygidium entire and both sexes lack paramedian ambulatory setae on sternum six.

DISTRIBUTION. *S. grossus* is represented by the five specimens listed as type material. All are from the Amazon Basin of Bolivia and Brazil.

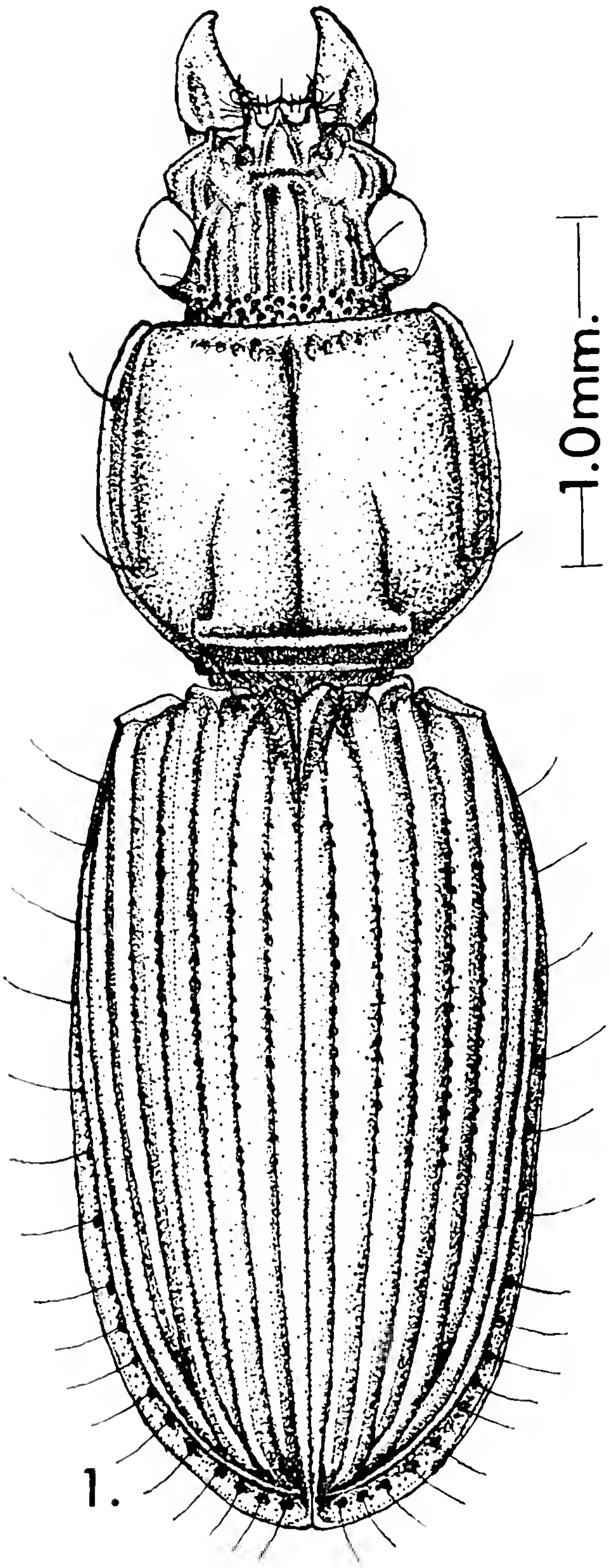
REMARKS. Several characteristics of *S. grossus* are unknown in other *Schizogenius,* as follows. 1. The narrow gula. 2. The sparsely setose third and fourth antennal articles. 3. The shallow emargination of the mentum. 4. The unusually large number of fringing setae of the labrum. 5. The additional (fourth) basal, postero-ventral seta of the front tibiae. 6. The shallow elytral striae. 7. The remarkably elongate tarsi. 8. The reduced apical brush of the male genitalia.

Some affinity with the *optimus-clivinoides-dyschirioides* complex may be suggested by a general similarity in most other respects, including the absence of secondary sex characters. However, species of that group lack well developed paramedian pronotal sulci, and they have a sharply and deeply emarginate labrum. As in the case of *S. carinatus,* this species is not closely allied with any others and belongs in a group of its own.

S. grossus is the largest known *Schizogenius* (hence its name). Of the next largest species, the relatively slender *S. quadripunctatus* Putzeys from Brazil, only the largest examples (maximum LE, 3.93 mm.) are within the size range of *grossus.* One very large Guatemalan specimen of the heavy-bodied *S. optimus* Bates (LE, 3.76 mm.) is nearly as large as the smallest *S. grossus,* so perhaps they too overlap.

Key to Major Elements of Schizogenius

1. Lateral channel of elytra with one or more deep subapical pits ---------- **CRENULATUS-TENUIS-QUINQUESULCATUS** COMPLEX
   Lateral channel of elytra without deep subapical pits ---------- 2
2. Pronotum lacking paramedian longitudinal sulci ---------- **OPTIMUS-CLIVINOIDES-DYSCHIRIOIDES** COMPLEX
   Pronotum with deep paramedian longitudinal sulci ---------- 3
3. Articles three and four of antennae plurisetose ---------- **GROSSUS** Whitehead
   Articles three and four of antennae pubescent ---------- 4
4. Elytral intervals lacking setigerous punctures ---------- **CARINATUS** Whitehead
   Elytral intervals three, five and usually seven each with a row of setigerous punctures (only on interval three in **quadripunctatus**) -- REMAINING SPECIES OF **SCHIZOGENIUS**



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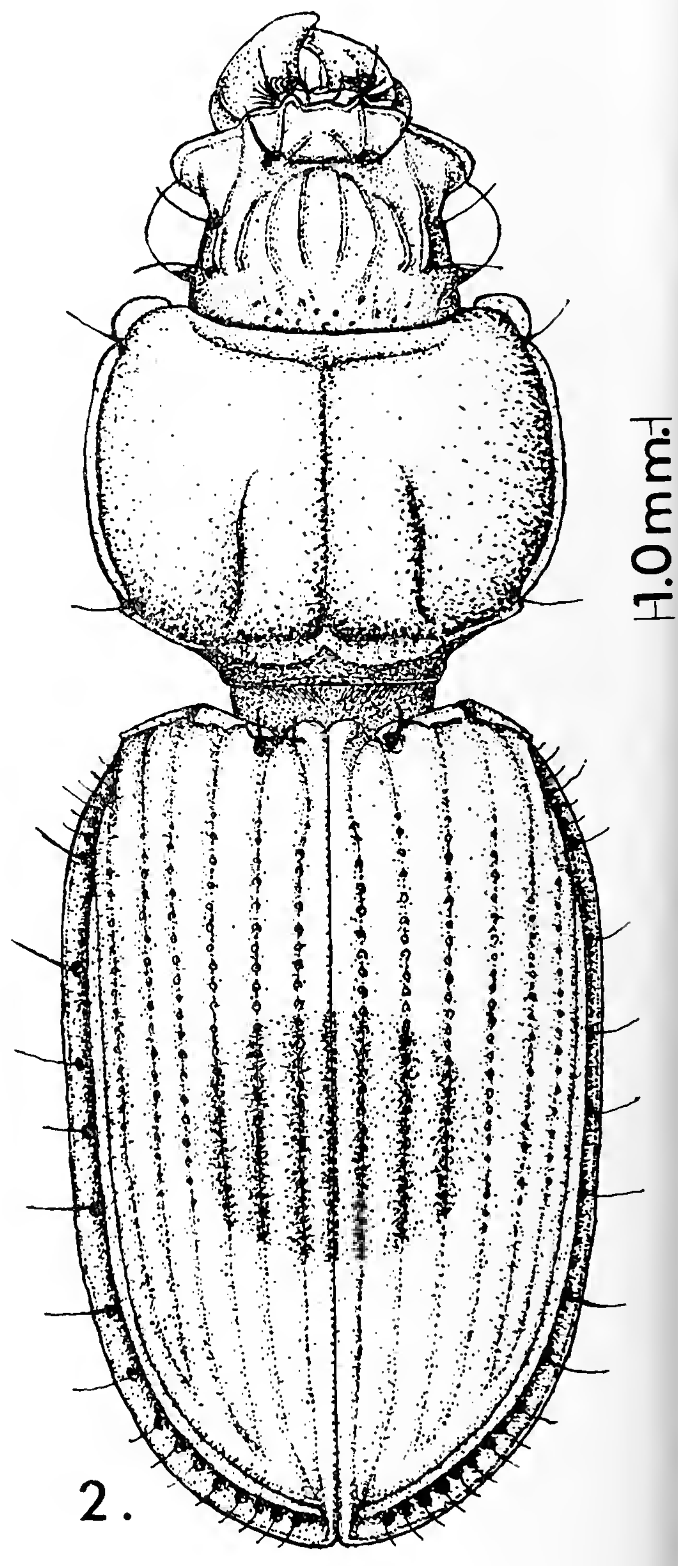

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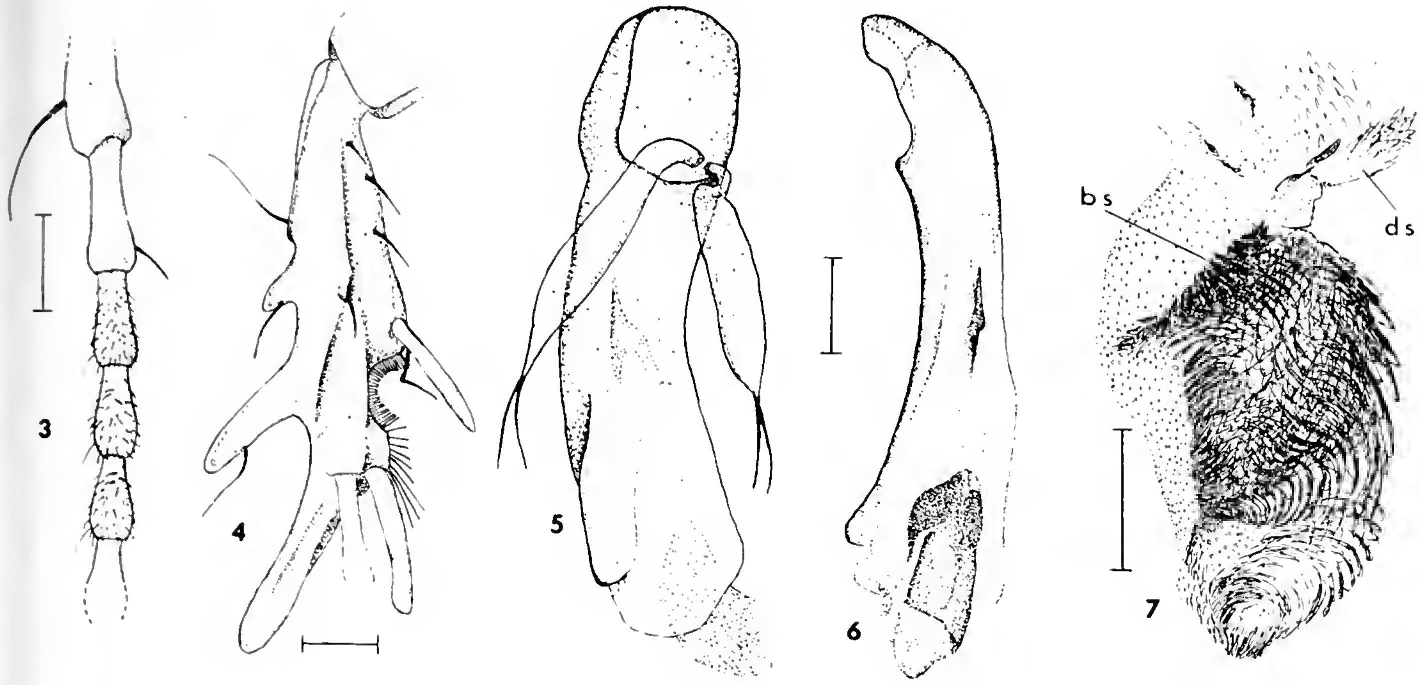
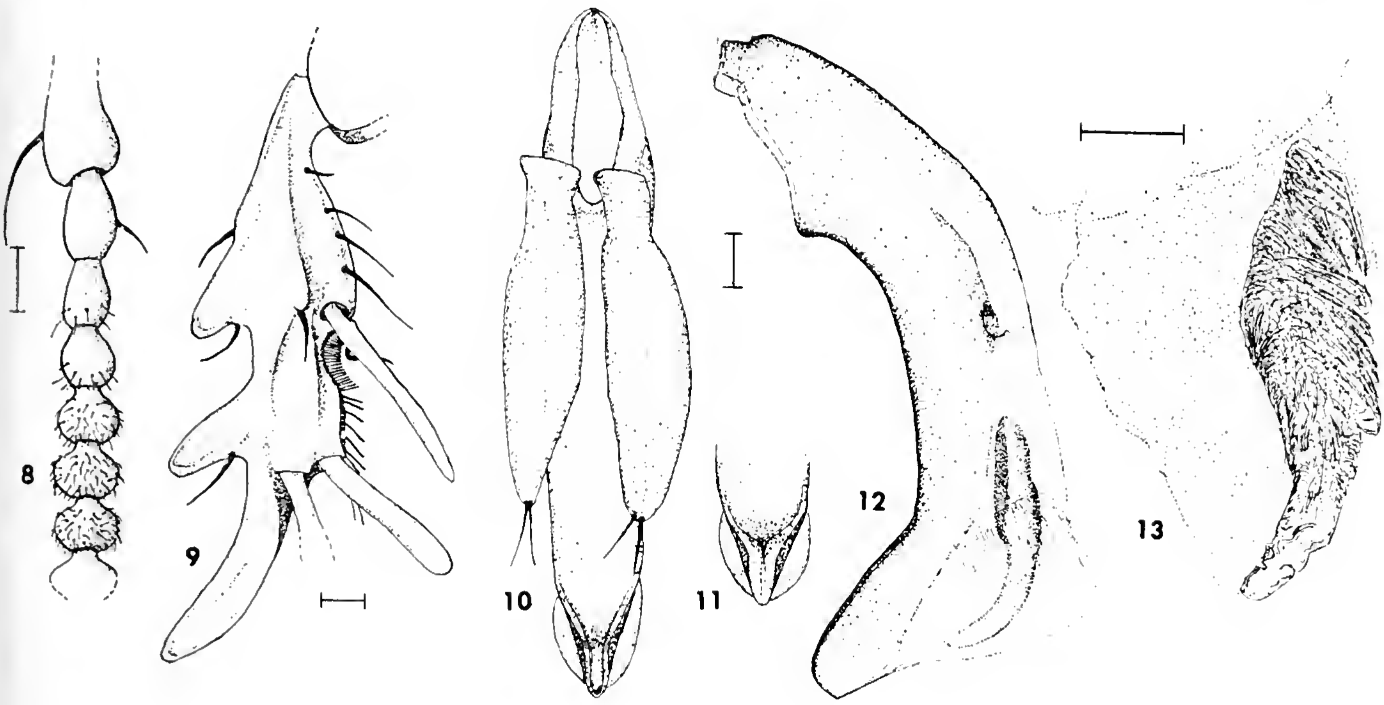
Figure 1, *Schizogenius carinatus*. Body, dorsal view.

Figure 2, *Schizogenius grossus*. Body, dorsal view.





FIGURES 3-7, *Schizogenius carinatus*. 3—Antenna, basal articles. 4—Front tibia, posterior view. 5—Aedoeagus, ventral view. 6—Aedoeagus, lateral view, 7—Internal sac (bs—basal collar spines; ds—dorsal cap sclerite).

FIGURES 8-13, *Schizogenius grossus*. 8—Antenna, basal articles. 9—Front tibia, posterior view. 10—Aedoeagus, ventral view (holotype). 11-Apex of same (paratype). 12—Aedoeagus, lateral view. 13—Internal sac.

(The line scales represent 0.10 mm.)

LITERATURE NOTICE

EXTERNAL CHARACTERS OF SIBLING SPECIES TRECHUS OBTUSUS ER. AND T. QUADRISTRIATUS SCHRK. (COLEOPTERA). By P. J. den Boer. Tijdschr. Ent. 108(9):219-239, illus. 1965.—Morphological structures are analyzed statistically in these two European species. It seems to be quite thorough.

A NEW SPECIES OF COLLOPS FROM WASHINGTON STATE (COLEOPTERA: MELYRIDAE)

By LOREN RUSSELL[1]

Collops dimorphicus Russell, NEW SPECIES

MALE: Elongate-oblong, depressed for the genus, widest at apical third of elytra. Head, pronotum and femora black; tibiae and tarsi rufous to black; labrum, apical half of clypeus, maxillae and mandibles testaceous to rufous; tips of mandibles darker, palpi black; antennae piceous with true second segment and posterior surfaces of first and third segments testaceous. Elytra shining violaceous to greenish black, with testaceous maculation at lateral and apical margins as figured, this maculation in one specimen extending narrowly along suture to mid-elytral level. Lower surface of body piceous, paler in membranous areas, shining. Entire body surface alutaceous, most densely so on pronotum.

Head with front flattened, densely and confluently punctured. Antennae 11-segmented, long, exceeding pronotum by four to five segments with head partly deflexed, strongly serrate; first segment expanded apically; second segment much reduced, obscured by first segment in direct dorsal view; third segment flattened, irregularly triangular in outline, anterior margin arcuately expanded, not excavated or deformed as in most *Collops* males.

Pronotum transverse, about 1.6 times as wide as long, widest behind middle, transversely convex, all angles broadly rounded. Faint callosities evident near hind angles in some specimens. Pubescence of head and pronotum similar, of sparse, dark, erect setae intermixed with abundant, fine, light, forwardly decumbent hairs.

Elytral apices divergent, subrectangular, surface somewhat scabrous, with sparse erect setae intermixed with more abundant fine semierect hairs. Hind wings of normal length. One or two abdominal tergites exposed by elytra, terminal segment triangular, its apex truncate and sometimes minutely emarginate. Protarsi four-segmented, other tarsi five-segmented; claws with membranous appendages.

FEMALE: Similar to male except in following characters. Body larger, abdomen considerably expanded laterally; elytra narrower, narrowed slightly apically from basal fourth, apices separately arcuately rounded, abbreviated to expose three or four apical tergites and lateral portions of additional segments; lateral abdominal vesicles very prominent. Wings vary from almost as long as elytra to nearly absent. Antennae slightly serrate, shorter, second segment obvious in dorsal view; third segment slightly enlarged, similar in shape to fourth segment. First three antennal segments testaceous except anterior apical quadrant of first segment and apical half of third segment. Eyes relatively much smaller and less convex, front somewhat more transverse. All tarsi five-segmented.

LENGTH: male, 3.0-3.3 mm.; female, 3.6-4.5 mm.

Holotype male, allotype female and three male and twelve female paratypes, all "Grand Coulee, Wash. / Dry Falls / V-8-1965 / on *Eriogonum* L. Russell." The type series was picked from the flowers of these very low plants, all within a thirty yard radius. None were present in sweepings taken in the same area. The holotype and allotype are in the author's collection; paratypes are there and in the University of Washington collection.

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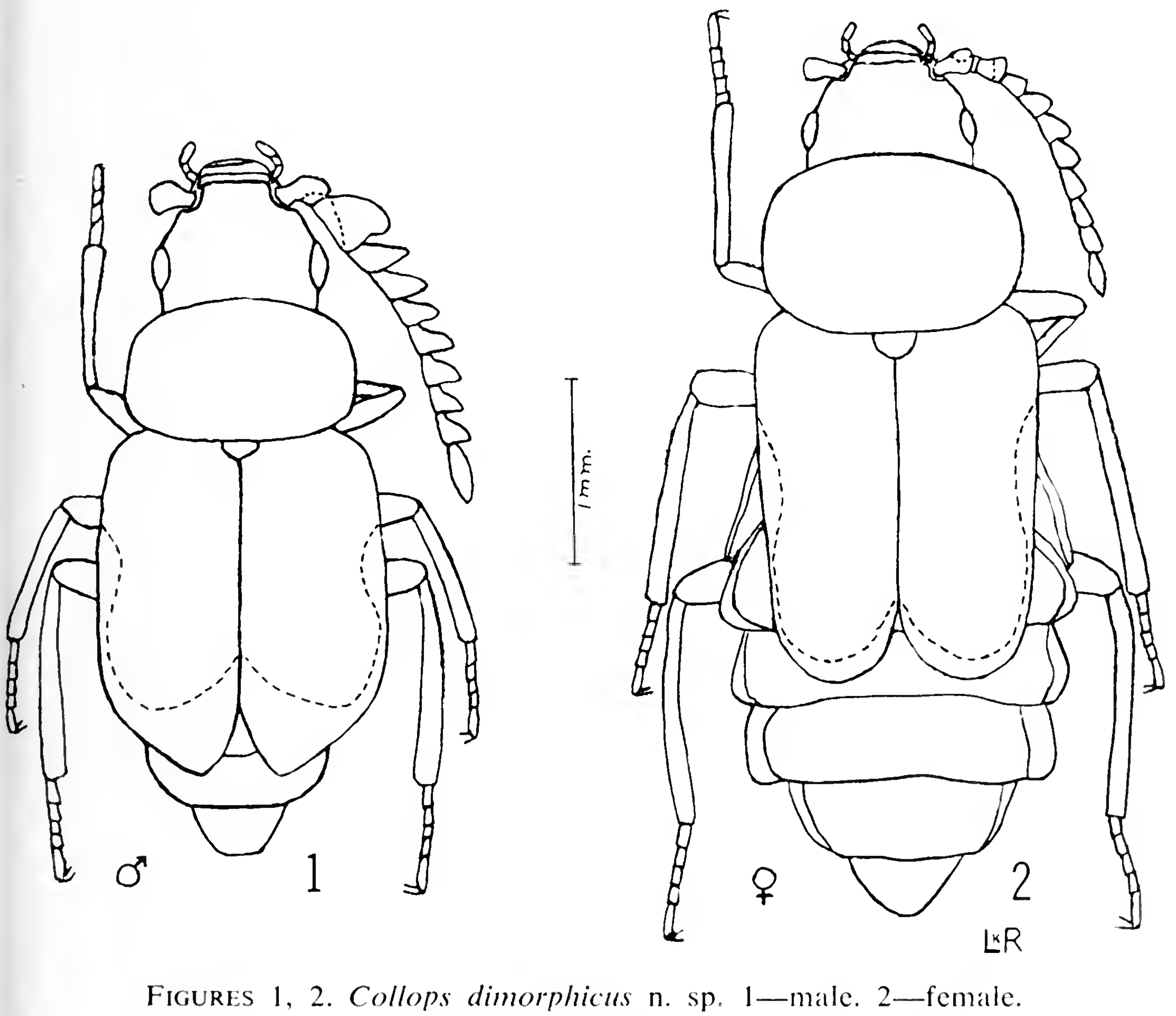
[1] Thomas Burke Memorial Museum and Department of Zoology, University of Washington, Seattle, Washington.

Among North American *Collops* only the central Californian *C. simplex* Marshall resembles the present species in the undistorted triangular third antennal segment of the male and in the marked sexual dimorphism in head shape and eye size. The *simplex* male type lacks elytral maculation, and its presumptive female possesses normal elytra. The abbreviated, apically narrowed elytra of female *dimorphicus* seem unique in *Collops*. Among North American species *C. cribrosus* LeC. and *C. crusoe* Fall are flightless in both sexes, but these possess full length elytra with narrow humeri, as well as the usual modifications of the male antennae. If *simplex* and *dimorphicus* are accepted as species of *Collops,* that genus should be defined by the *reduced* second antennal segment, rather than by the usual statement, "antennae apparently 10-segmented, third segment distorted in male."

The following key separates *dimorphicus* and *simplex* from the species included in Fall's key to North American *Collops* (1912:251).

1. True third antennal segment of male very large, excavated dorsally and appendiculate; pronotum usually smooth and shining; elytra of normal length --- Groups A, B, C of Fall
   Third antennal segment of male triangular, enlarged but not excavated or appenicu-late; pronotum alutaceous -- 2
2. Female elytra short, widest near humeri; elytra maculate and pronotum immaculate in both sexes -- DIMORPHICUS n. sp.
   Elytra normally long, exposing only pygidium; elytra and pronotum maculate in female allotype, male type immaculate -------------------------- SIMPLEX Marshall



FIGURES 1, 2. *Collops dimorphicus* n. sp. 1—male. 2—female.

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LITERATURE NOTICE

NORTH DAKOTA WATER BEETLES. By R. D. Gordon and R. L. Post. North Dakota Insects, Publ. No. 5, 53 pp., illus. 1965.—This is a manual with keys, descriptions, and distributions for 135 species in 10 families.

NOTAS SOBRE ANOBIDOS (COLEOPTERA). By F. Espanol. Eos 41 (1): 45-58, 22 figs. 1965.—Concerning *Ptilinus,* its characteristics, relationships, placement, relatives, and reassignment of some of its species into old and new genera.

STAPHYLININI UND QUEDIINI VON CANADA UND ALASKA (COL. STAPHYLINIDAE). By A. Smetana. Acta Universitatis lundensis, Sectio II, Medica, Mathematica, Scientiae rerum naturalium, No. 13, 18 pp., 9 figs. 1965.—A report on specimens collected by Lindroth, mostly locality records and general notes on distributions, with a new subspecies. (This recently new magazine is a continuation of Lunds Universitets Arsskrift, N. F. Avd. 2.)

A TAXONOMIC STUDY OF LOUISIANA CARABIDAE (INSECTA: COLEOPTERA). By R. T. Allen. Proc. Louisiana Acad. Sci. 28:56-85, 29 figs. 1965.—Contains keys to all species and parish records of capture. Some parts and whole beetles are illustrated.

A KEY TO NORTH AMERICAN STATIRA (COLEOPTERA: LAGRIIDAE). By C. T. Parsons. Psyche 72(3):241-254, 12 figs. 1965.—Sixteen species are included with the key and locality records. A new species, from Florida, is described.

VERGLEICHEND-MORPHOLOGISCHE UNTERSUCHUNGEN DER AEDEAGI DER MITTELEUROPAISCHEN MELIGETHINI (COL., NITIDULIDAE). By F. Blazejewski. Polskie Pismo Ent. 35(2):267-390, 83 figs. 1965.—Parameres and penes of 62 species are described in detail. The evolution of various aedegal types in the Meligethini are discussed.

REVISION OF DIAPERINI OF AMERICA NORTH OF MEXICO WITH NOTES ON EXTRALIMITAL SPECIES (COLEOPTERA: TENEBRIONIDAE). By C. A. Triplehorn. Proc. U. S. Nat. Mus. 117(3515):349-458, illus. 1965.—This revision will be welcomed by anyone having trouble identifying members of the tribe; the excellent keys, descriptions, and illustrations are the reason. Though the work stresses species of the United States, it shows many of the relationships of those species with the Latin American species. 34 species in 9 genera are included, with one species and genus being given incertis sedae status. Triplehorn has done a good job.

A NEW SPECIES OF DEROVATELLUS FROM GUATEMALA AND A DESCRIPTION OF ITS LARVA (COLEOPTERA: DYTISCIDAE)

By PAUL J. SPANGLER[1, 2]

The genus *Derovatellus* in the Western Hemisphere presently includes *D. lentus* (Wehncke), *D. lentus floridanus* Fall and *D. bruchi* Zimmerman. These species are similar in shape and color. *D. lentus* was described from Puerto Rico by Wehncke (1876) and has been reported from the following localities: Santa Rita and Santa Cruz [Brazil] by Sharp (1882); Dominican Republic, Haiti, Trinidad and Colombia by Young (1954). The subspecies D. *lentus floridanus* is known only from Florida, and *D. bruchi* is reported only from the type locality in Argentina.

During the summer of 1965 I collected a series of an interesting *Derovatellus* from Guatemala. The specimens were very similar to those of *D. lentus* that I collected in Puerto Rico but the elytral maculae seemed more distinct. The Guatemalan specimens were also interesting even if they were *D. lentus* and not a new species because they represented the first record of the genus from Central America. When I compared the Guatemalan specimens with those from Puerto Rico, I found that the Guatemalan series did indeed represent a new species. The species is described below and is dedicated to my friend Dr. Jorge Ibarra, Founder and Director of the National Museum of Natural History of Guatemala. Dr. Ibarra kindly helped me in many ways during my field activities in Guatemala and made my collecting there much more fruitful.

This new species is very similar to *D. lentus* (figs. 7-12) but may be distinguished from it by the alutaceous sculpture of head restricted to the area behind the posterior margin of the eyes, by the moderately coarse and sparse pronotal punctures, by the very fine, almost indistinguishable elytral punctures and by differences in the male genitalia (figs. 4, 5, 6).

Derovatellus ibarri Spangler, NEW SPECIES

(FIGS. 1-6)

Length of holotype male, 4.0 mm., greatest width 1.8 mm. Color of head testaceous; pronotum testaceous except small fuscous basal area; elytra black except for three transversely arranged, testaceous, postmedian maculae and another macula laterad along apical margin on each elytron; venter dark reddish brown except last abdominal segment lighter brown; antennae, mouthparts and legs testaceous. Head finely, sparsely punctate and faintly alutaceous between eyes and pronotum; punctures very fine and sparse on clypeus; clypeus curved downward and backward and arcuately emarginate; labrum finely sparsely punctate, deeply emarginate medially and dense fringe of golden setae in emargination. Antenna 11-segmented; basal and ultimate segments largest, subequal; second segment slightly

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[1] Department of Entomology, United States National Museum, Smithsonian Institution, Washington, D. C.

[2] This study was made possible in part by grant GB-1697 from the National Science Foundation.

shorter than first segment; third segment small, about two-thirds as long as second segment; fourth segment smallest, about one-third as long as second segment; additional segments subequal in length. Maxillary palpus four-segmented, basal two segments subequal in length; ultimate segment largest, swollen and longer than basal three combined. Labial palpus three-segmented, basal two segments small, subequal; ultimate segment swollen and four times longer than penultimate segment.

Pronotum moderately coarsely, moderately densely punctate; punctures on disk separated by a distance almost equal to their width and each puncture bears a long, fine golden hair; lateral punctures denser than those on disk; surface smooth between punctures or at most vaguely alutaceous; lateral margin arcuate but not forming continuous arc with elytra; finely, evenly margined laterally; base bisinuate; anterolateral angles produced anteriorly; posterolateral angles obtuse. Prosternum with process narrow between procoxae but expanded and three times wider behind coxae; expanded posterior portion with distinct longitudinal ridge in posterior half; process not attaining metasternum.

Elytra finely, sparsely punctate; punctures separated by a distance equal to twice their width and each with a long, fine golden hair; surface between punctures with vague, transverse strigae. Scutellum not visible.

Ventral surface of metathorax alutaceous; with coarse, shallow, sparse punctures; punctures separated by one or one and a half times their width; metasternal wings very short and feebly curved posteriorly; metacoxal processes diverge anteriorly, converge and then expand posteriorly, conjointly emarginate medially and sulcate longitudinally.

Abdominal segments with surface alutaceous. First abdominal segment with two indefinite rows of coarse punctures, one medial and one along hind margin; second and third segments twice as long as first segment, with numerous coarse punctures separated by a distance equal to one or one and a half times their width; fourth and fifth segments each with coarse median puncture bearing a tuft of long setae and each with a transverse row of coarse punctures along anterior and posterior margins of segments and few punctures scattered between rows; last abdominal segment with a few coarse punctures laterally and medially, a flattened tonguelike medial process with short golden setae on hind margin at apex (difficult to distinguish on dry specimens but indicated by marginal groove and golden setae).

Legs smooth. Proleg with coxa globular; trochanter about one-fifth as long as femur and with small tuft of golden pubescence beneath at apex; femur swollen, almost parallel sided in basal two-thirds, feebly notched below at apex and short fringe of golden hairs in notch; tibia slender, inner margin almost straight, outer margin arcuate, upper surface with a longitudinal series of coarse seta-bearing punctures on distal half; tarsus five-segmented but appears tetramerous; first and second tarsal segments expanded, notched apically, subequal in size and both with dense pubescent pad beneath; third tarsal segment slightly longer than second, about half as wide and with pubescent pad beneath; fourth tarsal segment very small and hidden in notched apex of third segment; last tarsal segment about as long as third, with two small arcuate claws apically. Middle leg with coxa globular; trochanter about one-fifth as long as femur and densely pubescent beneath at apex; femur narrower than profemur and almost parallel sided, ventral surface with dense tuft of hairs along basal three-fifths; tibia similar to protibia but upper surface with striole on distal three-fifths bearing dense row of short golden setae; tarsal segments similar to those of protarsus. Hind leg with trochanter slightly more than one-third as long as metafemur; femur almost parallel sided but tapered distally; tibia slender, feebly arcuate, with several rows of coarse seta-bearing

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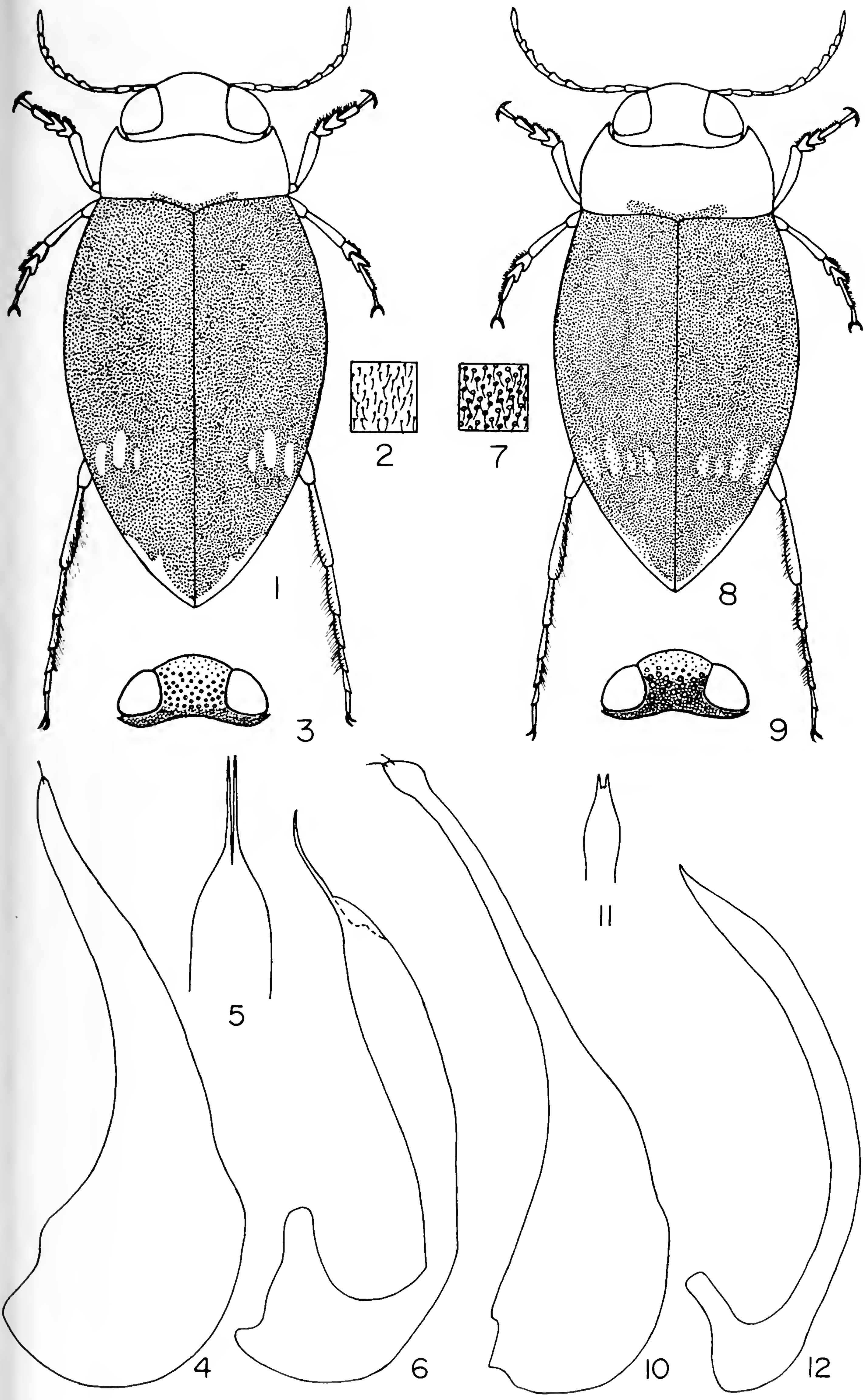
FIGURES 1-6, *Derovatellus ibarrai* n. sp., holotype. 1—Habitus view. 2—Punctation, elytral disk. 3—Head, punctures and alutaceous sculpture. 4—Right paramere, male genitalia. 5—Apex of median lobe, male genitalia, ventral view. 6—Median lobe, male genitalia, lateral view.

FIGURES 7-12, *Derovatellus lentus* (Wehncke). 7—Punctation elytral disk. 8—Habitus view. 9—Head, punctures and alutaceous sculpture. 10—Right paramere, male genitalia. 11—Apex median lobe, male genitalia, ventral view. 12—Median lobe, male genitalia, lateral view.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punctures on upper and lower margins, a fringe of golden natatory hairs on lower surface and two spurs at apex, outer spur twice as long as inner spur; tarsal segments slender, first segment longest, twice as long as second segment; second, third and last segments subequal in length; fourth segment slightly shorter than third segment; tarsal claws short, thick and blunt apically, inner claw almost twice as long as outer claw; all five tarsal segments with fringe of golden natatory hairs. Male genitalia as illustrated (figs. 4, 5, 6).

Female. Allotype similar to male except basal two segments of pro- and mesotarsus not broadly expanded, trochanters of fore and middle legs and ventral surface of mesofemur without dense tuft of golden setae.

Holotype. Guatemala, [Izabal] 1 Mi. N. Morales (Km. 239, Atlantic Hwy.), VIII-16-18-1965, Paul J. Spangler. Type No. 68918, deposited in the U. S. National Museum. *Allotype*. Same data as holotype. *Paratypes*. 12 ♂ ♂, 28 ♀ ♀, same data as holotype. One pair deposited in the California Academy of Sciences and one pair in the collection of Dr. Frank N. Young.

Variations. The type series varies in the size of the testaceous elytral maculae. In some specimens, there are four instead of three transverse postmedian maculae on each elytron, and the lateral macula along the apical margin is larger and more distinctly delimited. In a few specimens, the postmedian maculae are confluent and form a distinct transverse band. The alutaceous sculpture on the base of the head is less distinct on some specimens and especially on those that are teneral.

Key to the Species of Derovatellus

1. Size 5.0 mm.; sides of pronotum strongly rounded and widest at midlength then distinctly constricted at base; Argentina------------------------ **BRUCHI** Zimmerman
   Size less than 4.1 mm.; sides of pronotum moderately arcuate and widest at base, not constricted at base--- 2
2. Punctures of elytral disk fine (fig. 2); alutaceous sculpture of head restricted to area behind eyes (fig. 3); apex of median lobe of male genitalia with two long needlelike projections (fig. 5); Guatemala-------------------------- **IBARRAI** n. sp.
   Punctures of elytral disk coarse (fig. 7); alutaceous sculpture of head more extensive, occurring posteriorly from midlength of eyes (fig. 9); apex of median lobe of male genitalia with two short spinous projections (fig. 11)-------------- 3
3. Size 3.5 mm.-4.0 mm.; Antilles and South America---------- **LENTUS LENTUS** (Wehncke)
   Size 3.9 mm.-4.1 mm.; Florida-------------------------- **LENTUS FLORIDANUS** Fall

Habitat. On Aug. 16, 1965, a single specimen of *Derovatellus* was found after about a half hour of collecting among emergent vegetation in the shallow water of a small pond (fig. 13) in a pasture. On Aug. 18, 1965, I returned to the same pond to look for more specimens of *Derovatellus* and collected for 4 hours. During the first 3 hours, no *Derovatellus* were found as I collected in the pond at the water's edge and I began searching for other habitat niches. Adjacent to the pond in dense grass there were depressions containing water less than 3 inches deep. In these depressions (fig. 14) and in nearby water-filled hoof prints, I was able to collect 41 specimens of *Derovatellus* within an hour.

A close lookout was kept for unusual larvae that might be *Derovatellus* because the larva of this genus was unknown. Fortunately, a single, distinctive larva closely resembling the larva of *Macrovatellus* was found and is described below.

This larva was not reared to confirm its identity, but it is assumed to be correctly identified through association, elimination of known larvae,

FIGURE 13, Pond at type locality near Morales, Izabal, Guatemala.

FIGURE 14, Habitat niche beside pond at type locality.

and similarity to the larva of *Macrovatellus mexicanus* Sharp described by Spangler (1963). The larvae of *Derovatellus* and *Macrovatellus* have the elongate nasale and are as distinct from larvae of other dytiscid genera as the adults. *Derovatellus* and *Macrovatellus* along with a third genus, *Vatellus,* comprise the very distinctive tribe Vatellini. Probably when the larva of *Vatellus* is discovered it also will have the elongate nasale.

Description of the Larva

(Figs. 15-21)

Length 7.5 mm., greatest width of pronotum .85 mm. Color of integument white; dorsal sclerites of thorax and abdomen fusco-testaceous except small, gray, transverse macula laterally on pronotum as illustrated (fig. 18). Head also fusco-testaceous except for spatulate apex of nasale, a spot at base of nasale, along ecdysial cleavage line and its arms and around ocelli cream colored; ventral surface of head and mouthparts more nearly testaceous. Legs white except extreme base of coxae at point of articulation black.

Head subquadrate, slightly narrower posteriorly, with distinctive trifurcate nasale as long as length of head. Median branch of nasale narrow and parallel sided to broadly spatulate apex; dorsal surface glabrous (fig. 19) except spatulate apex with ten fine hairs along anterior margin; ventrolateral surface with two large spines on each side on anterior half; ventrally with group of 20 to 23 small spines directly behind spatulate apex; spatulate apex of nasale margined ventrally with setae as illustrated (fig. 21). Lateral branches of nasale about two-thirds as long as median branch. Each lateral branch of nasale with small Y-shaped fork at apex; five ventrolateral spines. Ecdysial cleavage line united at base and forked at basal third of head; frontal arms curve laterally and terminate between base of nasale and antenna. Dorsal surface of head glabrous except for four or five short stout setae laterally in a line below eye and five or six long hairs around ocular area. Ventral surface of head glabrous except two posterior tentorial pits at about midlength of head. Ocular area with six ocelli in two close vertical rows of three ocelli each. Antenna (fig. 16) four-segmented; second and third segments longest, subequal; ultimate segment smallest, slightly less than half as long as penultimate segment and appendage at base about one-third as long as ultimate segment; segments glabrous. Mandible long, slender, falciform, curved upward and inward apically, grooved along inner surface and a small seta ventrolaterally at base. Maxillary stipes rudimentary. Maxillary palpus (fig. 15) slender, elongate, four-segmented; first and third segments subequal in length; second segment almost twice as long as first segment; ultimate segment slightly more than half as long as penultimate segment; first segment with one long hair anterolaterally, other segments glabrous. Labium small, subrectangular, with one slender hair and two long slender spines apically between palpi (fig. 17); ligula absent; labial palpus very slender, two-segmented.

Pronotum subquadrate, wider basally, with five or six long hairs laterally and a few small setae along hind margin. Mesonotum slightly wider than and half as long as pronotum, with numerous setae along lateral and posterior margins of sclerite and a few setae scattered on disk; a spiracular opening present in pleural region below anterolateral angle of sclerite. Metanotum slightly wider than and about as long as mesonotum; setation similar to mesonotum.

Legs elongate; five-segmented; coxa long; trochanter about one-third as long as coxa; femur as long as tibia and tarsus combined; tarsus with two elongate, slender claws, outer claw slightly shorter than inner claw. Coxa with two short anterolateral setae. Trochanter with three small setae on ventral surface. Femur with four short setae on anterior (upper) surface and two long setae on posterior

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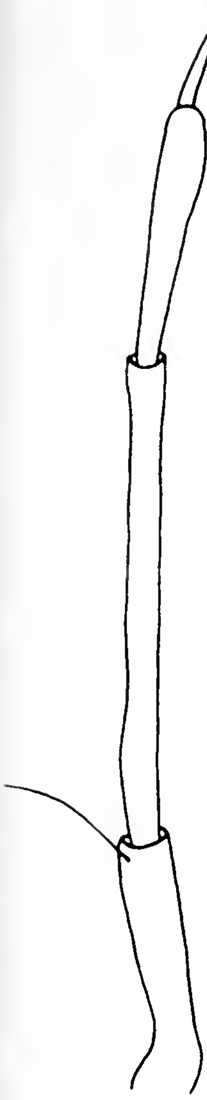
Figures 15-21, *Derovatellus ibarrai* n. sp., larva. 15—Right maxillary palpus, ventral view. 16—Right antenna, dorsal view. 17—Labium, ventral view. 18—Habitus view. 19—Nasale, dorsal view. 20—Abdominal segments 6 and 7, ventral view. 21—Apex of median lobe of nasale, anteroventral view.



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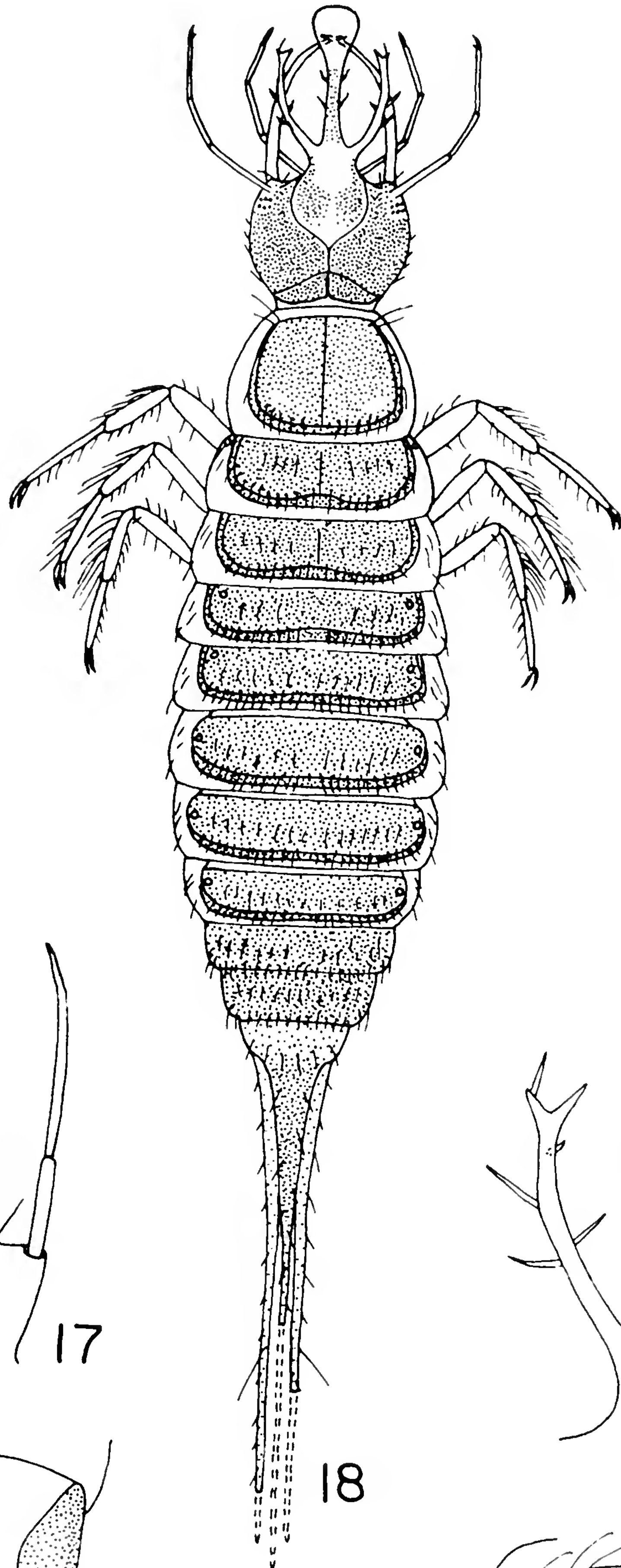

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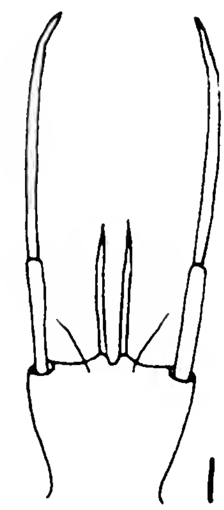

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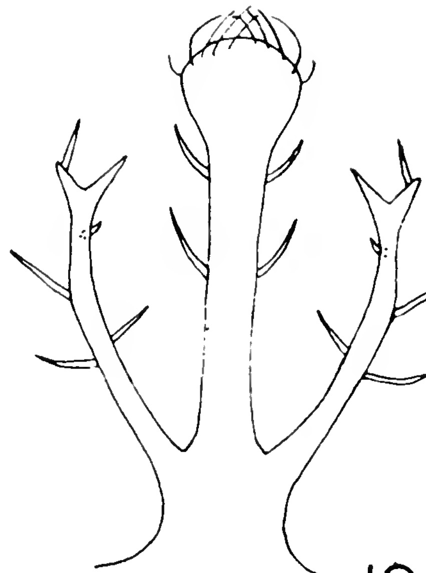

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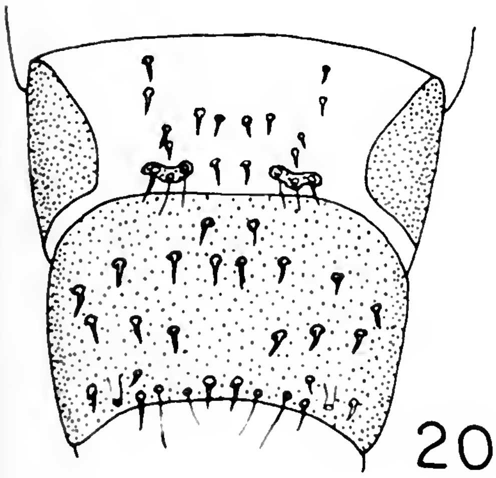

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edge. Tibia with four or five short setae on anterior surface and numerous setae on posterior edge. Tarsus with few setae on anterior surface and numerous setae on posterior edge.

Abdomen with eight distinct segments; segments 1 through 6 with dorsal sclerites; segments 7 and 8 completely sclerotized, ringlike (fig. 20). Terga of segments 1 through 7 with setae on lateral margins, across hind margins, and a few scattered over surface. Segment 8 setose over surface, prolonged posteriorly into a long, slender cercus beneath which arise two cerci of similar shape and color. All cerci are broken but apparently were unsegmented and all have numerous coarse setae throughout their length. Lateral margins of segments 1 through 7 each with a spiracle. Mesopleura, metapleura and pleural folds of segments 1 through 6 each with one to five setae arising from integument.

Although this larva resembles the larva of *Macrovatellus mexicanus,* it differs in the following ways: dorsal surface of median branch of nasale glabrous; each lateral branch of nasale with five ventrolateral spines; second and third antennal segments longest, subequal; ultimate antennal segment slightly less than half as long as penultimate segment; antennal segments glabrous; first and third segments of maxillary palpus subequal in length, second segment almost twice as long as first segment, first segment with one long hair anterolaterally, other segments glabrous.

The following couplet will distinguish the larvae of the two genera.

Second and third antennal segments longest and subequal; ultimate segment smallest, slightly less than half as long as penultimate segment -------------- **DEROVATELLUS**

First and third antennal segments longest, subequal; ultimate segment smallest, about one-seventh as long as penultimate segment ---------------------- **MACROVATELLUS**

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LITERATURE NOTICE

KLUCZE DO OZNACZANIA OWAKOW POLSKI, XII—COLEOPTERA, 24c—STAPHYLINIDAE: EUAESTHETINAE—PAEDERINAE. By A. Szujecki. Polski Zwiazek Entomologiczny, Nr. 48 serii klucyz, pp. 1-74, 202 figs. 1965.—Another in the series of keys to the insects of Poland. Besides keys and illustrations, it has a synonymical checklist of genera and species of the subfamilies concerned.

THE GENERA OF THE CHILOCORINI (COLEOPTERA, COCCINELLIDAE). By E. A. Chapin. Bull. Mus. Comp. Zool. 133(4):227-271, 18 figs. 1965.—A key to and characteristics of the 18 world genera are included in this important paper in a much neglected family. It is hoped that this paper will help stimulate interest in the taxonomy of the Coccinellidae.

ENTOMOLOGICAL RAMBLINGS IN MEXICO

By HENRY F. HOWDEN[1]

INTRODUCTION

The purpose of this paper is to describe a few localities in Mexico, visited between 1958 and 1964, which I found interesting entomologically, and to give road information and some details on lodging for the areas mentioned. In many areas changes can be rapid, often showing improvement on the main routes and deterioration in less traveled areas. In general, the American Automobile Association catalog on Mexico and Central America is reliable, and hence I have omitted lodging information in most cases when it is included in the book. Camping is difficult in most areas and there are no established campsites. In central and southern Mexico camps should be guarded as there is a distinct tendency for unwatched items to disappear. For anyone collecting off of the major tourist routes, a smattering of Spanish is desirable and in some places essential.

Since a meaningful description of the biotic areas would be lengthy because of the extremely varied topography, I recommend the discussion of the biota in the book by Leopold (1959). Goldman's (1951) description of his collecting from 1892 to 1906 is also worth reading, if for nothing else than to compare some of the habitats described with their condition today.

If any general statement can be made concerning insect collecting in Mexico, it is that the best collecting comes with the advent of the spring rains. These begin as early as April on the eastern escarpment, in late June in the central plateau and in the western mountain ranges, and in mid-July on the west coast. The varied topography is advantageous; if collecting is poor in one area, one can often move 30 or 40 miles and find better conditions.

MONTERREY TO LINARES

This is the old "main" route (Rt. 85) to Mexico City; there are a number of good places to stay but really modern motels are scarce. Most are 10 or more years old and few, even in the lowlands, are air-conditioned. The road is in fair condition, but is not "fast."

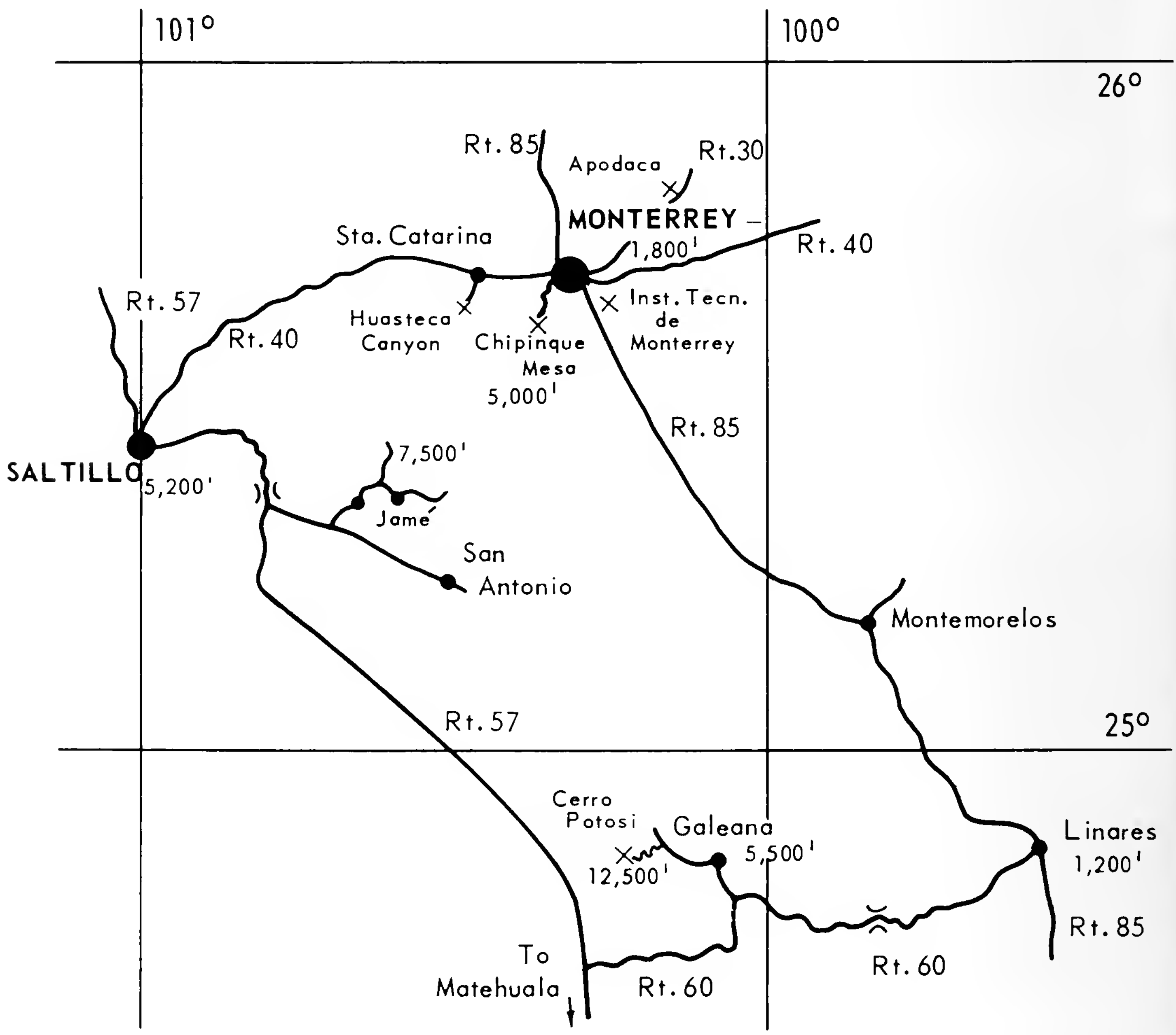
Monterrey, Nuevo Leon (1800 ft.), is a good base (Map 1). It is one of the larger cities in Mexico and has many modern stores. On the south side of the city is the Insituto Tecnologico y de Estudios Superiores de Monterrey, with an active group of entomologists and botanists headed by Dr. D. Enkerlin. Just across the street from the Insituto is a modern supermarket and 5 miles south on Rt. 85 is the Motel Siesta. This is an excellent motel for families—kitchenettes, two swimming pools, and good, safe drinking water. The motel grounds cover 6 acres and there is good

[1] Entomology Research Institute, Research Branch, Canada Department of Agriculture, Ottawa, Ontario.

thorn-scrub all around, with excellent collecting. From the southwest edge of Monterrey a paved toll road goes up the mountain to 5000 feet, ending at Chipinque Mesa. This area has many species of oak and pine, elements of the southeastern forest (for example, red bud), and the insect fauna is rich and varied. It represents the northern limit for many of the mesic forest insects (both genera and species). One can hire burros on the mesa and reach approximately 8000 feet in several hours if one can stand the ride! In the low country within a 20 mile radius of Monterrey, there are many varied desert habitats. The Instituto has a desert experiment station on Rt. 30 northeast of Monterrey, near the town of Apodaca, and entomologists are welcome. Collecting in the desert area is best in April and September, but it is good on the Chipinque Mesa and in El Diente Canyon (behind the Siesta Motel) most of the summer.

LINARES TO SALTILLO

The road south to Linares (Rt. 85) traverses mostly desert thorn-scrub country. At Linares a new, very good paved road (Rt. 60) goes west



MAP 1. Vicinity of Monterrey, Nuevo Leon.

to Galeana (Map 1) and to the Central Highway (Rt. 57). The highway passes just south of Galeana. If one takes the road to Galeana and then west to Cerro Potosi, one of the highest mountains in Nuevo Leon (12,500 ft.), it is possible to drive up the mountain to 10,300 feet on a good gravel road (any car could make it—at least in 1963) where it ends at a telephone microwave tower. At this altitude there is a beautiful pine forest and areas of "alpine type" meadows. Here it is possible to camp (no houses and only a few people tending cattle). The peak is isolated and the fauna seemed almost insular and depauperate, but very interesting. After returning to Rt. 60 from Galeana, if one goes westward and then north on Rt. 57, the road traverses several interesting arid areas. Almost 24 miles south of Saltillo, Coahuila, a paved road goes in an easterly direction to the town of San Antonio (Map 1). (The road is unmarked, but was the only paved road in 1963 leaving the main highway between Rt. 60 and the mountain pass, 18 miles southeast of Saltillo). Follow the San Antonio road for approximately 11 miles, then turn north on a good dirt road which eventually reaches the village of Jamé. The area around Jamé ranges in elevation from 7000 to 9000 feet and contains a great variety of pine-oak habitats. Many of the beetles collected in the area were closely related or identical with species occurring in southeastern Arizona. Good camp spots are frequent, but food and water should be brought in. The area is easily accessible from Saltillo (1 hour drive), and several motels and a supermarket make Saltillo a good base.

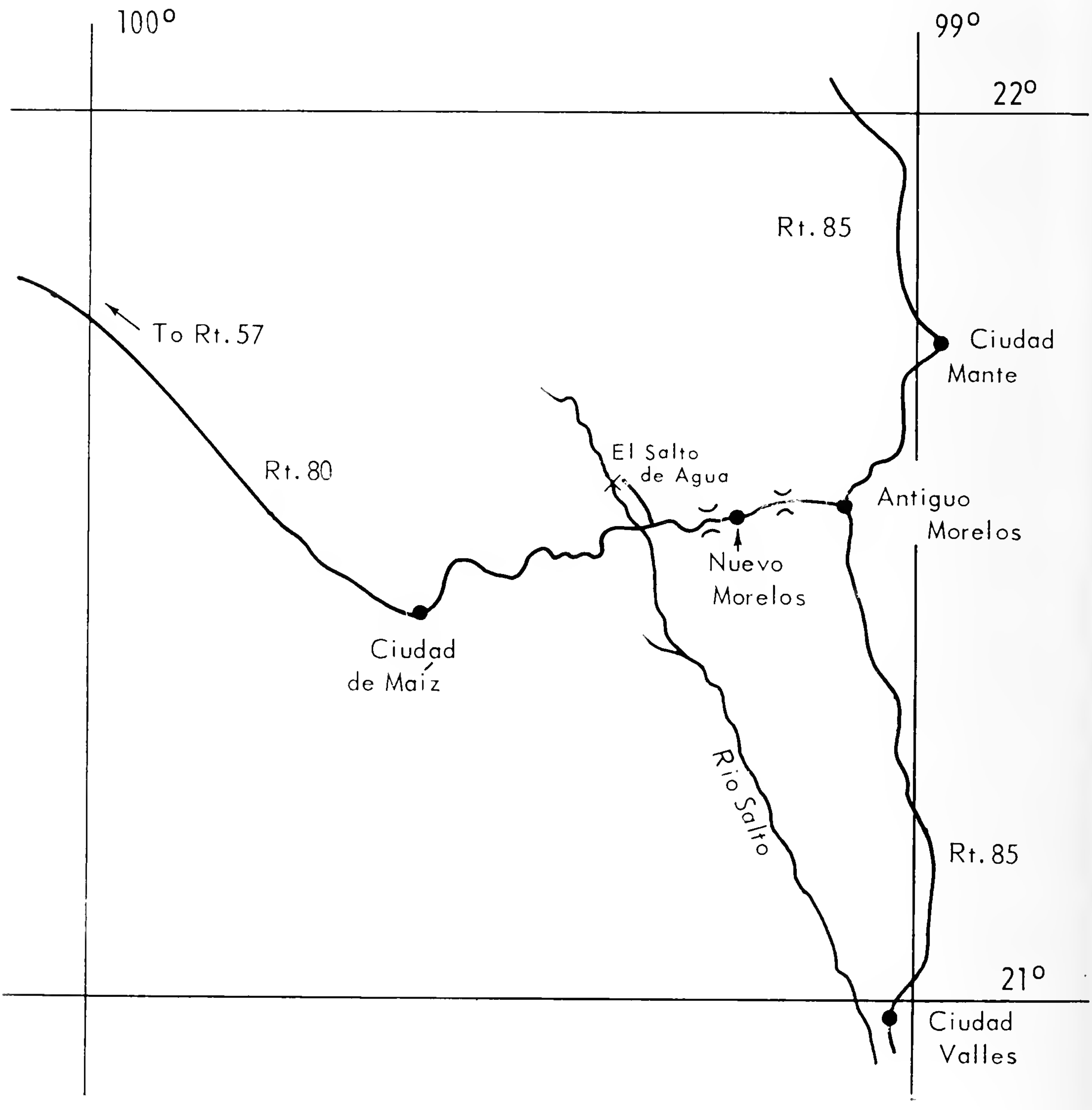
Linares to Mexico City

If one goes south from Linares on Rt. 85 instead of turning off to Galeana, one continues through lowland thorn forest which is occasionally broken by wet valleys with larger trees (cypress along the rivers, etc.). Near Ciudad Mante, Tamaulipas (several motels here), is a large sugar cane area, and tropical elements begin. One can turn on to Rt. 80 at Antiguo Morelos (Map 2). After a drive westward of about 22 miles over two low ranges, turn right onto a dirt road which goes north seven miles to El Salto de Agua, San Luis Potosí. El Salto is a large, beautiful waterfall, the spray from the fall supporting lush tropical vegetation (a hydro-electric development may change this). One can camp near the falls or use a small native motel there (food and water should be carried in). The area represents the approximate northern limit for many tropical forms, and collecting is good at almost any time of the year. From El Salto it is an easy drive on Rts. 80 and 57 to San Luis Potosí (desert with the season good in July and August) or on Rt. 85 to Tamazunchale. The latter is in a valley at the base of the Sierra Madre Oriental and has a distinctly tropical fauna and flora. The Hotel San Antonio is best, and the owners are helpful in directing one to nearby ranches. Continuing south on Rt. 85 one reaches Jacala (a scrub pine-oak area) after 3 or more hours of tortuous mountain driving. Simpson's Motel in Jacala was a good base (1960) for collecting in the surrounding mountains. From Jacala it is a full day's drive to Mexico City, where one has a choice of many types of lodging.

East of Mexico City

East of Mexico City are many interesting areas. A good base with much of archeological interest can be found at Tehuacán in a deep desert valley. Teziutlán at the eastern edge of the mountains had one of the few remnants of easily accessible cloud forest. The city of Veracruz on the lowland coastal plain has large sandy areas south of the city. The first two cities mentioned each have one small hotel while Veracruz has a number of acceptable old hotels. Each is approximately one day's drive from Mexico City.

San Andres Tuxtla is an easy day's drive south of the city of Veracruz on Rt. 180. There is a ferry crossing at Alvarado that may cause some delay. At Catemaco one can turn left on a dirt road by the school and drive around the north side of Lake Catemaco. About 3.5 miles from the town is the Hotel Playa Azul, which provides good accommodation



Map 2. Vicinity of El Salto de Agua, San Luis Potosí.

including separate cabins if desired. The lake is surrounded by an old volcanic rim and large tracts of tropical rain forest. The area represents the northern limits of many Central American species, including howler monkeys. Collecting is good most of the year and it would take a protracted visit to do a good job of collecting in the area.

South and West of Mexico City

A day's drive south of Mexico City will take you to Acapulco (expensive!) or Oaxaca. If going to the Acapulco area, Chilpancingo makes a good base with two fairly good (in 1961) hotels. From there one can collect in the unusual Rio Balsas thorn forest, the high country near Chilpancingo, or the coastal area at Acapulco. The fauna of the area is varied and contains many endemics.

Toluca is two hours' drive west of Mexico City on Rt. 15. The road goes through some beautiful stands of pine and fir before leveling out into the high grassland surrounding Toluca. The Hotel Rex (45 pesos for two in 1958) in the center of the city offered good accommodations and a fair restaurant, but cars had to be put in a garage four blocks away. West of Toluca on Rt. 15 are the high pine forests of Michoacan. Lodging can be found at Morelia, Patzcuaro, Uruapan and Zamora, but in some cases the lodging is expensive. Continuing north on Rt. 15, Guadalajara and Tepic have excellent places to stay, but the country surrounding both cities has been badly cut over. However, some good pine areas can be reached from Guadalajara (near Tequila), and some of the side roads near Tepic are well worth exploring.

North of Mexico City—Rt. 57

Near Queretaro and northward to the United States border, the central plateau is either grassland or desert thorn-scrub, with the topography fragmented by numerous small mountain ranges. Both major routes (45 and 57) traverse largely desert regions where collecting is best in July and August. Rt. 57 is the major tourist route to Mexico City and offers the more modern accommodations. Queretaro has at least one modern motel on the new highway on the west side of the city. San Luis Potosí, approximately 100 miles north of Queretaro on Rt. 57, has several new (1959) motels near the main road junction. The surrounding country has a variety of desert vegetation and is seemingly near the southern limit of mesquite on the central plateau.

Matehuala is the next town north of San Luis Potosí offering modern accommodations. A large modern motel (1958) just north of town appeared to be an excellent base for desert collecting, as areas of grassland, mesquite, acacia, yucca, and creosote bush were within a few miles. Saltillo, which has already been mentioned (Map 1), is the next sizeable city north of Matehuala.

North of Mexico City—Rt. 45

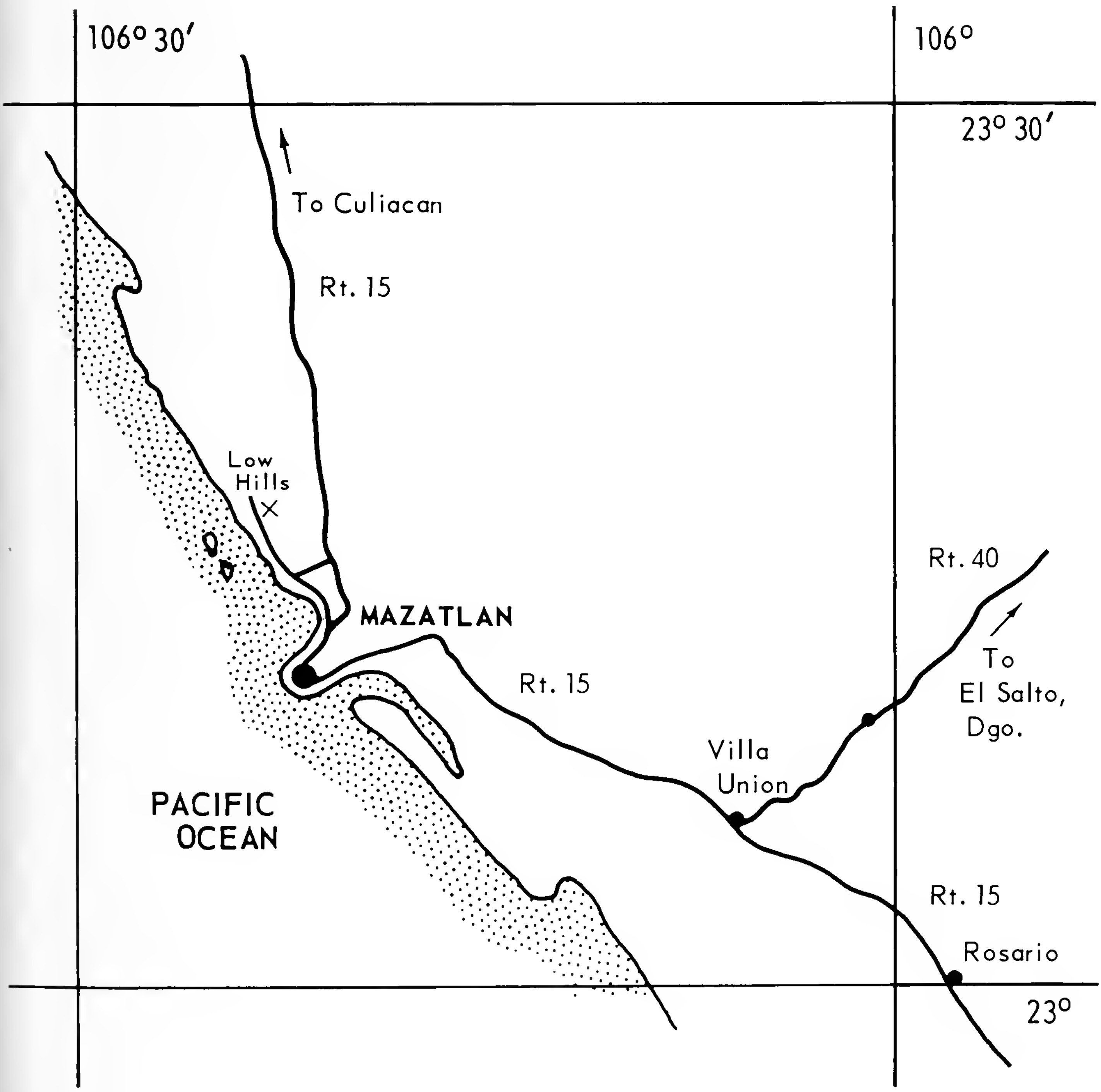
The cities on the western side of the central plateau, Aguascalientes, Zacatecas, Durango, Hidalgo de Parral, and Chihuahua, all have some good accommodations, but motels are not numerous. Route 45 is not a main tourist route, and even in a city of the size of Durango there are only two places listed by the American Automobile Association. The country near Aguascalientes and Zacatecas has been so intensively farmed and grazed that general collecting is difficult. Durango makes a better base (Campo Mexico Court), and collecting to the west of the city on Rt. 40 is good. The roads between Durango and Chihuahua, either via Torreon or via Hidalgo de Parral, traverse a number of desert habitats, with the area near Rodeo, Durango, on Rt. 45 having a rich desert flora. A variety of habitats can be reached from Chihuahua, the first city with accommodations (Santa Rita Motel) south of El Paso and Ciudad Juárez. Twenty-two miles north of Chihuahua on Rt. 45 a dirt road runs westward 20 miles to the Majalca national forest, composed mainly of oak and pinyon pine. The road reaches an elevation of 7000 feet and a passenger car can usually make it! Between Chihuahua and El Paso near Villa Ahumada is an interesting and extensive sand dune area, reminding one of White Sands, New Mexico. The fauna is scanty but interesting, some Scarabaeidae at least being endemic to the area.

The West Coast, Tepic to Mazatlán

Just north of Tepic, Rt. 46 (the route signs are often lacking) runs from Rt. 15 to the town of San Blas on the coast. Several hotels (of dubious quality) are in or near the town. Nearby are thick groves of palm, fig, and mangrove, and collecting can be excellent in July. On Rt. 15 north of San Blas much of the land is cut-over thorn-scrub. Near Mazatlán (Map 3) some good areas of the Sinaloan thorn forest still exist. On the north side of Mazatlán there are a number of good (but relatively expensive) motels and hotels along a beautiful sand beach (the Motel Sands at $8.00 for two people was good in 1964). North of most of the motels there is a traffic circle and Rt. 15 turns sharply inland. If one continues along the coast north of the traffic circle, first on a paved, then on a dirt road for five miles, several low hills can be seen to the right. A dirt road leads to a small quarry at the base of the first hill. Several dirt roads radiate from the quarry through the thorn-scrub. In mid-July, 1964, ten days after the first heavy rain, nearly 100 species of Cerambycidae were collected near the base of the hill in a five day period. Other groups showed nearly as much diversity, but by early August the number of species active in the area was appreciably reduced.

Mazatlán to Durango

At Villa Union, 17 miles south of Mazatlán on Rt. 15, Rt. 40 extends eastward to the city of Durango (a full day's drive). For the first 30 miles the road winds through dense thorn forest. The road then starts to climb and becomes extremely sinuous (hairpin curves!). Eight miles west of El Palmito, near the state line of Sinaloa and Durango, there are several "pull-offs" where one can camp (there are only three or four places where this is possible in 60 or more miles of the road) at an elevation of approximately 6000 feet. Mixed pine-oak forest extends from this area to within 25 miles of the city of Durango. East of El Palmito the road continues upward through some of the most spectacular scenery in Mexico. After some 700 sharp curves the top of the escarpment is reached at Buenos Aires (approximately 9000 ft.). Between Buenos Aires and El Salto (altitude varying from 8000 to 9000 ft.) there are many possible campsites. The best one is 10 miles west of El Salto, just east of Las Adjuntas. Rt. 40 at Km. 1080 crosses an abandoned railroad bed which is now used as a road. Turn north onto the road bed and after 100 yards turn north again into a small pine grove which is a good campsite. There are some good springs at the base of a steep hill across a large meadow.



MAP. 3. Vicinity of Mazatlán, Sinaloa.

The road bed stays firm, even in the rainy season. The climate is cool, 75° being the highest temperature recorded for the summer of 1964. However, the insects came in numbers to a blacklight at temperatures of 50°, and there was often more insect activity on rainy nights than on dry ones! From El Salto (some food and gas can be obtained here) it is a two and a half hour drive to the City of Durango (first good lodgings after leaving Mazatlán).

Mazatlán to Nogales

North of Mazatlán the size and density of the thorn forest is gradually reduced. Ciudad Obregón, approximately a nine hour drive from Mazatlán on Rt. 15, lies in the middle of the Sonoran desert and makes an excellent base. There are several good dirt roads leading to the coast (directions need to be obtained locally as the roads are unmarked and frequently changed) as well as several good collecting spots along the Rio Yaqui, particularly along the road leading to the Obregón dam (turnoff at Esperanza just north of Cd. Obregón). If one follows the Obregón dam road for approximately seven miles it is possible to turn right and follow a fairly good dirt road to the foothills of the Sierra Madre. In this area there are many good collecting spots and campsites are not difficult to find. North of Ciudad Obregón, Guaymas and Hermosillo have good accommodations, and the road passes through country similar to areas in southwestern Arizona. However, some of the fauna, at least around Hermosillo, does not extend into Arizona, and in a few instances shows a distinct relationship with the fauna of central Baja California.

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BEETLE TALK

The following proposals concerning the scientific names of beetles were placed before the International Commission on Zoological Nomenclature.

Crioceris sexpunctata Fabricius, 1792 (Insecta, Coleoptera): Proposed rejection as a *nomen oblitum*. R. F. Smith, 1965, Bull. Zool. Nomenclature 22(4):246.

Xyleborus Bowdich, 1825 (Insecta, Coleoptera): Proposed suppression under the plenary powers. R. T. Thompson, 1965, Bull. Zool. Nomenclature 22(4):269.

DESCRIPTION AND BIOLOGICAL NOTES ON THE LARVAE OF PHRADONOMA TRICOLOR (COLEOPTERA: DERMESTIDAE)

By E. J. FORD, JR.[1] AND J. M. KINGSOLVER[2]

Specimens of a *Dermestid* beetle which appeared to be a species of *Trogoderma* were collected from the hold of a ship in the Middle and Far East trade at Baltimore, Maryland, May, 1965, by E. J. Ford, Jr. and G. M. Prall. These insects were found in debris containing cumin seed *(Cuminum odoratum),* sesame seed *(Sesamum indicum),* peanut shells *(Arachis hypogaea),* other insects, burlap strands, paper bits, etc., and consisted of 2 male adults, 1 pupa, 1 larva, and 16 cast skins. All specimens were collected in a small area suggesting they were the same species. Further examination in the laboratory verified this association as follows: the 2 males were identified as *Phradonoma tricolor* (Arrow), the pupa found in the last larval skin (typical of the *Anthrenini*) had matured enough to be determined as a female of *P. tricolor;* this larval skin agreed in all important characters with the 16 cast skins and the larva.

Examination of other insects in the debris indicated that some organism had been feeding on the dead specimens. Assuming that the organism was the larvae of *Phradonoma* suggests that *Phradonoma* is not likely to be a pest of stored foods but may be found associated with these products when they are infested with other insects.

The genus *Phradonoma* Jacquelin du Val is very closely related to *Trogoderma* Berthold and distinguished in adults only by the presence of a row of strong teeth on the outer margin of the fore tibiae in *Phradonoma* (figs. 9 & 10). An additional character which may show some variation is that in the mesocoxal lines in *Phradonoma,* the lines extend nearly to the postero-lateral corners of the metasternum, but in the species of *Trogoderma* seen, these lines extend only half that distance.

The morphology of the larva of *Phradonoma* reflects the proximity of *Trogoderma* in that no consistent characters were found which are exclusively those of either genus. The interdigitation of characters suggests that *Phradonoma* might eventually be considered a species group of *Trogoderma.*

The following is apparently the first description of the larva of a species of *Phradonoma.*

Phradonoma tricolor (Arrow)

Mature larva: Length—6 mm., color light clear yellow to mahogany brown with anterior half of each thoracic and abdominal sternite slightly darker in the lightly colored specimens. Typical *Trogoderma*-like shape, legs and sternites as in *Trogoderma.* Erect spicasetae of each tergite mixed long and short, tending

[1] Plant Quarantine Division, Agric. Res. Serv., U. S. Department of Agriculture, Baltimore, Maryland.

[2] Entomology Research Division, Agric. Res. Serv., U. S. Department of Agriculture, Washington, D. C.

to be single-ranked; acrotergal setae long, ⅓ to ½ as long as tergite, all extending across acrotergal suture (fig. 2), no fine spicasetae anterior of medial row of erect spicasetae, no spicasetae inserted on posterior margins of tergites; hastisetal tufts dense on newly emerged larvae, but are easily abraded. Acrotergal sutures strong on all abdominal tergites and meso- and metathoracic tergites. Antennae with second segment nearly twice as long as first, terminal segment short (fig. 3a), occasionally bent at an angle (fig. 3b); inner face of basal segment with 4-7 short, curved setae scarcely extending beyond base of second segment which itself is devoid of setae in all specimens examined. Labrum as in fig. 1; distal sensory papillae as in figs. 5 or 6; proximal sensory pores 8 or 9.

Specimens deposited in U. S. National Museum.

Larvae of *Phradonoma tricolor* have been intercepted several times in eastern United States ports of entry. It apparently has not become established outside of the Middle East.

Comparative notes: The larvae of *Phradonoma tricolor* can be distinguished from the species of *Trogoderma* with a long second antennal segment by the following emendation to the key included by Beal, 1960 (p. 3, couplet 3, second choice):

Spicasetae of seventh and eighth abdominal tergites not noticeably stouter than spicasetae of anterior tergites; submedian row of large spicasetae on these tergites more or less continuous; spicasetae not in compact separated groups of two or three -- 3a

3a Sclerotized area on seventh abdominal tergum that bears hastisetal tuft separated from rest of tergum by narrow membranous area (somewhat as in **Anthrenus**) --**TROGODERMA PRIMUM** (Jayne)

Sclerotized area bearing hastisetal tuft not separated from rest of tergum ------ 3b

3b Distal sensory papillae arranged in a circular cup (fig. 7); third segment of antennae nearly as long as second (fig. 4)----------------**TROGODERMA ANGUSTUM** (Solier)

Distal sensory papillae as in fig. 5 or 6; third antennal segment less than ½ as long as the second --------------------------**PHRADONOMA TRICOLOR** (Arrow)

Only two known New World species of *Trogoderma, primum* and *ballfinchae* Beal, share the distinctive arrangement of distal papillae found in *P. tricolor,* but these can easily be distinguished by the characters in the emended key above. Two species doubtfully referred to *Trogoderma* by Beal (l.c., p. 24), *boganense* Armstrong and *carteri* Armstrong, have the same papillar arrangement but can easily be separated from other *Trogoderma* by the distinctive fiscisetae (Beal, l.c., fig. 7).

Trogoderma simplex Jayne is separated in the original Beal key.

Trogoderma angustum (Solier) perhaps most resembles *P. tricolor* in general appearance but can easily be distinguished by the arrangement of the distal papillae of the labrum, the relative lengths of the second and third antennal segments, the presence or absence of setae on the second antennal segment, and the relative length of the acrotergal setae. All of these characteristics are illustrated in the plate.

Orphinus fulvipes (Guerin) also has a "four plus two" arrangement of the distal papillae, but the segment containing four papillae is circular instead of C-shaped. This species is easily separated from the other species mentioned in this paper by the short second segment of the antennae and the separate sclerites bearing hastisetal tufts in the membrane posterior to the seventh abdominal tergite.

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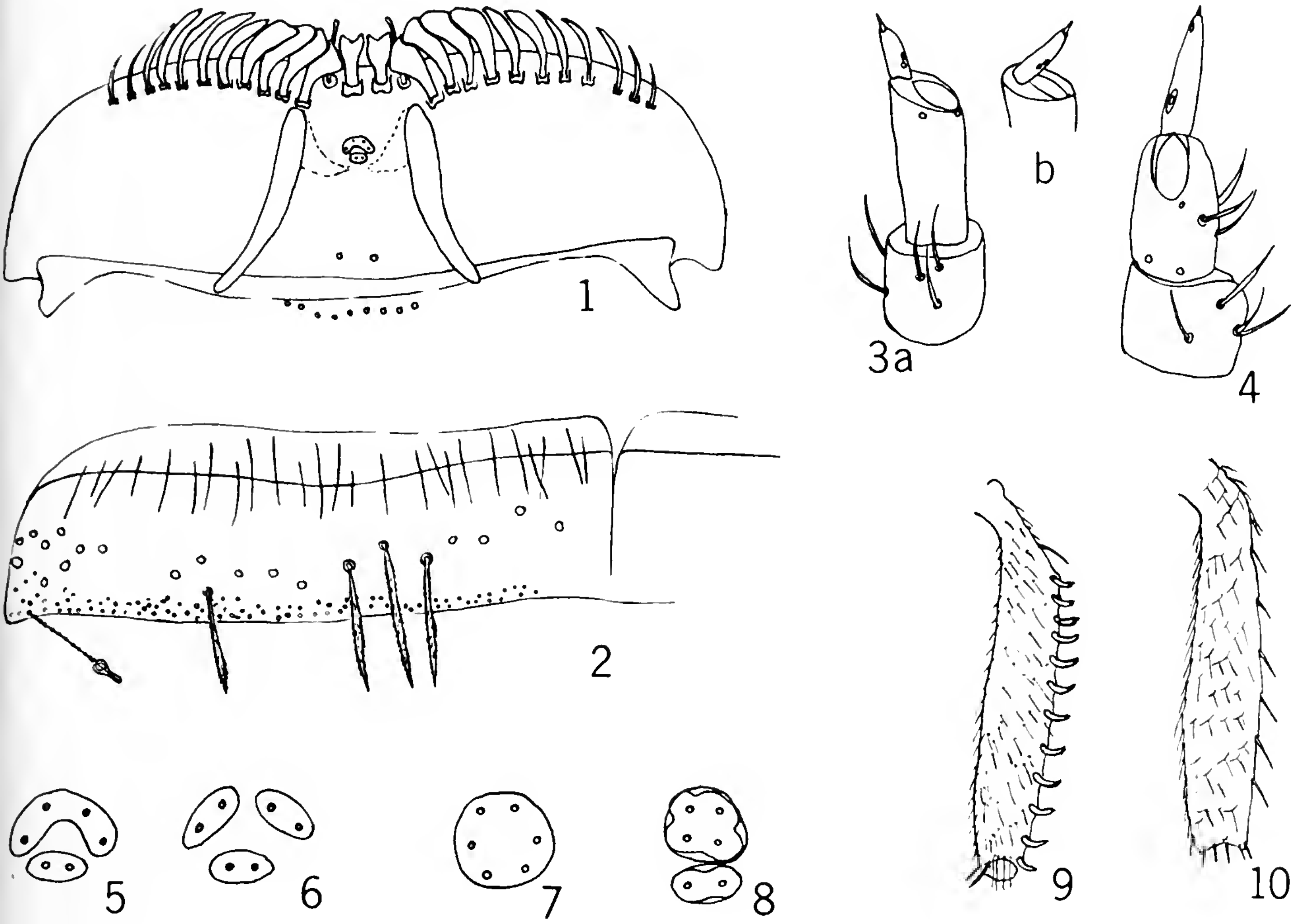

Figures 1-3, 5, 6, *Phradonoma tricolor*, larva. 1—labrum. 2—abdominal tergite 2. 3a b—antenna. 5—normal distal sensory papillae of labrum. 6—fractured arrangement of sensory papillae of labrum.

Figures 4, 7, *Trogoderma angustum*, larva. 4—antenna. 7—distal papillae.

Figure 8, *Orphinus fulvipes*, larva. Distal papillae.

Figure 9, *Phradonoma*, adult. Fore tibia.

Figure 10, *Trogoderma*, adult. Fore tibia.

BEMBIDION (AMERIZUS) OBLONGULUM MANNERHEIM IN NEW MEXICO (COLEOPTERA: CARABIDAE) WITH NOTES ON TRANSCONTINENTAL DISPERSAL IN PLEISTOCENE TIME.

By George E. Ball[1]

A NEW RECORD. Specimens of this species were collected by me in two localities in the Sangre de Cristo Mountains (the Las Vegas Range of Fall and Cockerell, 1907:148), San Miguel County, New Mexico: two males, Mosimann Ranch, 15.7 mi. west of Sapello, N. M. Route 266, June 20, 1963; one female, Holy Ghost Canyon, 14 mi. north of Pecos, N. M. Route 63, June 24, 1959. The former locality is in the "Beulah District" (Fall and Cockerell, 1907:145), and its position is shown on the Santa Fe, New Mexico sheet (U. S. Geological Survey, NI 13-2). The collections were made at an elevation of about 8,200 feet, in damp litter, in Canadian Zone forest consisting of aspen, alder, Douglas Fir, Engelmann and Colorado Blue Spruce. Adults of *oblongulum* were not found in August, although I searched for them. The presence of adults early in the summer and their absence later suggests that this species, like the similar eastern *Bembidion wingatei* Bland, is an imaginal hibernator (Lindroth, 1955:77).

Previously, *oblongulum* was known only from the Pacific Northwest (Lindroth, 1963:404). Probably it occurs throughout the Rocky Mountains at high elevations, from Idaho southward, but has not been collected in this area because individuals are small and inconspicuous, and not readily found because of the habitat, and because adults are not present at the height of the collecting season.

INTRASPECIFIC COMPARISONS. I have compared the New Mexico specimens with five specimens of *oblongulum* collected at Telegraph Point, near Kwinitsa, British Columbia. The eyes of the New Mexico specimens are slightly flatter. The two groups also differ in total length:[2] New Mexico males, 4.52-4.88 mm., females, 4.80 mm.; British Columbia males, 4.18-4.25 mm., females, 4.18-4.32 mm. This difference is not surprising in view of the small size of the samples, and considerable difference in latitude between the two areas.

INTERSPECIFIC COMPARISONS. The species *oblongulum* and the species *wingatei* are very similar to one another, and Lindroth (1963:406) suggested that the two might be geographically isolated subspecies of a single species (*wingatei* ranges from Newfoundland to northern Michigan and south in the mountains, to North Carolina). The New Mexico record extends the range of *oblongulum* about 400 miles eastward, and hence closer to *wingatei*. Therefore, it is worth comparing the New Mexico

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[1] Department of Entomology, University of Alberta, Edmonton, Alberta, Canada.

[2] Total length is the sum of three measurements: distance from base of mandible to posterior margin of compound eye; distance from anterior to posterior margin of pronotum, along mid-line; and distance from basal transverse line to apex, of longest elytron.

specimens with representatives of *wingatei* to see if the former are morphologically as well as geographically intermediate between the two nominal species.

The New Mexico specimens are like *wingatei* in form of the eyes, but differ in form of the pronotum and of the median lobe of the male. They are also larger in size. These specimens are more like *wingatei* than are the western specimens of *oblongulum,* but the New Mexico group cannot be regarded as an intergrading population. Therefore, I continue to regard the eastern and western segregates of this complex as distinct species.

ZOOGEOGRAPHICAL CONSIDERATIONS. The greater number of species of *Amerizus* in the west and the presence there of the related subgenus *Lionepha* Casey suggests that *Amerizus* is of western origin. The marked similarities between *oblongulum* and *wingatei* suggests that these two species are closely related, that is, they shared a relatively recent common ancestry. Of the two, *wingatei* seems to be the more derivative. Further, both forms are relatively cold-adapted, for they occur either in cool sheltered situations in lowlands, or else at high elevations. (For example, Carl H. Lindroth and I collected specimens of *oblongulum* in northern British Columbia, on a mountainside, at an elevation of about 2,000 feet, in an area just recently cleared of snow, and close to a snow patch. Even though the ground and air were cool, the beetles were very active.)

These facts suggest that the common ancestor of *oblongulum* and *wingatei* originated in the west, and could have spread eastward across the continent during a glacial period, in the boreal forest south of the ice. As warming occurred in an interglacial period, the ancestral species survived in cooler and damper areas. In the mountainous east and west, the species was able to spread southward at high elevations, but in the central part of the continent, the populations had to spread northward, as the ice melted, to find suitable habitats. Clinal differentiation may have taken place, so that the geographically extreme populations became quite different from one another. A later glaciation may have eliminated the populations in the central part of the continent. With the retreat of the ice, the surviving populations in the east and west moved northward, repopulating part, but not all, of the terrain that had been ice-covered, and giving rise to the present disjunct distribution.

This hypothesis requires a minimum of two glacial periods to produce the distribution pattern of the *oblongulum-wingatei* stock. Assuming that only two glacial periods were involved, and that they were the last two (Iowan and Wisconsin—Karlstrom, 1961), the entire process, from spreading to differentiation and partial extinction, required a time span of about 70,000 years.

A number of species or species pairs of northern carabids show a distribution pattern similar to the one described above, and the development of these patterns can be explained in the same way.

For a more detailed account of range change of an insect group during and since the Pleistocene, see Ricker (1964). See especially page 67 for a consideration of east-west disjuncts.

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LITERATURE NOTICE

BIOGEOGRAPHY OF THE SOUTHERN END OF THE WORLD. By P. J. Darlington, Jr. Harvard University Press, Cambridge, Mass. vii, 236 pp., illus. 1965.—The southern tip of South America, Tasmania with the southeastern corner of Australia, and New Zealand share many special groups of plants and animals in spite of the fact that these places are now separated by wide ocean gaps. Darlington describes these distributions and tries to explain them on evidence from climates past and present, geological history, paleontology, modes of dispersal, and ecology. As with his previous book, Darlington's unusually lucid and candid style of writing makes the usually difficult subject of biogeography rather understandable.

A NEW GENUS OF AUSTRALIAN CLAVICORN COLEOPTERA, PROBABLY OF A NEW FAMILY. By R. A. Crowson. Proc. Linn. Soc. New South Wales 89(2):241-245, 17 figs. 1964.—The larva and adult of *Cavognatha pullivora*, n.g., n.sp., are fully described and illustrated. Larvae were collected from nestlings of a bird and were reared to adulthood. The adults go to couplet 12 in Crowson's 1955 key to clavicorn families, but they can not be placed in either the Cucujidae or Silvanidae. The most distinctive feature of this beetle is on the mandibles; the lateral surface is deeply channeled and has an opening by a narrow passage into a large ovate internal cavity. Crowson suggests that the cavity might harbor bacterial spores as do the mandibular cavities of some sphindids.

NOTICE

In 1965 the JOURNAL OF STORED PRODUCTS RESEARCH began. It is a quarterly dealing with the biology, ecology, physiology, behaviour, genetics, or control of stored products organisms. The editors are at the Pest Infestation Laboratory, Slough, England, a first-class organization in the study of stored products pests; their advisory board is international. Most articles in the first issue concern beetles, and we can probably look forward to many more like articles because most of such pests are beetles. Annual subscription rates are ℔10 or $30.00 for libraries, government departments, industrial establishments, etc., and ℔5 or $15.00 for individuals. The publisher is Pergamon Press, Headington Hill Hall, Oxford, England, or 44-01 21st Street, Long Island City, N. Y. 11101, U. S. A.

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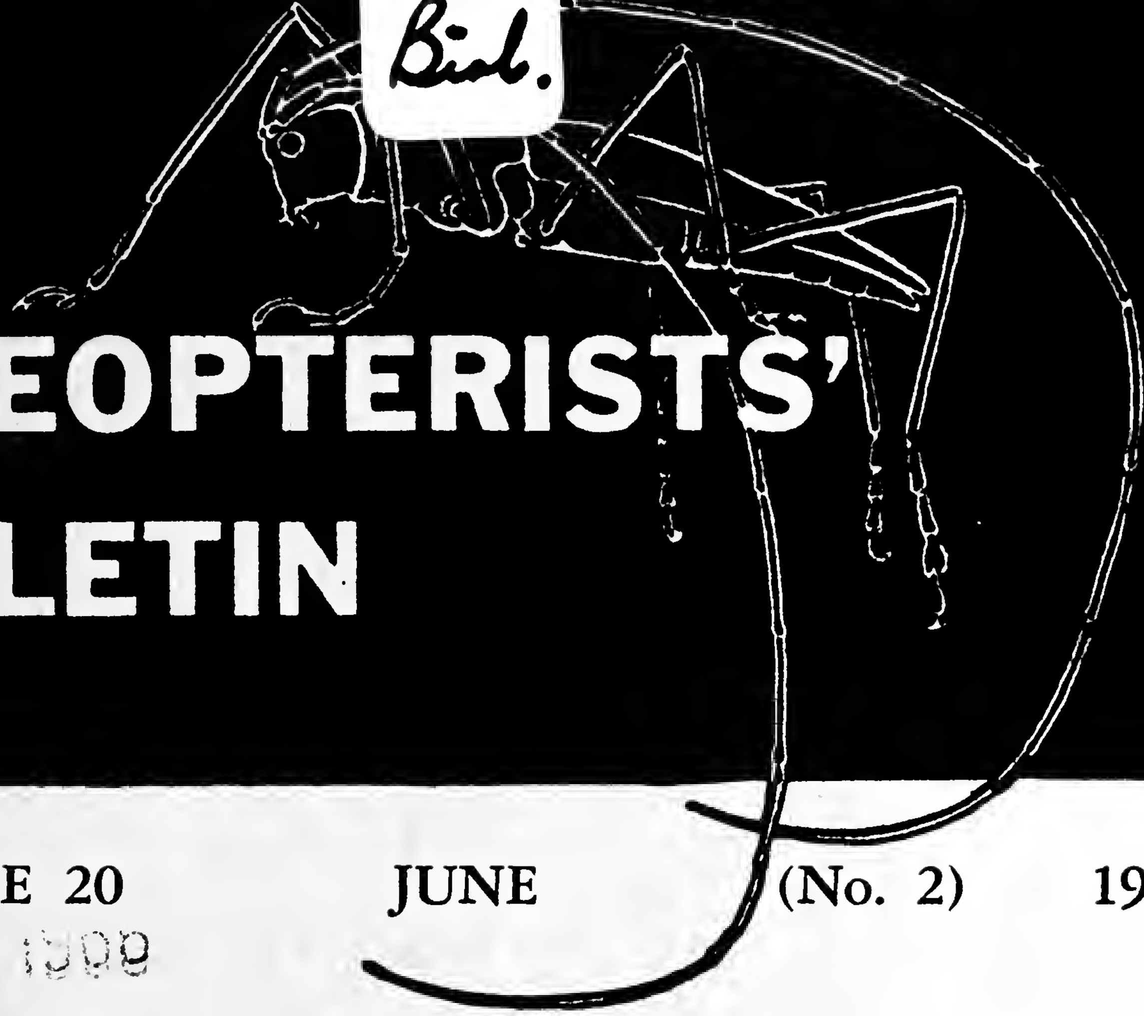

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A QUARTERLY PUBLICATION DEVOTED TO THE STUDY OF BEETLES

The Coleopterists' Bulletin

Volume 20 June (No. 2) 1966

TECHNIQUES FOR THE COLLECTION OF MICROCOLEOPTERA OF THE FAMILIES PSELAPHIDAE, PTILIIDAE, AND SCYDMAENIDAE

By WALTER R. SUTER[1]

The following account of collecting techniques employed on a series of field trips was initiated because the data accumulated might make future efforts more profitable by increasing efficiency. In general, the same basic technique are almost equally effective for the capture of representatives of the families Pselaphidae, Pitliidae, and Scydmaenidae; in fact, the normal pattern of occurence of these in essentially the same or equivalent habitats makes it almost impossible to collect one of them while missing the other two. Few, if any, of the methods in the following discussion are completely original, since my work has relied heavily upon discussions and suggestions of many people, chief of which have been Professor Orlando Park of Northwestern University, Rupert Wenzel and Henry Dybas of the Chicago Natural History Museum, and Harrison R. Steeves, Jr. of Birmingham, Alabama. To these go my thanks for making collection of these microcoleoptera possible and more profitable.

Previous work in this field by specialists has involved a number of techniques. Some of the more common of these would include hand-picking of various kinds of debris, especially under bark of trees, stones, or boards on suitable habitats; sifting material onto a white sheet through a screen; examination of the nests of ants and termites (Park, 1929, 1932, 1949, 1949, 1965); light trapping; and liberal use of the Berlese funnel and its modifications. Certainly all these methods have produced in the past; in fact, they are historically responsible for most of the material already collected and described. Moreover, although these families are not uncommon, their representatives are small enough and localized enough that accidental captures are relatively infrequent. Even in the past, most of the material on which classical research was done has been collected by a few workers who amassed impressive samples of material, usually from restricted areas. The names of Schmitt, Casey, Brendel, Ulke, LeConte, Fender, and many others are perpetuated in species names in these families for just this reason.

Three basic techniques seem to be important in the collection of these miniatures of the insect world, namely: selection of suitable material

[1] Biology Department, Carthage College, Kenosha, Wisconsin.

usually from particular habitats; concentration or examination of large quantities of this material; and use of as many methods of automatic extraction as possible.

Unfortunately, the first of these prerequisites has proven to be the most difficult to fulfill, since recognition of proper or at least promising habitats usually comes only through the slow acquisition of experience, often after an exorbitant expenditure of at least time if not also money. A few generalizations apply often enough, nevertheless, to aid the novice as well as the more experienced collector. The three families are all basically forest groups, probably arising in the not too distant geological past as members of floor communities and radiating from these to their present distribution (Park, 1947, 1965). This coupled with the fact that they have a relatively low vagility and are almost exclusively nocturnal leads the collector through an oft-times futile search for the most stable, dark, humid habitats that could be construed as forest-like. The five types of communities which have been most productive are bogs, forests, prairies, caves, and debris piles, and in almost all cases the stratum inhabited is the floor or its extensions.

A bog can be defined as an area with little or no drainage, a situation which often leads to extensive development of mosses as floor cover. These mosses, notably Sphagnales in the northern United States, are the most important habitat for microcoleoptera in these situations. The general pattern of collecting usually employed has been a systematic sifting of material with manual collection from the debris until an aggregation is found which warrants the use of the Berlese funnel. The groups appear to migrate, especially seasonally, so that a variety of situations may have to be tested to find a suitable aggregation, but once this is accomplished the Berlese funnel can usually be used to advantage. In any case, a few species are too minute for manual collection and must be collected automatically. In general, hummocks of mosses will yield proportionally more material than the areas between them, except during very dry periods; and the smaller animals, notably *Bibloplectus* among the Pselaphidae, may be found most commonly in the masses of fern rhizomes laid down by the genus *Osmunda*. Occasionally the animals tend to extreme aggregation, so that poor yields in moss-covered areas may be supplemented by worth-while yields from isolated or peripheral hummocks. In these situations completely isolated clumps of moss around shrub bases or litter accumulations in bush forks often yield exceptionally well, especially in flooded situations.

Work in forests cannot be limited to such a small number of habitats, probably because the families in question evolved in forest situations and have adaptively radiated to a greater degree in the greater length of time available. But a few situations yield well enough to mention in the interests of efficiency: tree holes and forks (Park, Auerbach, and Corley, 1950; Park and Auerbach, 1954), log mold (especially that protected by bark), ant nests, tree buttress debris or its equivalent, and moist pockets on the floor, especially those next to rotting logs on slopes. Also the size of the population and the number of species present often depends on the successional stage of the major community; for example, in the Chicago area the best yields of species and individuals come from pre-climax oak or climax beech-sugar maple forests. The collector should be aware of habitat specificity even within the general forest community. In tree holes and forks, large cavities close to the ground generally have larger populations, and those with a cover of leaves or wood chips are better than unprotected ones. Tree forks generally do not support a large population except for basal forks in pine forests in the Gulf states, possibly because of the paucity of tree holes, but axillary debris from palmetto yields exceptionally well in the south. Finally, collection of debris from the floor should take into account depth, protection, moisture supply, and any other factors which would give the greatest stability to the habitat. Some of the most interesting collections have been obtained from litter interlaced with fungal hyphae under conifers or in pseudoforks (accumulations between intertwined buttresses of adjacent trees) in southern forests, and from mixtures of debris under rhododendron in the southern Appalachians. Generally destructive flooding or burning eliminates the possibility of good yields, but "islands" in swamp situations often yield exceptionally well.

Prairie species are probably the least well known for a variety of reasons, some of which may be the apparent dissimilarity between prairie and forest, the need for different collecting techniques, and the rapid disappearance of natural prairie through the efforts of man. There are, nevertheless, a number of species which are restricted to this community and which are only slightly more difficult to find than the prairies themselves. In the midwestern United States prairie relicts can often be found by spotting a trio of biotic indicators, namely: compass plant, rosin weed, and rattlesnake master. Good yields have been obtained from three collecting methods. First the "trapping" of beetles is done by supplying a cover of isolated boards to the floor. Examination of these boards, especially after a spring fire, often gives good yields, but aestivation of the populations may lead to their apparent absence during the summer. Ant nests also yield some species and Berlese extraction from floor clumps, piles of grasses, or debris often gives good results (Park, Auerbach, and Wilson, 1949, 1953).

Caves offer a rather restricted group of Pselaphidae which are especially important in a study of speciation (Park, 1951), but the other two families are either uncommon or absent. In these interesting situations the majority of animals will be found under rocks near the entrance, but at least one genus has retreated out of this twilight zone to the darkness of the interior. Small limestone caves with small openings, dampness but no stream seem to yield best. In the United States, the vast majority of records have come from older caves in the southern Appalachians and its extensions into Alabama and Tennessee.

The search for microcoleoptera has so far been channeled to natural, stable communities, but one group of unnatural habitats yield some species in good number. The yield in these situations is enhanced by a surrounding natural area, but these microseres attain enough stability of their own with time to support flourishing populations. These are basically piles of debris, and yield increases with size and age, although aggregations of some species in larger piles may make finding them more difficult, and extreme age leads to the disappearance of the pile. Three major types are important, namely: accumulations of grasses, sawdust piles, and piles of horse manure (Wagner, 1962). The last of these might at first glance seem the least likely to produce because of the origins and habits of the families, but a few species have successfully adapted to this habitat and in many cases attained a nearly world-wide distribution, possibly because of a lack of serious competition. Grass accumulations take the form of compost heaps, hay stacks, and grass cuttings on the periphery of natural communities, especially swamps. So long as moisture is retained and temperature extremes are avoided yields may be surprising. Finally, sawdust piles often prove to be a mecca to the microcoleopterologist, with the majority of species therein apparently adapted to life in buttresses or subcortical log mold of forests. The Berlese funnel should always be used if the sawdust is over ten years old because of the small size of many of the species. Piles of leaves or bark chips on the sawdust may be especially rich, but interesting yields of larger forms come from under slabs of wood laying on the sawdust or buried in it. Concentrations of Coleoptera seem to occur near the periphery of the piles, which may be a consequence of heat accumulation nearer the center or a reflection of aggregation and thinness of the pile near its edge, but which is enhanced by encroachment of natural vegetation (and protection). These three types have yielded well in the past, but there are many similar situations which yield on occasion, so that it might pay to watch for suitably aged and protected debris piles in general.

One distressing fact of the distribution of these microcoleoptera has been recently discussed by Dybas (1966). The small size of the animals reduces their fecundity directly by limiting the number of eggs carried by the female. This affects collecting because the animals cannot breed fast enough to "fill" an extensive forest, leading to the anomalous situation of small stands yielding better than extensive ones. And situations of restricted size may arrise naturally in "tension areas" such as the Chicago area where forest, bog, and prairie interdigitate, or Highlands County, Florida, where the one hundred foot plateau drops off into cypress and magnolia swamps, giving maximum variability and with it maximum collecting efficiency.

With the exception of the Ptiliidae, most microcoleoptera are not common, although few are truly rare. The collector who does not need exact quantitative data, therefore, should attempt to concentrate his samples to obtain both large numbers of species and, more important, large series of most of the species. For work with light traps this involves simply the enclosure of the apparatus in a screen with openings of one-half inch or smaller so larger flying insects, notably Lepidoptera, do not clutter the collections. In this case the importance of the concentration lies with the sorting, which becomes infinitely easier. Dybas has also used a very fine mesh net to advantage for collecting which might be considered a method of light trapping. This is mounted on a regulation hoop and handle from an insect net and held out the side of a slowly moving car while driving at dusk in forested areas with the lights on bright. Yields from this system depend on the same physical conditions as does light trapping, with highest yields on warm, humid nights. Floatation of organic material in water with subsequent drying and Berlesing has also been suggested, but I have done little of this. My most effective method was shaking down litter with a riddle or other mounted screen followed by Berlese extraction. This increases the floor area sampled by eliminating material which had not aged enough to provide habitats for microcoleoptera and breaks up some materials from which they could not otherwise be dislodged. This system has only limited applicability when dealing with prairie sod, tree hole mold, manure, and sawdust, but it becomes especially important in concentrating leaf litter, subcortical log mold, and straw piles, and the riddle alone is grossly effective when used on mosses in swamps and bogs.

Generally, methods other than automatic can only be justified as a means of testing habitats for possible subsequent treatment with Berlese funnels. One type of this apparatus is diagrammed in Peterson (1964, 164: 1, 2, and 3), but my funnel utilizes a single slope, detachable brackets, quarter-inch mesh screens supplemented with cheesecloth, and simple wire harnesses developed by Mr. Steeves for bottle attachment. For maximum (but non-quantitative) yields 100 watt bulbs are used and the funnels allowed to run for only six to ten hours, depending upon the water content of the sample, since tests indicated that microcoleoptera react immediately to heat even though the majority of soil arthropods are vagile or resistant enough to be dislodged only by the slower drying of the samples. Using this timing, which allows for three batches of litter a day, and running banks of ten to twenty funnels hundreds of localities and thousands of habitats can be run through in a year's time.

In any case, expect to be surprised both favorably and unfavorably in your collecting efforts directed to microcoleoptera. The methods outlined herein have been used to collect as many as a thousand or more a day under favorable conditions, and as few as two or three a day in unfavorable ones, but the lesson to be learned from the efforts expended is some idea of the basic ecology of these animals. The more information you derive from your successes and failures about the habitats and habits of these animals, the easier it will be to find them in the future.

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LITERATURE NOTICE

STUDIES ON THE BEETLES LEPTINILLUS VALIDUS (HORN) AND PLATYPSYLLUS CASTORS RITSEMA (COLEOPTERA: LEPINIDAE) FROM BEAVER. By D. M. Wood. Proc. Ent. Soc. Ontario 1964 [1965] 95:33-63, 35 figs. 1965.—The egg, larva, and pupa of both species and the adult of the first species are described and illustrated. Life histories, including host relationships, activities, food getting, temperature requirements, laboratory rearing, mating, and egg laying, are described and discussed. These ectoparasitic beetles are fascinating, and so is this study.

THE SYSTEMATIC POSITION OF PLAUMANNIOLA COSTA LIMA (COLEOPTERA: SCYDMAENIDAE)

By John F. Lawrence[1]
and Hans Reichardt[2, 3]

The genus *Plaumanniola* was proposed for the Brazilian species *P. sanctaecatharinae* and was made the type of a distinct subfamily of Ptinidae, the Plaumanniolinae (Costa Lima, 1962). Because of the peculiar structure of the head and antennae, it was assumed that the beetle lives with ants, and several references were made in the description to the similarities between this species and the Australian myrmecophile *Ectrephes calvatus* Mjöberg. In connection with the preparation of a forthcoming paper on myrmecophilous Ptinidae, the authors had the opportunity of obtaining for study a male paratype of *Plaumanniola sanctaecatharinae.* A careful examination of the specimen confirmed our suspicions that the species is not a ptinid at all, but rather belongs to the family Scydmaenidae.

The following characters of *Plaumanniola* clearly indicate its inclusion within the Scydmaenidae: 1) 3rd segment of maxillary palp enlarged, the terminal segment small, acuminate, and partly buried in the apex of the 3rd (fig. 1). 2) Procoxal cavities open behind, the coxae conical and projecting, contiguous, and the trochantins hidden. 3) Mesepisternum elevated above the plane of the metasternum. 4) Metacoxae well separated but not distant. 5) Hindwing with reduced venation, the anal lobe (Forbes, 1926) and the medio-cubital loop (Crowson, 1955) absent. 6) Abdomen with 6 freely-articulated visible sternites; tergites completely covered by elytra, the first 4 membranous and the last 2 sclerotized. 7) Aedeagus similar to *Stenichnus collaris* Müll. (Sharp and Muir, 1912:508, fig. 56) with a short, thick median lobe, which is curved ventrad at the base to form a narrow, flat process, narrow lateral lobes attached dorsally, and a complex internal sac bearing sclerotized plates.

The wing venation is undoubtedly staphylinoid (Crowson, 1955:12, fig. 6) with the medio-cubital loop entirely absent. Within the Staphylinoidea, the Pselaphidae and Staphylinidae never have more than 2 tergites membranous, while the Leptinidae and Anisotomidae lack the procoxal characters. The hidden trochantins and the structure of the abdomen separate *Plaumanniola* from the Silphidae and Scaphidiidae. The raised mesepisternum and the structure of the maxillary palp appear to be found only in the Scydmaenidae. The general structure of the aedeagus is not uncommon among staphylinoids, but the dorsal articulation of the lateral lobes is unique to the Scydmaenidae.

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[1] Museum of Comparative Zoology, Harvard University, Cambridge, Mass.

[2] Departamento de Zoologia, Secretaria da Agricultura, São Paulo, Brazil; presently at Harvard University.

[3] Acknowledgements. We gratefully acknowledge the assistance of M. A. Vulcano, Departamento de Zoologia, São Paulo, Brazil, for the loan of the paratype specimen. (This specimen was bought by Hans Reichardt from Fritz Plaumann and deposited in the collection at São Paulo.)

Aside from the peculiar structure of the head and pronotum, both of which are broad and flattened, the most aberrant character of *Plaumanniola* is the structure of the antenna, which is enlarged apically forming a 5-segmented club (fig. 2). Even this, however, is not without precedent among the Scydmaenidae. Crowson (1955:37) mentions that *Cephennium* and its allies have a distinctly anisotomid-like club, while several scydmaenids figured by Schaufuss (1866), Sharp (1897), and Reitter (1909) have the last 2 to 5 antennal segments variously enlarged. The sensory vesicles present in the antenna of *Eutheia* (Crowson, 1955:30, 37, fig. 30) could not be seen in the specimen of *Plaumanniola*.

The position of the genus within the Scydmaenidae is somewhat more difficult to ascertain, since the family is badly in need of revision. According to the characters used by Casey (1897), Arnett (1961), and Marsh (1962), for the North American fauna, *Plaumanniola* may be tentatively placed near the tribe Euconnini, sharing with its members the following characters: 1) 4th segment of maxillary palp acuminate. 2) Antennal insertions fairly widely separated. 3) Neck short and abruptly con-

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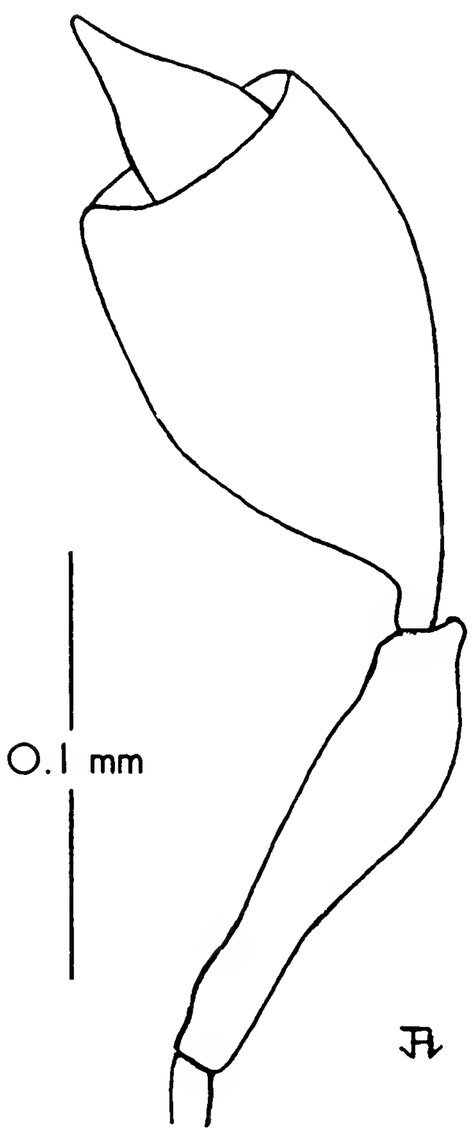

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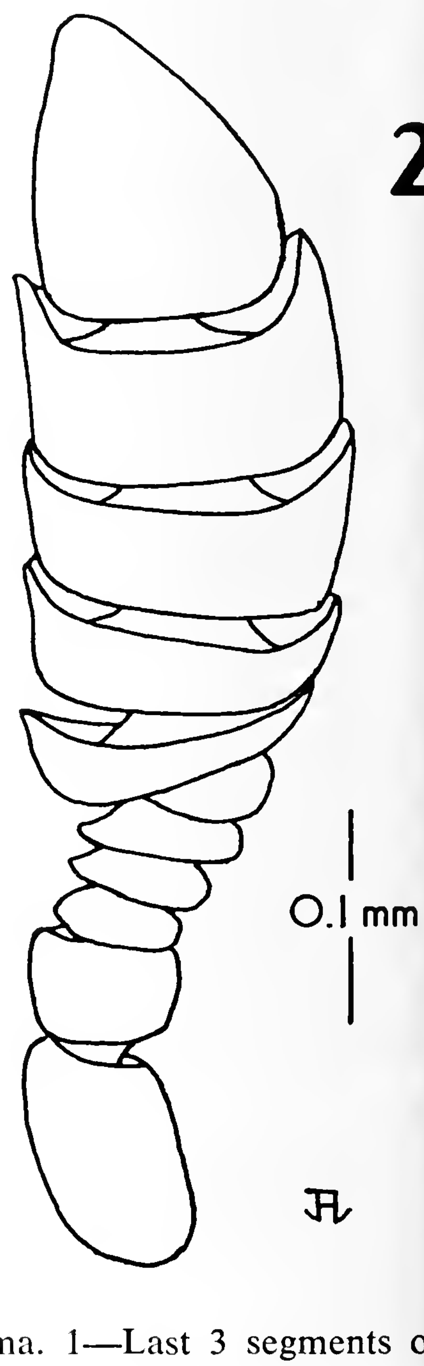

FIGURES 1-2, *Plaumanniola sanctaecatharinae* Costa Lima. 1—Last 3 segments of maxillary palp. 2—Antenna.

stricted. 4) Eyes placed slightly anterad of middle of head. 5) Prosternum deeply emarginate before the coxae. 6) Mesosternum distinctly carinate. 7) Hind coxae distinctly separated, transverse, attaining the sides of the body. 8) Scutellum not visible.

The tribe Euconnini is fairly well represented in the Neotropical region, with the majority of species, according to Blackwelder (1944), belonging to the genus *Euconnus*. Because of the specialized character of *Plaumanniola* and the uncertain nature of the present scydmaenid classification, we think that the genus should remain in a separate tribe of the Scydmaeninae, the Plaumanniolini, which might be placed near the Euconnini and the Scydmaenini. A more detailed treatment of the generic relationships must await a thorough revision of the family.

The supposition that *Plaumanniola sanctaecatharinae* may be myrmecophilous is not supported by evidence at present, since Costa Lima's specimens were collected by Fritz Plaumann among dry leaves on the forest floor. It is not improbable, however, that the species lives in association with ants, since myrmecophily appears to be fairly common among the Scydmaenidae. Wasmann (1894) lists 32 species of scydmaenids which have been collected with various ant species. It is hoped that a further investigation of this remarkable species will shed light both on its taxonomic relationships and on its habits.

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LITERATURE NOTICE

A CASE OF MULLERIAN MIMICRY OF SOUND. By C. Lane and M. Rothschild. Proc. Ent. Soc. London (A) 40(10-12):156-158, 4 pls. 1965.—Stridulation and behaviour displayed by *Necrophorus investigator* (Silphidae) is described and compared with that exhibited by the bumble bee when disturbed in a semi-torpid state. It is suggested that this display of mimicry by the beetle is directed against crepuscular ground predators as well as birds. A short but very interesting paper.

THE TYPES OF ADAPTATIONS OF LEGS' STRUCTURE OF DESERT DARKLING BEETLES (COLEOPTERA, TENEBRIONIDAE. [In Russian.] By G. S. Medvedev. Ent. Obozr. 44(4):803-826, 29 figs. 1965.—Another article by Medvedev on morphological adaptations of tenebrionids. He had previously written on the mouthparts.

ESTUDIO MORFOLOGICO DE DOS COLEOPTEROS ACUATICOS CHILENOS: RHANTHUS SIGNATUS (DYTISCIDAE) Y TROPISTERNUS SETIGER (HYDROPHILIDAE). By M. Etcheverry and W. Brunner. Publ. Centro. Est. Ent. (Santiago de Chile) No. 7:1-28, 68 figs. 1965.—The text contains general information on the habits of both families, a list of Chilean species of both families, and only two pages of morphological descriptions of the two species. Most of the article is made up of illustrations.

MORE NEW GALERUCINE BEETLES WITH EXCISED MIDDLE TIBIAE IN THE MALE and A REVIEW OF THE BEETLES OF THE GENUS NEOBROTICA AND SOME CLOSELY RELATED GENERA. By D. H. Blake. Proc. U. S. Nat. Mus. 118:233-266, 35 figs., and 267-372, 104 figs., respectively. 1966.—A key to genera treated in each paper, a key to the North and Central American species of *Neobrotica* in the second, and descriptions and illustrations of both new and old species make up these two papers.

TWO CRYPTIC NEW FIREFLY SPECIES IN THE GENUS PHOTINUS (COLEOPTERA: LAMPYRIDAE)

By JAMES E. LLOYD[1,2,3]

Studies on the mating behavior of *Photinus* fireflies have resolved each of three familiar species into a cryptic species-pair. For each pair one sibling requires formal characterization and a name. Two of the necessary descriptions are furnished here; description of the third species is deferred until critical observations can be made.

Photinus macdermotti Lloyd, NEW SPECIES

DIAGNOSIS: This species has previously been confused with *Photinus consanguineus* LeConte. Male flash pattern with two flashes approximately two seconds apart (versus two flashes one-half second apart in *consanguineus*). Procoxae with anterior surfaces fuscous or piceous (versus pale in *consanguineus*). Mesocoxae with anterior surfaces fuscous or piceous without pale areas (versus pale or with pale areas in *consanguineus*). Less constant characters are 1) the coloration of the anterior surfaces of the metafemora, completely or nearly completely dark in *macdermotti* and bicolored in *consanguineus,* and 2) the frequent presence of a median longitudinal pronotal sulcus in *macdermotti* (versus a median carinula in *consanguineus*). Specimens of *macdermotti* collected in Gainesville, Florida, are, on the average, 1.3 mm. shorter than those of *consanguineus* from Gainesville.

HOLOTYPE: Male. Form as in figure 1. Length 9.0 mm. Eyes large, separated medially above by less than diameter of eye. Pronotum with median longitudinal sulcus; with median piceous brown vitta about .27 of width of pronotum and attaining base but not apex, diffusely entering anterior coarsely punctate area; rectangular area each side of vitta rosy. Scutellum piceous black. Mesonotal areas black. Elytra piceous black; sutural bead flavate, continuously around apex, wider than explanate margin. Procoxae with anterior surfaces fuscous. Mesocoxae with anterior surfaces piceous brown. Metafemora with anterior surfaces concolorous, piceous brown. Ventral abdominal segments 2-5 piceous brown, 6 and 7 yellow and luminous, 8 translucent, 9 fuscous. Pygidium brown and truncate. Aedeagus as in *consanguineus* (see Green, 1956). Flash pattern composed of two short flashes approximately two seconds apart; repeated every four to seven seconds of flight.

TYPE LOCALITY: Gainesville, Alachua County, Florida, 12 May, 1964, J. E. Lloyd. Mesophytic woods. Attracted to a flashlight flashed in a manner to simulate the female flash-response. Deposited in the collection at Cornell University.

VARIATION: Length 8.0-10.5 mm. Width of pale elytral border varies from barely wider to much wider than explanate margin. Anterior surfaces of procoxae

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[1] Department of Entomology, Cornell University, Ithaca, New York.

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sometimes piceous brown. Anterior surfaces of metafemora occasionally bicolored. Pronotal median longitudinal sulcus occasionally absent and rarely a carinula is present.

FEMALES: Length 7.5-9.0 mm. Alate, similar to males in form and coloration. Eyes small, separated medially above by more than diameter of eye. Ventral abdominal segment 6 yellow and luminous in median third of width, pale each side; segments 2-5, 7 and 8 piceous brown. Pygidium brown and narrowly rounded. Female flash-response a single short flash emitted about one and one-half seconds after the beginning of the second pulse of the male flash pattern.

DISTRIBUTION: P. macdermotti was observed and behavior voucher specimens collected during May 1964 and April and May 1965 at Gainesville, Florida (Holotype, 61 males, 9 females), and June 1963 and 1964 at Pisgah Mountain, North Carolina (3 males, 3 females).

NOTES: This species is named in honor of Mr. Frank A. McDermott of Wilmington, Delaware.

P. consanguineus was observed and behavior voucher specimens collected during May 1964 and April and May 1965 at Gainesville, Florida (48 males, 4 females), June 1963 at Fife, Goochland County, Virginia (5 males, 4 females), and May 1965 at Otter Creek, Levy County, Florida (2 males).

The morphological characters given to distinguish *macdermotti* from *consanguineus* permit correct identification of over 95 percent of the voucher specimens of both species collected at Gainesville, Florida.

There apparently is no type of *consanguineus*. The LeConte Collection (Museum of Comparative Zoology) contains several specimens of this species, and only the first specimen bears LeConte's determination label. I have labeled this specimen "nomenifer *P. consanguineus*" in order to avoid freezing a type selection among specimens possibly not of LeConte's type series. In any case, the series in the LeConte Collection at Harvard is mixed (see Green). The nomenifer measures 12.0 mm. Pronotal carinula present. Pro- and mesocoxae pale. Metafemora bicolored, although not markedly so. Locality W. Va. (West Virginia).

Photinus tanytoxus Lloyd, NEW SPECIES

DIAGNOSIS: This species has previously been confused with *Photinus collustrans* LeConte. Male flash pattern a single flash approximately one-half second long (versus one-quarter second in *collustrans*). Flying and flashing period of males beginning after 40 minutes past sunset (versus beginning about 15 minutes past sunset and ending by 45 minutes after sunset in *collustrans*). Apical one-third to one-half of elytral sutural bead black (versus elytral sutural bead fulvous throughout in *collustrans*), (see fig. 3).

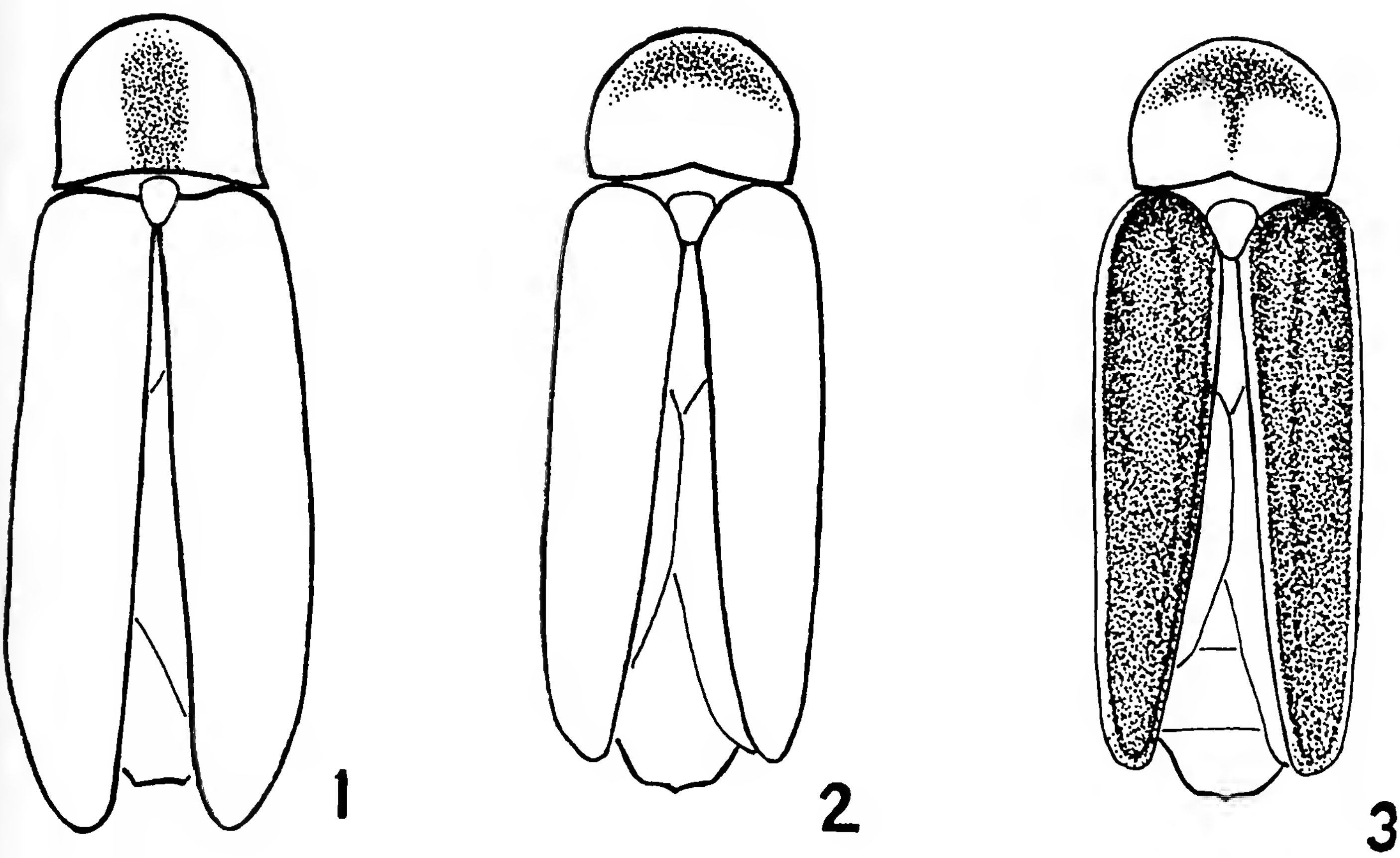
HOLOTYPE: Male. Form as in fig 2. Length 8.0 mm. Eyes large, separated medially above by less than diameter of eye. Pronotum slightly wider than long, broadly rounded in front; disk rufous, with deeply impressed longitudinal sulcus; anterior punctate area piceous black, diffusely so anteriorly. Scutellum and mesonotal areas fulvous and rufous respectively. Elytra piceous black; basal one-half of sutural bead fulvous, apical one-half black, continuously around apex; narrow explanate margin flavous, becoming fuscous apically. Each elytron tapering posteriorly with lateral and sutural margins feebly converging to near apex. Ventral abdominal segments 2-5 piceous black, 6 and 7 yellow and luminous, 8 translucent with white spots, 9 translucent; pygidium black, apex bisinuately subtruncate. Aedeagus as in *collustrans* (see Green). Flash pattern a single long flash about one-half second in duration; emitted every two to four seconds of flight.

TYPE LOCALITY: Route 26, 3.7 miles west of Gainesville, Alachua County, Florida, 24 May, 1964, J. E. Lloyd. Pasture, probably originally a xerophytic hammock. Attracted to a female caged in a glass container. Deposited in the collection at Cornell University.

VARIATION: Length 7.0-9.5 mm. Piceous pronotal coloration frequently extends posteriorly along midline (see fig. 3). Color of elytral apical margin frequently flavous. Portion of elytral sutural bead colored black varies from one-third to one-half of length of sutural bead.

FEMALES: Length 6.0-11.0 mm. Dissimilar, elongate, brachypterous, of soft larval texture. Eyes small, separated medially above by more than diameter of eye. Pronotal and elytral coloration as in males except elytral sutural bead usually entirely black, continuously around apex, occasionally basal one-fourth fulvous. Ventral abdominal segment 6 luminous in median third of width. Other abdominal segments, both dorsal and ventral, fulvous, rosy laterally. Female flash-response a single long flash averaging one second in duration and emitted approximately one second after beginning of male flash.

DISTRIBUTION: P. tanytoxus was observed and behavior voucher specimens collected during May 1964 and April and May 1965 at Gainesville, Florida (33 males, 1 female), and 3.7 miles west of Gainesville on route 26 (Holotype, 64 males, 25 females).



FIGURES 1-3, *Photinus* spp. 1—Form of *macdermotti* n. sp. 2—Form of *tanytoxus* n. sp. 3—Composite drawing; pronotum showing dark coloration extending posteriorly along midline as found in some individuals of *tanytoxus* n. sp. and *collustrans* LeConte; left elytron with sutural bead as in *tanytoxus,* right elytron with sutural bead as in *collustrans.*

NOTES: This species is named for the appearance of the flight path of flashing males—a long arc.

P. collustrans was observed and behavior voucher specimens collected during May 1964 and April and May 1965 at Gainesville, Florida (42 males, 12 females), May 1964 and 1965 at Highlands Hammock State Park, Highlands County, Florida (21 males), May 1965 on route 26, 10 miles west of Gainesville (19 males), and 14 May, 1965 at the *collustrans* type locality, Enterprise, Volusia County, Florida (21 males).

The morphological character given to distinguish *tanytoxus* males from those of *collustrans* permits the correct identification of over 95 percent of the voucher specimens of both species.

The type of *collustrans,* in the LeConte Collection at Harvard University, has a well marked fulvous elytral bead.

Upon the completion of this study, behavior voucher specimens will be deposited in the collections at Cornell University, the California Academy of Sciences, the United States National Museum, the University of Florida, Harvard University, and the University of Michigan.

The following additions to Green's 1965 key are made; Couplet 20, page 567, first alternative, in place of "(17) *P. collustrans* LeConte" introduce the following couplet.

Elytral sutural bead black in apical one-third to one-half---------- P. TANYTOXUS Lloyd
Elytral sutural bead fulvous throughout--------------------- P. COLLUSTRANS LeConte

Couplet 25, page 568, second alternative, in place of "(25) *P. consanguineus* LeConte" introduce the following couplet.

Procoxae with anterior surfaces fuscous or piceous. Mesocoxae with anterior surfaces fuscous or piceous without pale areas----------------------- P. MACDERMOTTI Lloyd
Procoxae with anterior surfaces pale. Mesocoxae with anterior surfaces pale or with pale areas ------------------------------------- P. CONSANGUINEUS LeConte

Literature Cited

Green, J. W.
1965. Revision of the nearctic species of *Photinus* (Lampyridae: Coleoptera). Proc. Calif. Acad Sci. 28(15):561-613, 19 figs.

NOTES ON THE NEARCTIC ANTHOPHAGINI WITH A KEY TO THE GENERA (COLEOPTERA: STAPHYLINIDAE)

By IAN MOORE[1, 2]

Considerable confusion exists in the Nearctic literature concerning the characterization of a number of genera of the Anthophagini, the largest tribe of the subfamily Omaliinae. In the present paper I am presenting the results of some studies of the group, partly in order to correct some existing errors, but largely in order to present a new key to the Nearctic genera. Members of all the genera have been examined.

The Omaliinae can be distinguished from all other Nearctic staphylinids except the Leptotyphlinae by the presence of a pair of pale mounds on the upper surface of the head near a line drawn through the posterior margin of the eyes. (*Vellica longipennis* Casey lacks these structures but is obviously a member of the tribe.) These mounds have generally been called "ocelli." Coiffait, 1959, demonstrated that they are not true ocelli as found in the Orthoptera and Hymenoptera, but mark the point of attachment of the posterior arm of the tentorum. He proposed the name *frontal calluses* for these structures. The Omaliinae differ from the Leptotyphlinae in having five-segmented tarsi, whereas a lesser number is present in the latter subfamily.

The Anthophagini may be briefly characterized as follows: last segment of maxillary palpi longer than width of penultimate, usually not narrower than penultimate; tarsi with first four segments not wider than fifth segment; last segment of posterior tarsi shorter than first four together, segments two through four usually decreasing in length.

Members of this tribe are known largely from the Holarctic region. Others have been found in Australia, New Zealand and the Andean areas of Chile and Argentina. Most of the few known tropic species were probably collected at high altitudes.

Although the key to the genera which follows is clear, the use of it involves considerable difficulty due to the fact that the generic differences in this tribe are often slight and not easy to observe. This is particularly evident in the palpal and tarsal structure. The terminal segments of the maxillary palpus and the posterior tarsus of a member of each genus are illustrated to facilitate identification. Members of each genus usually conform to a characteristic facies which is difficult to define. Consequently, an outline drawing of a member of each genus, as seen from above, is given as a further aid to identification.

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[1] Associate in Entomology, San Diego Natural History Museum, San Diego, California.

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Key to the Nearctic Genera of the Anthophagini

1. First segment of posterior tarsi about as long as, or longer than last segment------ 2
First segment of posterior tarsi shorter than last segment-------------------- 7
2. Last segment of maxillary palpi not more than twice as long as penultimate-------- 3
Last segment of maxillary palpi more than twice as long as penultimate---------- 5
3. Last segment of maxillary palpi not distinctly narrower than penultimate-------- 4
Last segment of maxillary palpi distinctly narrower than penultimate **OROBANUS** LeConte
4. Penultimate tarsomere bilobed------------------------------**PELECOMALIUM** Casey
Penultimate tarsomere not bilobed--------------------------**AMPHICHROUM** Kraatz
5. Head with impressed nuchal line----------------------------------**UNAMIS** Casey
Head without nuchal line--- 6
6. Head with a pair of frontal calluses between eyes----------**PHLAEOPTERUS** Motschoulsky
Head without frontal calluses--------------------------------------**VELLICA** Casey
7. Last segment of maxillary palpi narrower than apex of penultimate-------------- 8
Last segment of maxillary palpi not narrower than apex of penultimate---------- 9
8. Last segment of maxillary palpi slender, parallel sided------------**MICROEDUS** LeConte
Last segment of maxillary palpi fusiform------------------**GEODROMICUS** Redtenbacher
9. All antennomeres densely pubescent ------------------------------------- 10
First four antennomeres glabrous except for a few long setae------------------ 11
10. Penultimate segment of maxillary palpi one-half longer than wide--------**ARTOCHIA** Casey
Penultimate segment of maxillary palpi not longer than wide----------**LESTEVA** Latreille
11. Second antennomere twice as long as third-------------------**PORRHODITES** Kraatz
Second antennomere not longer than third---------------------------------- 12
12. First segment of posterior tarsi one-half longer than second------------**ACIDOTA** Stephens
First segment of posterior tarsi not or very little longer than second----------- 13
13. Head with well-impressed nuchal line; last segment of maxillary palpi seldom longer than penultimate-- 14
Nuchal line absent or feeble; last segment of maxillary palpi usually longer than penultimate -- 17
14. Base of pronotum tumid, reflexed-------------------------**PARADELIPHRUM** Hatch
Base of pronotum not tumid, not reflexed--------------------------------- 15
15. Tarsi with a small membranous bilobed pad at base of ungues--**ANTHOPHAGUS** Gravenhorst
Tarsi without pad at base of ungues--------------------------------------- 16
16. Last segment of maxillary palpi not more than one-half longer than penultimate ---**ARPEDIUM** Erichson
Last segment of maxillary palpi more than twice as long as penultimate ---**XYLODROMUS** Heer
17. Pronotum not widest at base --- 18
Pronotum widest at base--- 21
18. Mesosternum carinate------------------------------**MATHRILAEUM** NEW GENUS
Mesosternum not carinate-- 19
19. Gular sutures united (or extremely approximate)-----------------**OLOPHRUM** Erichson
Gular sutures distinctly separate-- 20
20. Head abruptly constricted behind eyes to form a distinct neck; tempora much shorter than eyes--**ANTHOBIUM** Leach
Head not constricted behind eyes; tempora longer than eyes----------**OROCHARES** Kraatz
21. Head produced in a beak which anterior to eyes is one-half longer than wide ---**TANYRRHINUS** Mannerheim
Head anterior to eyes not longer than wide------------------**TRIGONODEMUS** LeConte

Discussions

OROBANUS. Members of this genus are distinctive within this tribe in that the last segment of the maxillary palpi is shorter and much narrower than the preceding segment. In *Microedus* and *Geodromicus* a similar but much less pronounced condition occurs. In the latter two genera, the first segment of the posterior tarsus is much shorter than the last segment, whereas in *Orobanus* the first segment is longer than the last.

Seven species are known from the Western United States and British Columbia. The genus was revised by Mank, 1934.

PELECOMALIUM. The bilobed penultimate tarsomere is a unique character within the tribe, as also is the strongly sexually dimorphic maxillary palpus.

Twelve species are at present recognized in this genus. Eleven of these are known from the Western United States, British Columbia and Alaska. The other is from Pennsylvania.

Some of Casey's species appear to be weakly separated from *scutatum* and *opaculum*; the color is variable and other differences given seem light.

AMPHICROUM. Members of this genus resemble those of *Pelecomalium* but differ in palpal and tarsal structure.

Three Nearctic species are known from Southern California to Alaska. Seven species have been described from the Palaearctic region and two from India.

UNAMIS. There is no single outstanding character to distinguish these small dark insects. They resemble members of *Phlaeopterus,* from which they differ in having a transverse impressed line across the upper surface of the head, just behind the frontal calluses.

The four known species are found on the Pacific coast from British Columbia to middle California. Hatch, 1957, gives a key to the species.

PHLAEOPTERUS. These are moderate-sized dark insects which are usually rather strongly flattened dorso-ventrally.

The fourteen described species are from the Western United States, Western Canada and Alaska. All but three of these are treated by Hatch, 1957.

VELLICA. The single species, *longipennis* Casey, is remarkable in lacking frontal calluses. Structurally it resembles *Phlaeopterus* and *Unamis,* but is small and not depressed. It is apparently not common in Northern California.

Vellica is an example of the exception so often encountered in taxonomy. The outstanding characteristic of the group is lacking, but the insect is otherwise so similar to others of the group that it cannot be excluded merely because it lacks frontal calluses. Conversely, *Brathinus* must be excluded from the family Staphylinidae (as explained later), although it has frontal calluses.

MICROEDUS. These small, dark insects are structurally similar to members of *Geodromicus,* but differ in palpal structure. The last segment of the maxillary palpus is somewhat narrower than the preceding and is nearly parallel-sided for most of its length. In *Geodromicus,* the last segment is thickened centrally and gradually narrowed to base and to apex. In members of both of these genera the fourth posterior tarsomere has beneath, extending distally from its apex, a small, membranous appendage, the apex of which bears a pair of long setae which extend between the ungues. I have not observed this structure in other members of the tribe.

Six species are known from the western United States and British Columbia, and one of these is also found in Newfoundland. Hatch, 1957, treated all of the species.

GEODROMICUS. These moderate-sized beetles are sometimes marked with patterns of red or yellow. An unusual appendage on the underside of the posterior tarsus is described in the notes under *Microedus.*

Twelve species are reported from the Nearctic region, two of which are also known from Europe. Twenty-five other species have been described from the Palaearctic region and sixteen from India.

ARTOCHIA. The elongation of the front of the head is unusual in this subfamily. A much more pronounced elongation of the head occurs in *Tanyrrhinus,* but the palpal structure and the facies will readily distinguish them. The form of the maxillary palpi (as illustrated) will aid in identification of members of the genus.

The two known species, both from California, are apparently rare. The elytra of *productifrons* are as long as wide, whereas in *californica* they are much longer than wide.

LESTEVA. The palpal structure is the most distinguishing characteristic of species of this genus. The very short penultimate segment and the very long last segment is an unusual combination.

Two species are known from the Northern United States, Canada and Alaska. Twenty-four other species have been described from the Palaearctic region and four from India.

Casey, 1893, erected the genus *Tevales* for a new species, *cribratulus.* At the same time, he proposed the generic name *Pseudolesteva* for *Lesteva pallipes* LeConte, later changing the generic name to *Paralesteva* on the assumption that *Pseudolesteva* was preoccupied. Steel, 1952, showed that the two species for which Casey has established these two genera were not sufficiently distinct to warrant separate genera for them. He united them with *Lesteva.*

Blackwelder, 1952, demonstrated that the type-species of *Lesteva* is in the genus called *Anthophagus,* which name (under a strict application of the rules) it should replace. Since this left the genus without a name, he proposed the name *Lesta* for it. Blackwelder was unaware of Steel's study of the same year, which synonymized *Tevales, Pseudolesteva* and *Paralesteva* with *Lesteva.* If a strict application of the rules is to be accepted, the correct name to apply to this genus would be *Tevales* Casey. However, much confusion would exist if this name were changed. Subsequent students have continued to use the names *Lesteva* and *Anthophagus* in their original sense. It is reasonable to assume that the International Commission on Zoological Nomenclature will conserve these older names. Consequently, I am using the older name, *Lesteva,* for this genus, and *Anthophagus* for the genus which has long been known by that name. Assuming that the International Commission on Zoological Nomenclature will conserve the name *Lesteva* in its original sense, the American species should be listed as follows: *Lesteva* Latreille, 1896, with *Tevales* Casey, 1893, *Pseudolesteva* Casey, 1893, *Paralesteva* Casey, 1905, and *Lesta* Blackwelder, 1952, as synonyms, and with two species, *cribratulus* (Casey), 1893, and *pallipes* LeConte, 1863.

PORRHODITES. A second antennomere, twice as long as the third, is unique within the tribe. In other members of the tribe this segment is not longer than the third and often much shorter.

A single circumpolar species of this genus has been reported from Labrador, Michigan, Colorado, British Columbia, Alaska and Europe.

ACIDOTA. There is no single character to distinguish members of this genus from others of the tribe. They are coarsely sculptured, with shining integuments.

The three known American species are northern in distribution. Two of the American species and five other species are found in the Palaearctic region.

PARADELIPHRUM. The tumid, reflexed base of the pronotum is not pronounced but is an unusual character.

Hatch, 1957, described this genus and two species, *tumidum* from British Columbia and Oregon, and *inflatum* from British Columbia. I have seen specimens of the latter from California and Colorado.

ANTHOPHAGUS. As this genus has not previously been reported from America, a generic description follows:

Head oval, strongly constricted behind to form a neck; with a definite nuchal constriction across the dorsal surface; with a discrete longitudinal impression each side before the frontal calluses. Labrum tranverse, shallowly emarginate in front. Mandibles stout, pointed. Maxillary palpi four-segmented; first segment small; second elongate, curved, widest at apex; third about as long as second, apex wider than second; fourth a little longer and almost as wide as third, narrowed apically. Outer lobe of maxillae longer than inner lobe, curved at apex, which is densely pubescent; inner lobe hooked at apex, inner margin setose and pubescent. Ligula triangularly emarginate at apex. Labial palpi three-segmented; first segment short; second longer, swollen apically; third about as long as second, narrower, cylindrical. Gular sutures united at middle, widely divergent behind.

Pronotum about as wide as head, constricted behind. Prosternal process pointed, extending halfway between the coxae. Mesosternum not carinate, its process short and pointed. Middle coxae contiguous. Elytra wider than pronotum.

Tibiae pubescent, with a few spines externally. Posterior tarsi with first four segments short, subequal, fifth a little shorter than the first four together. With a small bilobed membranous pad between the ungues.

This genus differs from all other omaliinids in the presence of the small bilobed membranous pad between the claws.

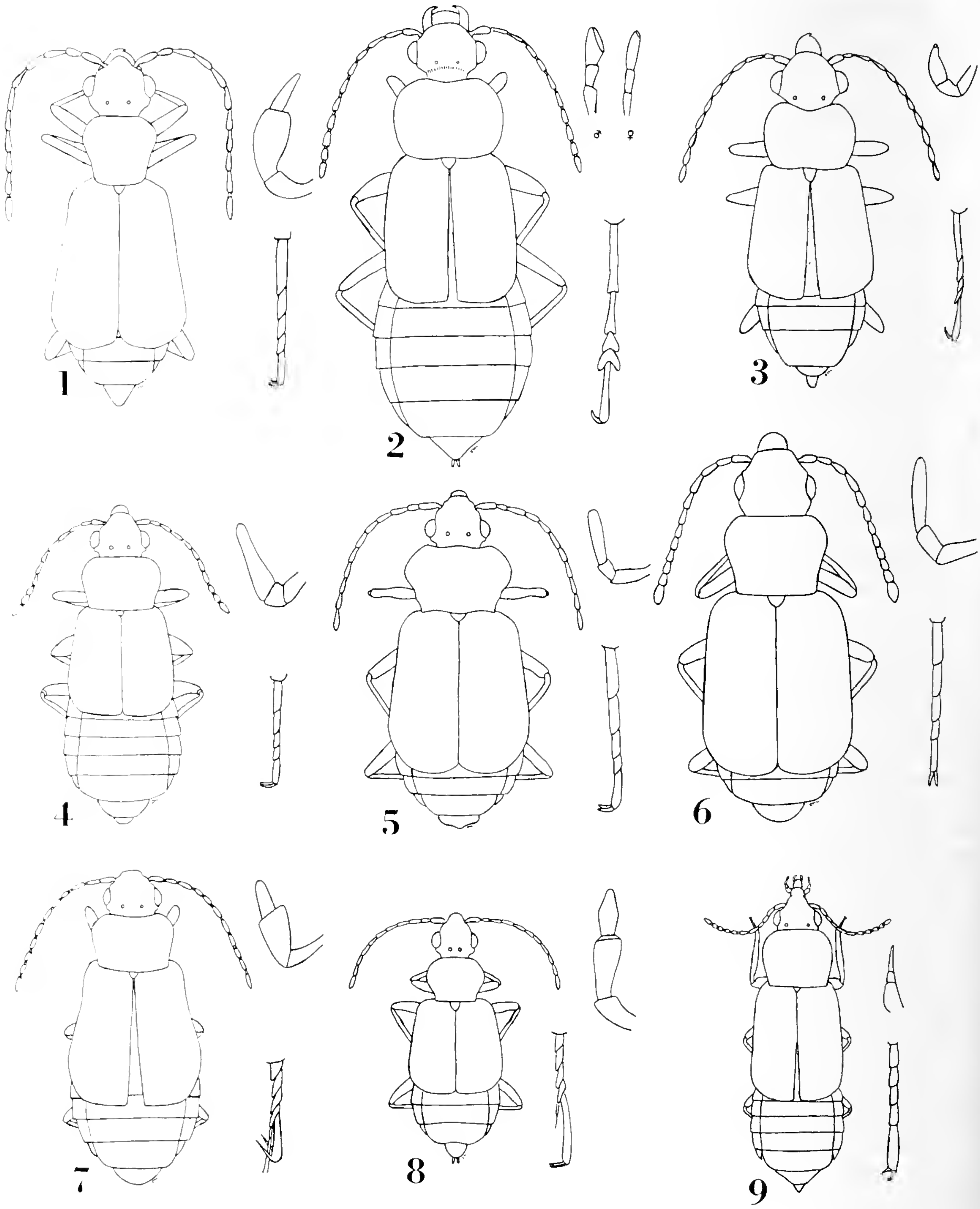
The use of this name rather than *Lesteva* for this genus, as proposed by Blackwelder, 1952, has been discussed in the notes under the genus *Lesteva.*

A series of specimens very similar to the European *A. caraboides* Linné was collected at Prairie Creek, California, by Van Dyke in August, 1939. These are now being studied by William O. Steel.

Thirty-two species of this genus are known from Europe, and three species from Japan.

ARPEDIUM. Members of this genus vary considerably in facies. The distinguishing generic characters are not pronounced.

Of the nine species reported from America, at least three are also known from the Palaearctic region. Fourteen other species have been



FIGURES 1-9. Neartic Anthophagini, one species of each genus; outline drawings of the body, as seen from above, the last three segments of the maxillary palpus, and the posterior tarsus.. 1—*Orobanus densus* Casey. 2—*Pelecomalium puberulum* Fauvel. 3—*Amphicroum floribundum* LeConte. 4—*Unamis truncata* Casey. 5—*Phlaeopterus fusconiger* Motschoulsky. 6—*Vellica longipennis* Casey. 7—*Microedus ewingi* Hatch. 8—*Geodromicus plagiatus* (Fabricius). 9—*Artochia californica* Bernhauer.

described from the Palaearctic region and one, a doubtful member of the genus, from India. The American species are difficult to identify from the existing literature.

XYLODROMUS. The American species tend to be parallel in form with moniliform antennae.

Although I have not seen Casey's types, his descriptions are in sufficient detail to lead me to believe that the synonomy in the following list of the three Nearctic species is correct.

capito (Casey) NEW COMBINATION. *(Omalium)*
concinnus (Marsham)
 lacustre Casey NEW SYNONYMY. *(Omalium)*
depressus (Gravenhorst)

Capito was described from Wisconsin. The other two species are widely distributed in the northern part of the continent and also in the Palaearctic region, from which seven other species are known.

MATHRILAEUM Moore NEW GENUS.

Head wider than long; somewhat produced in front, the anterior margin vaguely tumid; irregularly impressed before the frontal calluses; eyes large, prominent; sides with a strongly reflexed border behind the eyes, thence abruptly narrowed to a broad neck. Antennae incrassate. Labrum transverse, emarginate in front. Mandibles stout, base thickened, abruptly flattened in apical third, strongly arcuate and hooked at apex. Maxillary palpi four-segmented; first segment short; second elongate, arcuate, widest at apex; third shorter than and about as wide as second; fourth wider and longer than second, gradually narrowed to apex. Outer lobe of maxillae longer and wider than inner lobe, externally at apex with a row of spines, internally densely pubescent; inner lobe hooked at tip, setose internally. Ligula tranverse, apex emarginate, with a central chitonous rod. Labial palpi three-segmented; first segment longer than wide; second a little narrower than first, tranverse; third narrower than second, longer than wide, subcylindrical. Mentum large, trapezoidal. Gular sutures united at the middle, widely divergent behind.

Pronotum transverse, subquadrate, side margins crenulate. Prosternum tumid in the middle, its process long and pointed. Mesosternum strongly, longitudinally carinate, its process long, pointed, extending more than halfway between the coxae. Metasternal process short, rounded, not meeting the mesosternal process. Elytra covering most of the abdomen; with impressed longitudinal striae.

Tibiae without spines on the outer edge. Hind tarsi with the first four segments short, progressively decreasing a little in length; fifth segment shorter than first four together.

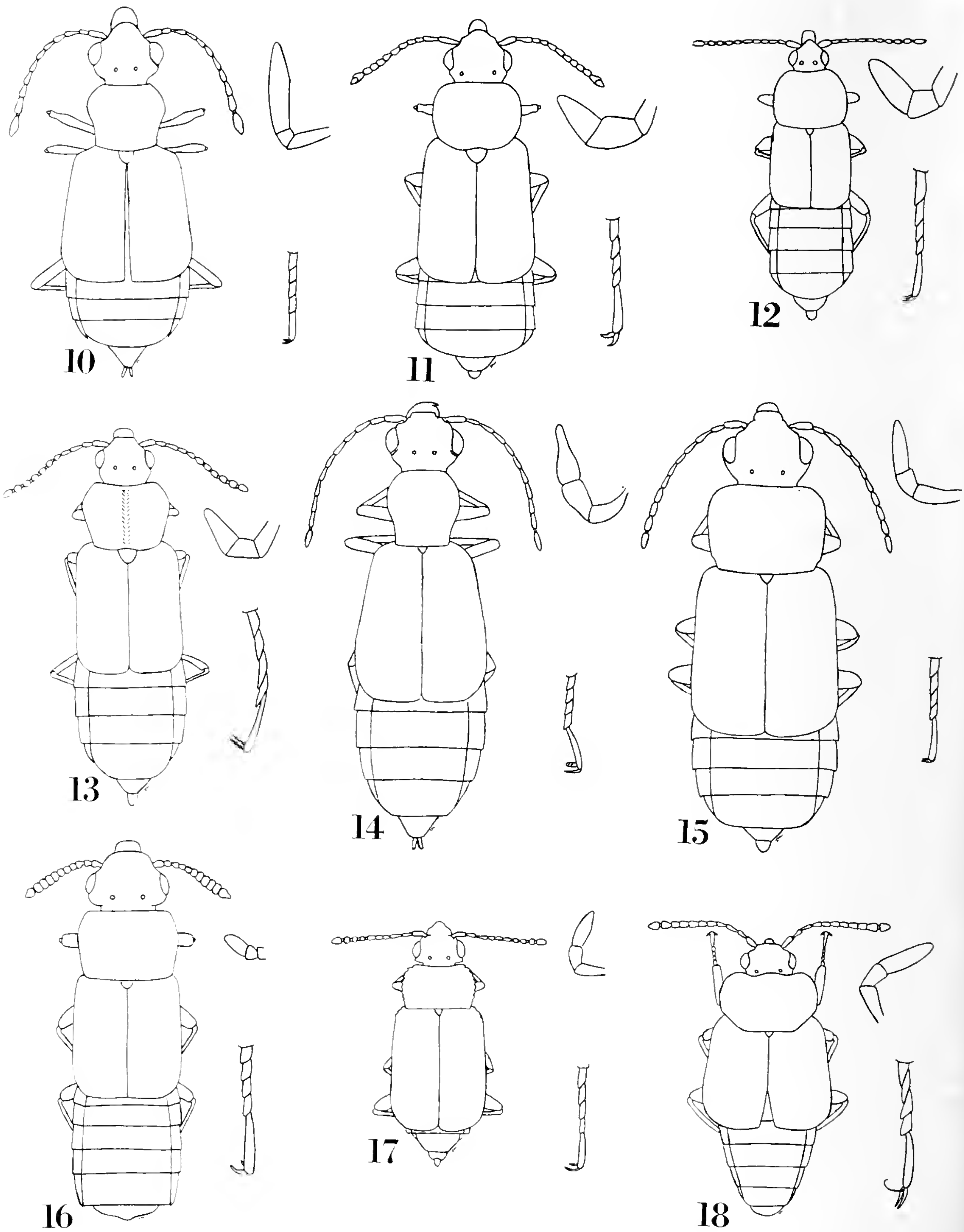
Type-species: Lathrimaeum pictum Fauvel.

Also included in this genus is *Lathrimaeum subcostatum* Mäklin. These two species have always been placed in the genus now called *Anthobium*. In *Anthobium* the mesosternum is not carinate, the gular sutures are separated and the tibiae usually have a few spines externally.

The two known species are found in fungus from British Columbia to middle California.

Key to the Species of Mathrilaeum

Elytra with three to five rows of punctures between suture and first raised interspace -- SUBCOSTATUM (Maklin)
Elytra with single row of punctures between suture and first raised interspace -- PICTUM (Fauvel)



FIGURES 10-18. Nearctic Anthophagini, one species of each genus; outline drawings of the body, as seen from above, the last three segments of the maxillary palpus and the posterior tarsus. 10—*Lesteva cribratulus* (Casey). 11—*Porrhodites fenestralis* (Zetterstedt). 12—*Acidota quadrata* Zetterstedt. 13—*Paradeliphrum inflatum* Hatch. 14—*Anthophagus* sp. 15—*Arpedium quadrum* (Gravenhorst). 16—*Xylodromus depressus* (Gravenhorst). 17—*Mathrilaeum pictum* (Fauvel). 18—*Olophrum obtectum* Erichson.

OLOPHRUM. It has usually been stated that members of this genus lack spines on the outer edge of the tibiae, a character which has been used to differentiate several related genera. This character is variable within this genus, some species having no spines, others a few and some quite a number. The character cannot be employed advantageously in this section of the tribe.

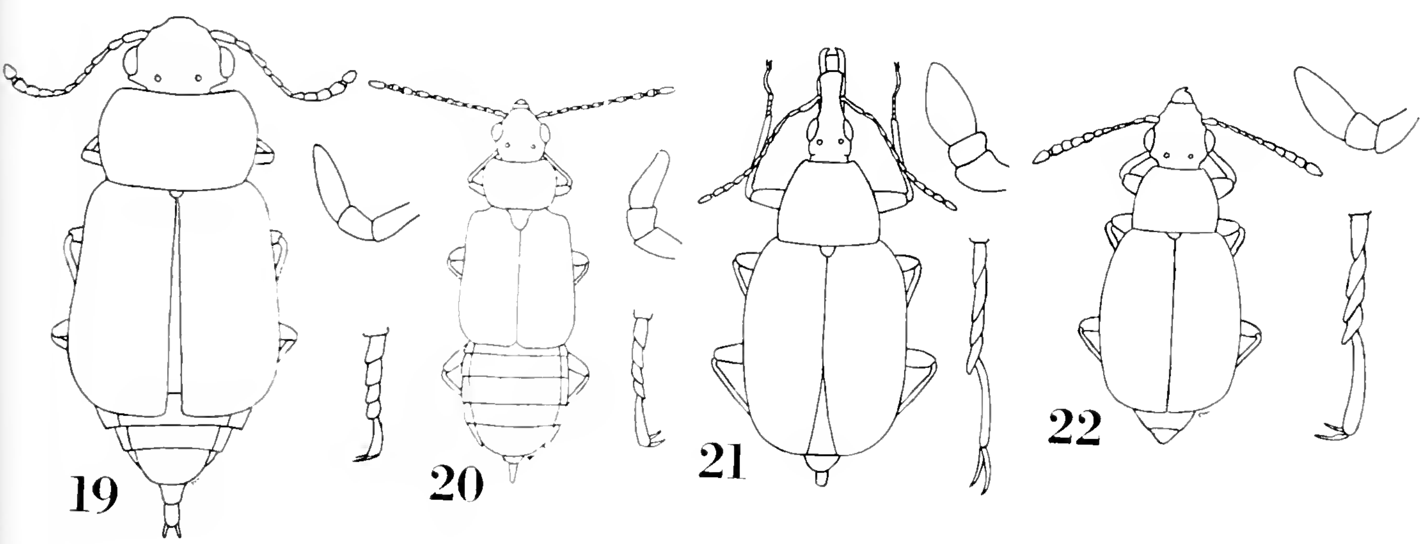
I have seen specimens of *Olophrum nigropiceum* Motschoulsky from Alaska, previously known only from Siberia.

Thirteen Nearctic species are known, four of which are also reported from the Palaearctic region. Thirty-six other Palaearctic species, and one species from India, have been described.

ANTHOBIUM. Members of this genus have no single outstanding character for their easy recognition. It has usually been stated that the tibiae of members of this genus are not spinose on the outer edge, one of the characters used to separate the genus from *Deliphrum*. The type-species, *melanocephalum* (Gyllenhal), and a number of other species have a distinct series of small spines interspersed with the pubescence on the outer edge of the tibiae. As with *Olophrum,* this is not a dependable character. I can find no character of importance to separate the type-species of *Deliphrum, tectum* (Paykull), from *Anthobium melanocephalum* (Gyllenhal), so I am uniting the two genera (NEW SYNONYMY).

Anthobium pictum (Fauvel) and *subcostatum* (Mäklin) have been removed in this paper to the new genus *Mathrilaeum.*

The Nearctic species are as follows: *Anthobium aequicolle* (Casey) NEW COMBINATION *(Deliphrum), atrocephalum* (Gyllenhal), *clarki* Hatch, *crenulatum* Hatch, *expansum* (LeConte) NEW COMBINATION *(Deliphrum), fimetarium* (Mannerheim), *marginatum* (Kirby & Spence), *nigropiceum* (Casey), *occiduum* (Casey) NEW COMBINATION *(Deliphrum), reflexicolle* (Casey), *sinuosum* Hatch, and *spretum* Hatch.



FIGURES 19-22. Nearctic Anthophagini, one species of each genus; outline drawings of the body, as seen from above, the last three segments of the maxillary palpus and the posterior tarsus. 19—*Anthobium atrocephalum* (Gyllenhal). 20—*Orochares angustata* (Erichson). 21—*Tanyrrhinus singularis* Mannerheim. 22—*Trigonodemus striatus* LeConte.

Of the above twelve species, only one, *atrocephalum,* is reported from the Palaearctic region. Twenty-eight other species have been described from the Palaearctic region and eight from India.

OROCHARES. The only known species, the European *angustata* (Erichson), has been reported from Massachusetts. Although this record appears to be in doubt, its inclusion here will facilitate its recognition should it be found to be established in this country.

TANYRRHINUS. Aside from its unusual facies with the elongate head, there is little to distinguish the single species of this genus from other genera of the *Anthophagini.* It is known from Alaska to middle California.

TRIGONODEMUS. The species are very similar to *Tanyrrhinus singularis* Mannerheim, but lack the long beak. Only two species are known, both from the Nearctic region.

BRATHINUS LeConte. Some authors have treated this genus as a member of this tribe. Others have put it in a family by itself. I am excluding it from the Staphylinidae because the first four tergites (dorsal segments three through six) are membranous.

EUNONIA Casey. I have seen two specimens in the Bernhauer collection labeled *"Eunonia keeninana* Casey," collected near Prince Rupert, British Columbia, by Keen. They answer perfectly to Casey's description of this species except for the absence of frontal calluses. They are specimens of a species of *Syntomium,* either identical with or very similar to *Syntomium malkini* Hatch. The head is very roughly sculptured in this species, which probably led Casey to believe that he detected "ocelli." Thus, *Eunonia* Casey, 1904, equals *Syntomium* Curtis, 1828 (NEW SYNONYMY); the genus belongs in the Oxytelinae.

REVELSTOKEA. *Revelstokea hopping* Hatch is being treated by William O. Steel.

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CHANGES IN NOMENCLATURE AND REASSIGNMENT OF PLATYDESSUS PERFORATUS (COLEOPTERA: DYTISCIDAE)

By PAUL J. SPANGLER[1,2]

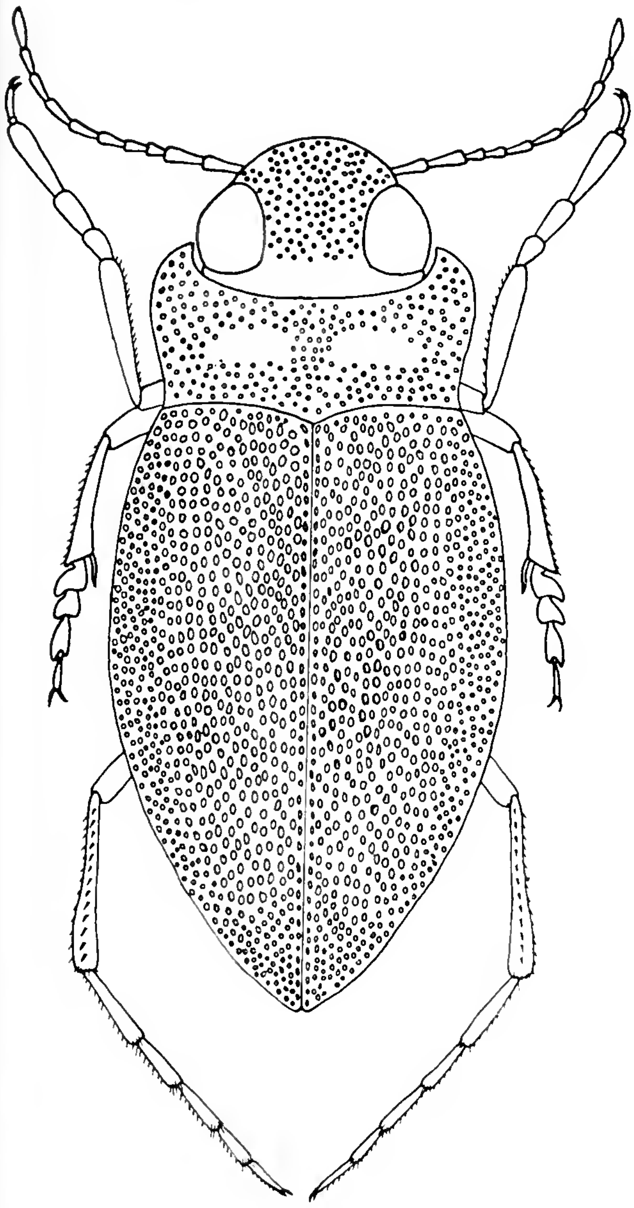

FIG. 1
Macrovatellus perforatus (Guignot).

While trying to identify and describe some South American bidessine beetles, it was necessary to examine the type of the monotypic genus *Platydessus* described and assigned to the tribe Bidessini by Guignot (1955). Through the kindness of Mr. G. Frey, Museum G. Frey, Munich, Germany, I was able to borrow the female type of *Platydessus perforatus* Guignot for study.

As I suspected when I read that the type specimen was 5 mm. long (unusually large for a bidessine), the type does not belong to the tribe Bidessini. I have examined the metathoracic episterna of *perforatus* and found that they are excluded from the middle coxal cavities by the mesosternal epimera; therefore, the species is excluded from the Bidessini. Also, the prosternal process is short and does not attain the metasternum so the species belongs to the Vatellini. The mesosternum is mostly visible too, as is characteristic of the genus *Macrovatellus* described by Sharp (1882). I have compared *perforatus* with *Macrovatellus mexicanus* Sharp and *M. haagi* Wehncke and found it is congeneric with them. Consequently, the following changes are necessary.

Macrovatellus Sharp

Macrovatellus Sharp, 1882, Sci. Trans. Roy. Dublin Soc. 2(2):282. Type, by subsequent designation, *Macrovatellus marginalis* Sharp (F. Guignot, 1946, Rev. Français Ent. 13(3):112).

Platydessus Guignot, 1955, Bull. Inst. Roy. Sci. nat. Belgique 31(27):3. Type, by monotypy, *Platydessus perforatus* Guignot (NEW SYNONYMY).

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1 Department of Entomology, United States National Museum, Smithsonian Institution, Washington, D. C.

2 This study was made possible in part by grant GB-1697 from the National Science Foundation.

Macrovatellus perforatus (Guignot) NEW COMBINATION

Platydessus perforatus Guignot, 1955, Bull. Inst. Roy. Sci. nat. Belgique 31(27):4. Type female: "Bolivia"; in the G. Frey Museum, Munich, Germany.

Because Guignot's *perforatus* has never been illustrated, a dorsal view (fig. 1) of his type specimen is included. The distinctive habitus of species belonging to the genus *Macrovatellus* is characteristic for most of the Vatellini.

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NOTICE

In the March issue of the Bulletin, Vol. 20, No. 1, on page 11, Spangler's new species of *Derovatellus* is spelled *ibarri.* It should have been spelled *ibarrai.* The name is spelled correctly in all other parts of the article.

GNATHIUM MINIMUM (SAY) IN ILLINOIS (COLEOPTERA: MELOIDAE)

By JOHN K. BOUSEMAN[1, 2]

On August 11 and 12, 1962, while collecting in an area of sand-prairie along the Mississippi River three miles south of Savanna, Illinois, I found many adults of *Gnathium minimum* (Say) on flowers of *Helianthus*. Most of the beetles were on flowers of *Helianthus petiolaris,* but a few were on *H. occidentalis* and *H. rigidus*. Seventy-three specimens were collected on the two days. On August 19, 1962, I returned to the sand-prairie and found *G. minimum* on *H. petiolaris* three miles north of Fulton, Illinois. At this locality egg masses of the beetle were present on *H. petiolaris*. Females oviposit at the base of the bracts of the host plant. Two egg masses from the bracts of a single flower yielded a total of 290 larvae. Six egg masses deposited in the laboratory by caged females hatched in six or seven days.

MacSwain (1952, Wasmann Jour. Biol. 10:205-224) has summarized the known distributions of the species of *Gnathium* occurring in the United States. My records of *G. minimum* are of especial interest as they are not only the first for *Gnathium* in Illinois, but are also new northeastern limital records for the genus. Further, they are the first records at this latitude for *G. minimum* east of Nebraska.

Gnathium minimum is probably a member of that group of insects which find their easternmost distributional limits in the xeric sand-prairies of western Illinois. It is of interest to note that *Helianthus petiolaris* is believed to be adventive in Illinois from the western United States (Jones, 1963, Amer. Midland Natur. Monogr. No. 7:1-401). *G. minimum* might also be a recent migrant to the state.

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[1] Department of Entomology, University of Illinois, Urbana.

[2] Thanks are due to Barbara A. Bouseman and John M. Campbell for their assistance in the field and to Richard B. Selander who verified the determination of the beetles.

BEETLE TALK

The G. H. Dieke collection of beetles and entomological library was acquired by the U. S. National Museum in 1965. Dieke was chairman of the Physics Department of Johns Hopkins University in Baltimore. His special entomological interest was the Coccinellidae, and the collection is especially rich in specimens (about 14,000) of that family. Furthermore, the predominance is in the Epilachninae, Dieke's favorites.

A large part of the synoptic collection of Anastase Alfieri was acquired by the U. S. National Museum in 1966. Alfieri, of Cairo, is Secretary General of Société Entomologique d'Égypte. The collection contains Coleoptera, Hymenoptera, Neuroptera, and a smattering of other orders. It is not a huge collection, consisting of a few specimens of many species, but all are identified, some being type material, and all are from Egypt or nearby. The Coleoptera are most numerous, with 3805 specimens of 1929 species.

A NEW GENUS AND NEW SPECIES OF ANOBIIDAE FROM JAMAICA WITH A LARVAL DESCRIPTION (COLEOPTERA)

By RICHARD E. WHITE[1]

An undescribed species of Anobiidae has several times been intercepted in coconut palms from Jamaica; it is sufficiently distinct from described genera to warrant a new generic name. The larval description is from specimens associated with adults.

Parobius White, NEW GENUS

General: Body quite elongate, nearly paralled-sided, nearly cylindrical in form; pronotum sharply margined, fully as wide as elytra; pubescence fine, appressed, moderate in density, evenly distributed; surfaces granulate-punctate.

Head: Eyes distinctly bulging, more strongly so in male; antennae 11-segmented, ⅓ to ½ length of body, segments 4 to 8 inclusive nearly equal in size and shape, last 3 segments enlarged, together nearly as long as all preceding; clypeus and labrum distinct; maxillary and labial palpi similar, basal segment moderate in length, 2nd shortest, 3rd longest and widest, pointed at apex.

Dorsal surfaces: Pronotum wider than long, broadest anteriorly, punctures largest, most distinct on disk; scutellum nearly square, a little wider than long; elytra lacking striae and grooves, granules indistinct, punctures nearly evenly distributed.

Ventral surfaces: Prosternum distinctly wider than long, length before coxae about equal to longitudinal coxal diameter, prolonged between coxae, front coxae rather small, oval, narrowly separated; mesosternum similar in form to prosternum; mesocoxae oval, narrowly separated, a little larger than front coxae; metasternum rather long, not declivous in front, longitudinally sulcate posteriorly; metepisternum distinctly widest anteriorly; metacoxae narrowly separated at center, distinctly transversely grooved near center, more open laterally; first abdominal suture not as distinct as others, curving posteriorly at center, others nearly straight, segment 1 longest, 2 and 3 moderate, nearly equal, 4 shortest, 5 moderate; legs rather stout; tarsi short, broad, 2nd and 3rd segments prolonged ventrally, 4th segment broad, flat, 5th segment arising near base of 4th, claws simple.

Type-species: *Parobius globulus* White, sp. nov.

The genus *Parobius* is a member of the subfamily Dryophilinae and, among North American genera, is most similar in general form to *Ernobius* Thomson and *Xarifa* Fall. *Parobius* is readily distinguished from *Ernobius* in that the front coxae are oval, moderate in size, not prominent, and narrowly separated (they are conical, prominent, and touching in *Ernobius*). *Parobius* differs from *Xarifa* in that the pronotum is sharply margined laterally; in *Xarifa* the pronotum lacks a margin. In Fall's key to the Dryophilinae (1905, p. 131) *Parobius* keys with some difficulty to *Xestobium;* in the latter genus the prosternum before the coxae is equal to about ⅓ the maximum coxal diameter, whereas in *Parobius* it is about equal to the maximum coxal diameter. In reference to the world genera of Dryophilinae (including the Ernobiinae of some classification schemes), *Parobius* is most similar to the European and North African genus *Ochina* Stephens. The latter genus differs from *Parobius* in that the

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[1] Entomology Research Division, Agr. Res. Serv., U. S. Department of Agriculture, Washington, D. C.

prosternum is very short before the coxae (equal to about ⅓ maximum coxal diameter) and antennal segments 4 to 8 inclusive are serrate. In *Parobius* the prosternum before the coxae is about equal to the maximum coxal diameter, and antennal segments 4 to 8 inclusive are nearly globular.

Parobius globulus White, NEW SPECIES

(FIG. 1)

General: Quite elongate, nearly parallel-sided, body 2.3 to 2.7 times longer than wide; color nearly uniformly light reddish brown to rather dark reddish brown, usually legs, antennal club, abdomen and sometimes elytral suture noticeably lighter than remainder; pubescence very light yellowish, nearly evenly distributed, moderate in length and density (somewhat finer on ventral surface), appressed, that of frons and apex of abdomen faintly or somewhat (♀) to distinctly (♂) lengthened and bristling; surfaces rather finely granulate-punctate.

Head: Frons normal (♀) or rather protuberant (♂), in latter instance clypeus appearing depressed; surface of head finely, evenly granulate-punctate; bristling pubescence converging toward midline; eyes separated by 1.9 to 2.1 times (♀) or 2.2 to 2.5 times (♂) their vertical diameter, more bulging in ♂; antennae about ⅓ (♀) or about ½ (♂) length of body, 1st segment moderate in length, curving, 2nd short, nearly as wide as long, 3rd, 4th, and 5th rather similar, longer than wide, segments 6, 7, and 8 similar, progessively rather smaller, segments 1 to 8 rather shining, with rather long, bristling pubescence; segments 9, 10, and 11 lengthened, somewhat broader than preceding segments and less shining, club nearly to quite as long as all preceding, 9th and 10th segments similar, widest apically, 11th segment longest, widest near or just beyond middle; terminal segment of maxillary palpus elongate, apex pointed, widest before middle; terminal segment of labial palpus rather elongate, pointed apically, widest at middle.

Dorsal surface: Pronotum somewhat flattened at center, lateral margin sharp, even, with a series of backward projecting hairs, punctate, disk shining, with punctures large, well developed, granules obsolete, with feeble, flat carina posteriorly; elytra finely, irregularly granulate and punctate.

Ventral surface: Prosternal process between coxae rather narrow, elongate, somewhat broadened apically; short, broad intercoxal process of anterior margin of metasternum sulcate at base, posteriorly with distinct, rather narrow, longitudinal groove, this about ½ length of metasternum; 1st abdominal segment longest, 4th shortest, 2nd, 3rd, and 5th moderate, 5th longer than 3rd or about equal to it, 5th segment of ♀ with 2 small posteriorly directed pits near apex, that of ♂ simple.

Length: 2.8 to 4.5 mm.

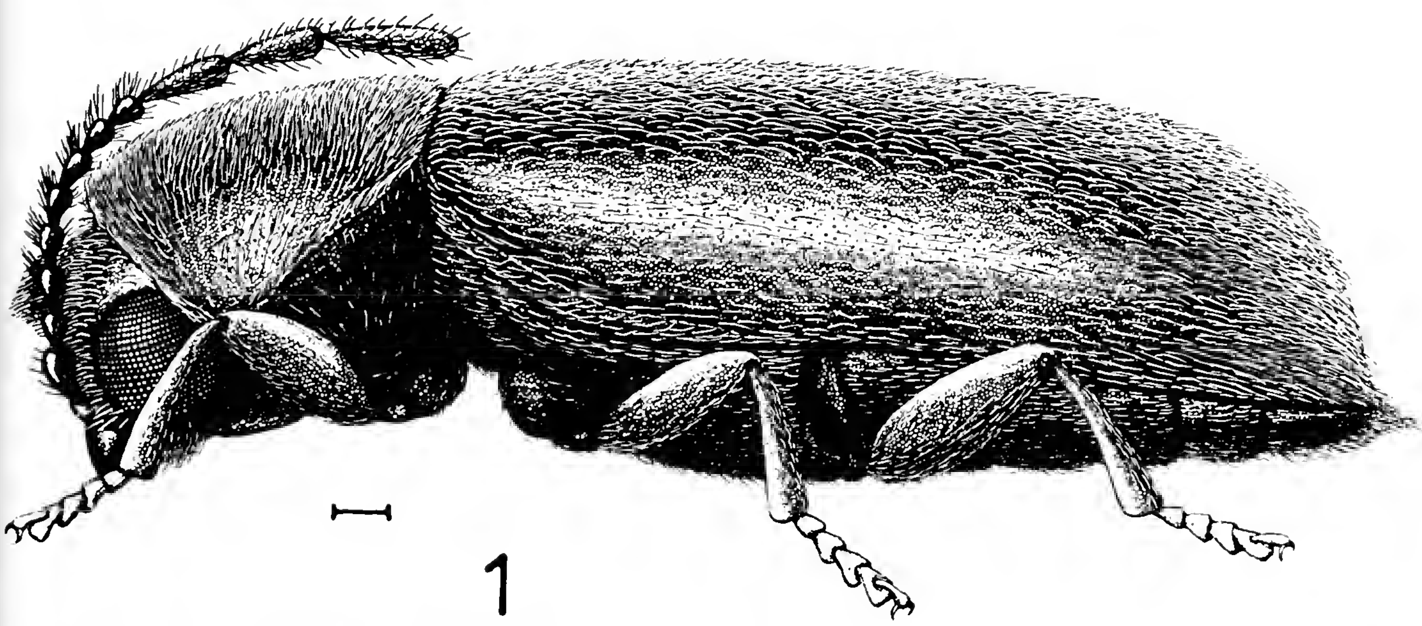
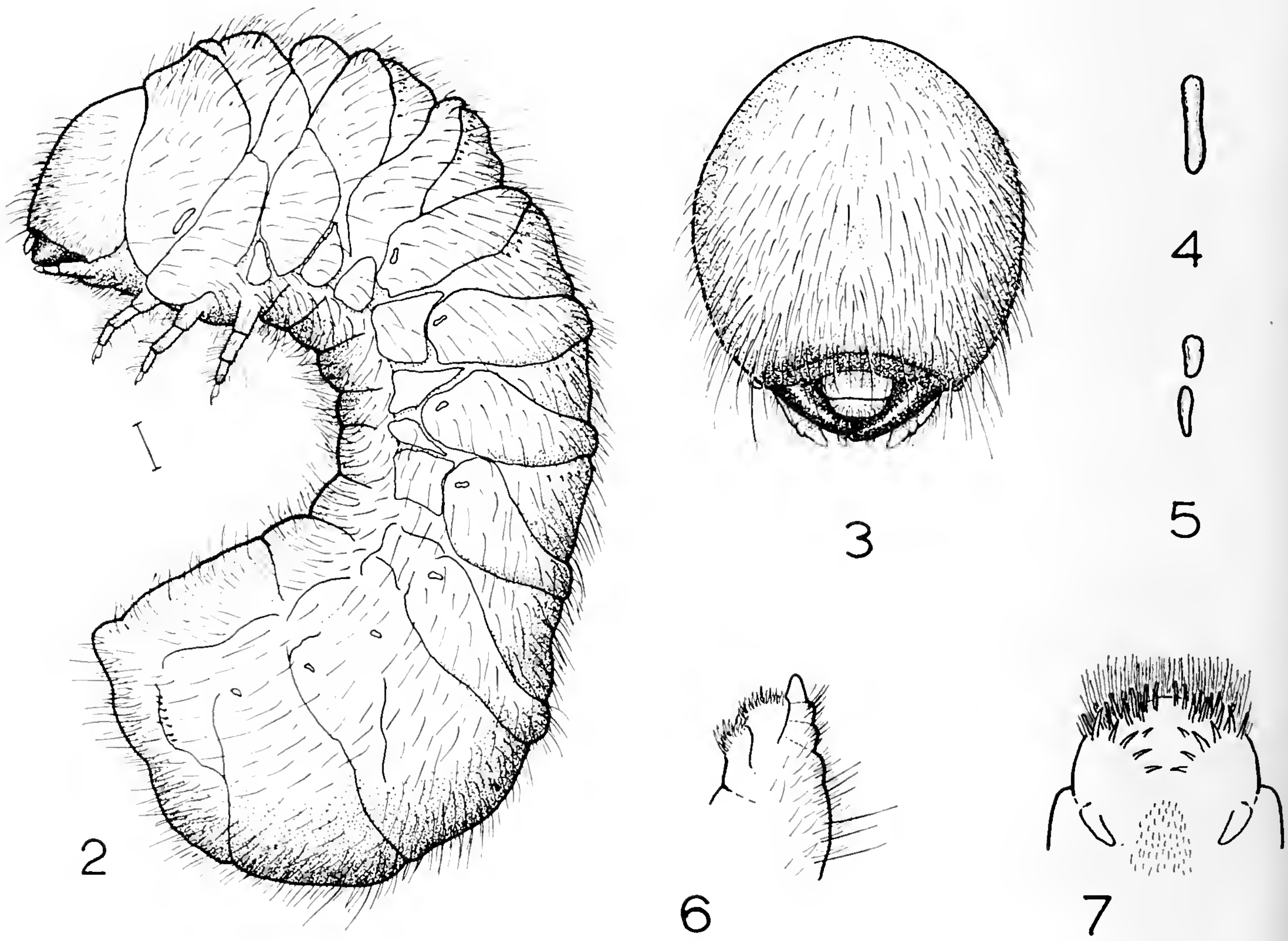


FIGURE 1, *Parobius globulus* sp. nov., lateral view, ♂ paratype; line equals actual size.

This species is described from 13 individuals (7 ♂ ♂, 6 ♀ ♀) which were intercepted in palm pedicels, fronds, and branches from Jamaica. The data on the holotype (♂, USNM type number 68627) are as follows: Ex Jamacia WI, Miami No. 6726, 58-11329, in coconut pedicel and frond. The allotype and 3 paratypes (2 ♂ ♂, 1 ♀) bear the same data. Two paratypes (1 ♂, 1 ♀) bear the following data: Ex Jamaica WI, Miami No. 6738, 58-11331 in coconut pedicel. One paratype (♀) bears the following: Ex Jamaica, at JFKIA 00040, 64-4246, in dry palm branch, *Cocos* sp. Six paratypes (3 ♂ ♂, 3 ♀ ♀) bear the following: Ex Jamaica, WI, intercepted San Juan, PR., January 5, 1963, 63-7400, in palm branch. In addition to the 13 specimens in the type series, I have seen 3 individuals with the same data as the holotype; one incomplete due to dissection, the other 2 incompletely formed tenerals. The latter 3 individuals are not included in the type series. All of the above specimens are in the U. S. National Museum collection. The specific name refers to the nearly globular intermediate antennal segments. The abbreviation JFKIA refers to the J. F. Kennedy International Airport, New York, N. Y. The numbers of the data refer, respectively, to the USDA interception and lot numbers.



FIGURES 2-7, *Parobius globulus* sp. nov., last instar larva. 2—lateral view, line equals actual size. 3—anterior view of head. 4—thoracic spiracle. 5—abdominal spiracles. 6—maxilla. 7—epipharynx.

LAST INSTAR LARVA

(FIGS. 2-7)

Length: 4.1 to 4.8 mm.

Head: (fig. 3) Oval, a little higher than broad, widest just below middle, vague frontal lines evident, in shape of an inverted y; pigmented field behind epistoma narrow, not sharply set off posteriorly, nearly transversely parallel, with numerous fairly long setae, cranium with intermixed, fairly dense, long and short setae, these distinctly sparser dorsally, anterior margin of epistoma with about 10 moderate to long setae; antennae minute, apparently not segmented, a projecting membrane beneath; anteclypeus lacking setae.

Labrum: Transverse, over 2 times wider than long, evenly rounded at sides; surface with dense setae, paired marks present.

Epipharynx: Two short coryphal setae present anteriorly, acanthoparial setae stout, blunt, moderate in length, about 10 each side; 5 or 6 stout chaetoparial setae each side, in a line; tormae short, stout, curved inwardly at base, crepidal field with fine pubescence.

Mandible: With 2 nearly equal teeth at apex, cutting edge extending to and including tooth or ridge-like elevation between 2nd tooth and base of mandible, marginal brush present, directed backward; aboral surface with proximal patch of 4 to 6 long to short setae, distal patch of 4 or 5 rather short setae.

Maxilla: Lacinia over ½ size of galea, with about 8 stout, rather short setae arising near apex; galea with about 9 rather short, quite stout setae, apex blunt, also with 4 to 5 hair-like setae; palpi 3-segmented, first 2 segments with sparse, slender setae, last segment pointed, lacking setae.

Body: In lateral view narrowest at level of 4th and 5th abdominal segments, broadest at level of 7th and 8th segments. Prodorsal asperites on each side of segments as follows: abdominal segment 1 with 8 to 12 in one irregular to very irregular row; segment 2 with 6 to 11 in one fairly even row; segment 3 with 5 to 8 in one irregular row; segment 4 with 5 to 8 in one irregular row; segment 6 with 0 to 4 in one regular row; segment 9 with 5 to 12 in a lateral patch; other segments lacking asperites.

Spiracles: Narrow elongate, nearly parallel-sided; thoracic spiracle 4 to 5 times longer than wide; abdominal spiracles 2 to 3 times longer than wide.

Leg: Pretarsus ⅓ to ¼ length of tibio-tarsus, claw short, slender, arolium present.

This description is from specimens bearing the same data as the 6 adult paratypes which were intercepted in Puerto Rico.

Appreciation is extended to T. J. Spilman for calling the adult and larval specimens to my attention.

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BOOK REVIEW

KEYS TO THE INSECTS OF THE EUROPEAN PARTS OF THE U.S.S.R. VOL. 2, COLEOPTERA AND STREPSIPTERA. By O. Kryzhanovskij and others. 668 pp., 172 plates. Moscow, 1965. [In Russian]

The first of five volumes on the insects of Russia under the general editorship of G. Y. Bey-Bienko, this book is well printed and bound. Many good line drawings and habitus sketches serve as useable illustrations. The format is simple, consisting solely of keys to families, genera, and species after a short introduction to beetle anatomy.

The text states that there are 20,000 species of beetles recorded from all of Russia (including Siberia), but fails to mention the total number included in this work. It is presumed to be complete for European Russia, but the fauna seems very limited if this is so. Of course, European Russia does not have the variation in habitats that we are used to in this country.

The keys are simple and compact, made possible by the liberal use of abbreviations as is the European tradition in faunal works of this sort. Eighty-four families are included, following a notably conservative classification. Each family is numbered and a brief account of the family is given which includes habitat information, the approximate number of species in the area covered as well as the number for all of Russia. Except for the large families, for example, Scarabaeidae, no keys to the subfamilies of tribes are included. Separate keys to genera precede the generic treatment. Each genus has a brief account and the number of species that occur in all of Russia is given. There follows a key to the species. The part of the couplet leading to the specific name contains a fuller account of the characters of the species than does the alternative. Comments on the habitats of larvae and adults and the distribution of the species is also included in this part of the couplet.

A limited knowledge of the language and the fauna prevents me from commenting on the usefulness of the book or the number of errors. I have only two criticisms: 1) the authors did not attempt to bring the nomenclature up to date, 2) no references or bibliography of any kind appear in the book. There are not even references to general works on the beetles of Russia. However, I am sure the book has a very practical value to those working with this fauna.—ROSS H. ARNETT, JR., *American Entomology Institute.*

A KEY TO THE GENERA OF THE SUBFAMILY NITIDULINAE (COLEOPTERA: NITIDULIDAE). By Lorin R. Gillogy. Calif. Dept. of Agric., Bur. Ent. Occasional Papers No. 8, 24 pp. 1965.

Coleopterists wishing to do taxonomic studies of the Nitidulidae have been handicapped for a long time by the lack of adequate diagnostic tools. There are relatively good keys for the fauna of the Palearctic and Nearctic Regions, but this is not true of the rest of the world. Lorin R. Gillogly has a project underway designed to alleviate this situation. The first publication resulting from this effort was released in November 1965. It considers the largest and most varied of the five subfamilies, which it indicates contains 96 genera. This is a welcome addition to the literature on Nitidulidae and it is hoped that this project will soon be producing additional material of this nature.—W. A. CONNELL, *Univ. of Delaware, Newark, Delaware.*

NOTICE

Mark Robinson, of Philadelphia, died on October 9, 1965. A man of broad interests, he is best known among coleopterists for his work on the Scarabaeidae.

Charles H. Seevers, of Chicago, died on December 4, 1965. He was the outstanding authority on the termitophilous and myrmecophilous Staphylinidae.

Harold J. Grant, Jr., died on February 27, 1966. Grant was known to all systematists as the Curator of Insects at the Academy of Natural Sciences of Philadelphia.

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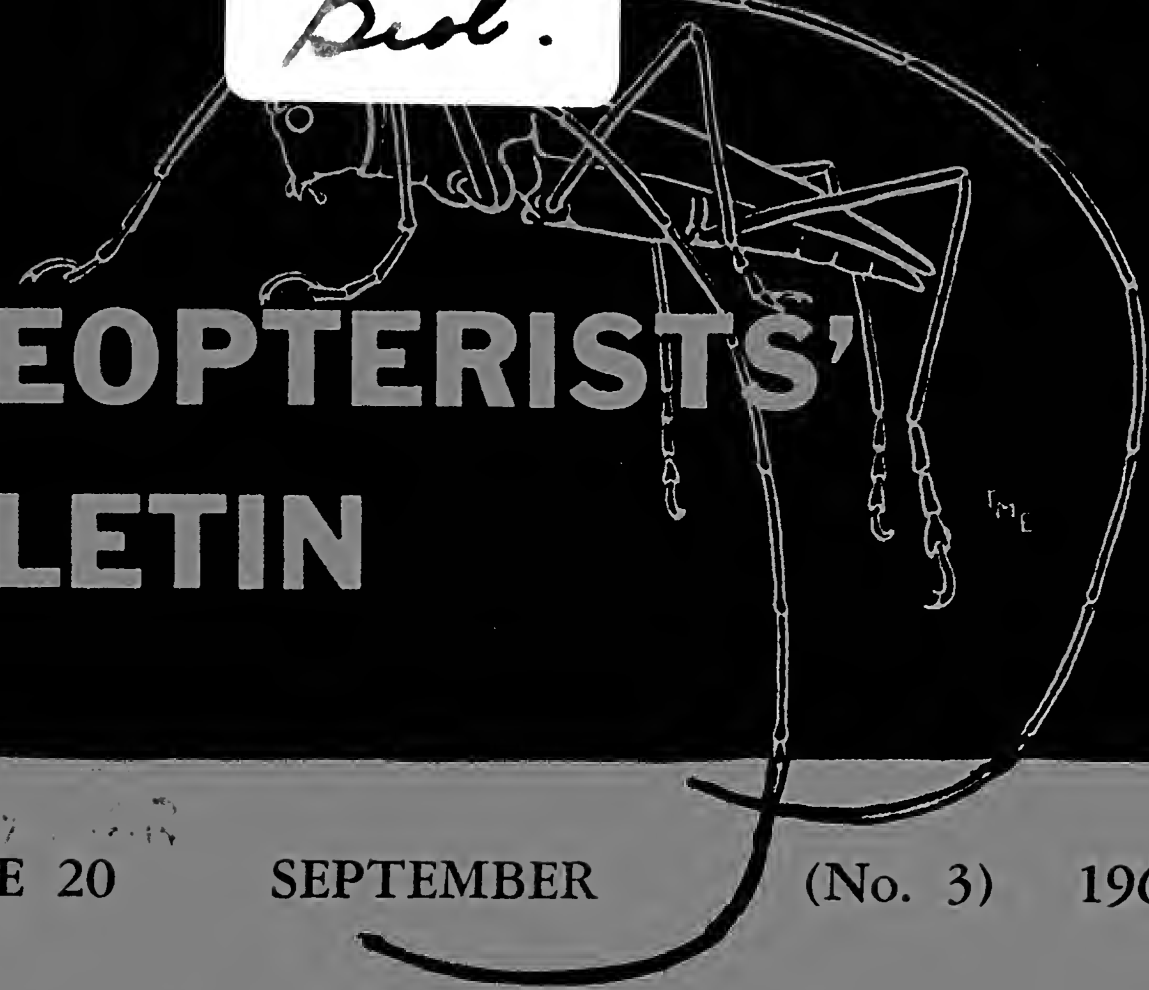

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THE COLEOPTERISTS' BULLETIN

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Any article, note, or news items likely to be of interest to readers of the Bulletin will be considered. Articles with illustrations are particularly desired, and *in all cases, descriptions of new species must be illustrated.* Descriptions of new species or genera MUST contain keys or be correlated with existing keys.

A QUARTERLY PUBLICATION DEVOTED TO THE STUDY OF BEETLES

The Coleopterists' Bulletin

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A REVIEW OF THE HYLOBIUS OF NORTH AMERICA, WITH A NEW SPECIES INJURIOUS TO SLASH PINE (COLEOPTERA: CURCULIONIDAE)

By ROSE ELLA WARNER[1]

Members of the weevil genus *Hylobius* are of economic importance because they damage trees. This review of the North American species brings together and summarizes information on their life histories and distribution from scattered sources. A new species from southeastern North America is described, and keys to males and females of the North American species are presented.

Hylobius aliradicis Warner, NEW SPECIES (FIGS. 37, 38, 48)

This species is closely related to *Hylobius rhizophagus* but differs in morphology and in some details of life history. I am describing this apparently native *Hylobius* from adults reared from larvae found in slash pine, *Pinus elliottii* Engelm. The larvae were found in tunnels in the roots of slash pine in the area of Homerville, Georgia, during the investigations into the cause of the poor condition and dying of slash pine. The reared specimens were submitted for identification by Mr. Bernard H. Ebel, U. S. Department of Agriculture Forest Sciences Laboratory, Athens, Georgia.

HOLOTYPE. Female. Length 10.4 mm.; body dark brown; coarsely punctured; tan setae distributed over the surface, patches of coarse setae more dense on pronotum, elytra, and laterally on visible abdominal sterna 2, 3, 4, and 5 and medially on sterna 3 and 4, scutellum covered with setae.

HEAD. Rostrum feebly arcuate, 0.9 mm. wide at apex, 0.8 mm. wide at base, 0.7 mm. wide in middle, 3.0 mm. long from apex to interocular fovea; densely punctured, punctures decreasing distally, large coalescing punctures forming shallow, lateral grooves in front of eyes, punctures of head large, separate; vestiture of rostrum from base anteriorly to antennal insertion of suberect, curved, tan setae, thicker, more abundant, and less curved next to eyes on sides of interocular fovea, from antennal insertion to apex with minute setae from each puncture, vertex with a patch of coarse setae; antennal segment 1 as long as next two combined (0.37 mm.), slightly more than twice as long as wide (0.37 mm.-0.16 mm.).

[1] Entomology Research Division, Agricultural Research Service, U. S. Department of Agriculture, Washington, D. C.

THORAX. Pronotum in dorsal view wider than long (3.0-2.6 mm.); punctation dense, strigose on either side of a smooth median carina; vestiture of coarse, tan setae, setae coarser laterally, in a small patch medially each side of carina, and in front of scutellum. Prosternum with coarse, large punctures, apex of intercoxal process densely covered with appressed orangish, coarse setae; mesothoracic and metathoracic sterna and pleura coarsely punctured, each puncture with a coarse tan seta; intercoxal process of mesosternum elevated, apex pointed, densely covered with orange setae; scutellum densely covered with orange setae.

LEGS. Femora with large tooth, capped with a tuft of setae; each puncture with a seta; tibiae straight along dorsal border, ventral border sinuate and carinate near base, a row of setae on each side of carina; tarsi normal.

ELYTRA. Length 7.3 mm.; width at humeri 3.7 mm.; vestiture of fine and coarse setae, sutural interval flat, more finely punctured, other intervals coarsely punctured. Elytron at half length with coarse setae forming diagonal bars, one short, directed anteriorly toward suture and extending from interval 10 to 7, one long, directed posteriorly toward suture and extending from interval 7 to 2, one short, directed anteriorly toward suture and extending from intersection with long bar at interval 4 to 2; across declivity with broad, horizontal bar extending from interval 10 to 2, with smaller, short bar, directed anteriorly toward suture and extending from intersection with horizontal bar at interval 4 to 2. Bars which reach interval 2 form diamond at half length and triangle across top of declivity on middle of combined elytron. Elytra with scattered patches of setae between bars but not forming definite patterns.

ABDOMEN. 1st and 2nd visible abdominal sterna shiny, finely and sparsely punctate, posterior half of 2nd, all of 3rd, 4th, and 5th coriaceous, not as shiny, 5th coarsely densely punctured, laterally impressed. Each puncture with seta, setae broader, thicker, and forming patches on lateral margins of sterna 1-5 and medially on sterna 3 and 4.

TYPE LOCALITY. Homerville, Georgia, USA. Collected as larvae in the roots of young slash pine (*Pinus elliottii* Engelm.), October 23, 1964, by Bernard H. Ebel. Emerged November 9, 1964, USDA Forestry Sciences Laboratory, Athens, Georgia. U.S.N.M. type number 69023.

ALLOTYPE. Male. Slightly larger and more slender than holotype. Patches of setae on elytral intervals arranged in more exact bars with the diamond and triangular spaces more pronounced than in holotype. Rostrum stouter. First and 2nd visible abdominal sterna medially concave, 5th medially impressed with fine erect setae in the impressed area. Collected in Athens, Georgia, 10-19-43, by P. W. Fattig. This specimen was selected as the allotype rather than one from the reared material from which the holotype was selected because two males of that series are teneral, and one has the 5th visible abdominal sternum very convex before the impression. The three male specimens from a third series, Hopkins no. 45725, collected in 1961, were used in genetic studies before being submitted for identification and are in very poor condition.

PARATYPES. Three males, Homerville, Georgia, August 31, 1961, collected as larvae in roots of 4-year-old slash pine; reared at Olustee, Florida, November 25, 1961; Hopkins no. 45725. Two females collected near Homerville, Georgia, August 31, 1961, as larvae, B. H. Ebel, reared ex 2- to 4-year-old slash pine roots, November 29, 1961; Hopkins no. 45724. Five females and three males, Homerville, Georgia, October 23, 1964, B. H. Ebel, in roots of young slash pine, emerged November 4-9, 1964, at Athens, Georgia. One male, Olustee, Florida, Baker Co., April 4-10, in pine bolt trap with *H. pales*.

Other material examined includes specimens from the following localities: One female from fruit fly trap, 1953, C. L. Smith; one female, Florida [probably Valparaiso], Wakely, May 8, 1931, injurious to *Pinus palustris*

Mills. seedlings. [*Pinus palustris,* the name generally accepted for longleaf pine, is the name used by Small (1933) and others for slash pine]. One female, Hockly [sic], Texas, I. W. Thuron. Two females, Bolton, North Carolina, November 1965, by H. Laymen; Hopkins no. 50506-F.

H. aliradicis can be separated from the other Nearctic species of *Hylobius* by the characters in the key. Two characters, the shape of the 7th tergum and the arrangement of the stridulatory tubercles on the 7th tergum, not previously used in separating the species of *Hylobius,* are used here. Although the number of tubercles varies to a considerable degree and is unreliable for separating the species, the arrangement of the tubercles is of taxonomic value. Only in *pales* are the stridulatory tubercles arranged in two divergent lines and not intermingled with the dense split setae covering the tergum (fig. 5). The stridulatory ridges are very evident in *pales* and can be seen easily with low magnification. In *radicis, rhizophagus,* and *aliradicis* the stridulatory tubercles are intermixed with the vestiture of the 7th tergum and are not easily discernible. In *pales* and *congener* the posterior margin of the 7th tergum is retuse (figs. 5, 6); in *aliradicis* it is rounded (fig. 9); in *radicis* it is slightly retuse (fig. 7); and in *rhizophagus* it is truncated (fig. 8). A compound microscope was used to study the cleared 7th tergum mounted in glycerine.

A Key to the Species of the Nearctic Hylobius (Males)

1. Femoral tooth well developed -- 2
   Femoral tooth absent or inconspicuous -- 6
2. Scutellum glabrous or with a few fine setae; basal third of posterior surface[2] of metafemur medially carinated and grooved; ventral edge of protibia with a fringe of long white setae; apex of uncus of metatibia broadly rounded (fig. 1); stridulatory tubercles on 7th tergum prominent (fig. 6); median lobe of genitalia as figured (fig. 12); length 6.4-9.0 mm.-- CONGENER
   Scutellum covered with scale-like setae; metafemur not carinated and grooved; protibia without a fringe of long white setae; apex of uncus of metatibia broadly rounded or acute -- 3
3. Apex of uncus of metatibia broadly rounded; head usually with a patch or line of broad setae on vertex; punctures immediately behind interocular fovea coalescent, forming short, irregular rugae; stridulatory tubercles of 7th tergum in 2 very prominent divergent rows; posterior margin of 7th tergum retuse (fig. 5); median lobe of genitalia as figured (fig. 13); length 5.8-11.3 mm.------------------ PALES
   Apex of uncus of metatibia acute (figs. 2, 3, 4); head not usually with a patch or line of broad setae on vertex; punctures immediately behind interocular fovea separated; stridulatory tubercles on 7th tergum not immediately evident; posterior margin of 7th tergum retuse or not---------------------------- 4
4. Body dull reddish brown; vestiture of fine setae; elytra with irregularly placed spots of yellow setae, better developed on even intervals and rarely forming submedian or subapical bars, the general effect tessellate; lateral setae on visible abdominal sterna 1-2 diffused, not condensed into spot; stridulatory tubercles in 2 broken lines; posterior margin of 7th tergum slightly retuse (fig. 17); median lobe of genitalia as figured (fig. 14); length 9.7-12.0 mm.-------------------- RADICIS
   Body black or piceous-- 5
5. Body shining black; antennae and tarsi brown; white setae distributed on surface, with dense patches scattered over dorsal surface of elytra, fine setae below interocular fovea suberect; stridulatory tubercles usually in 2 broken lines; posterior margin of 7th tergum more or less truncate (fig. 8); median lobe of genitalia as figured (fig. 15); length 8.9-10.0 mm.-------------------------- RHIZOPHAGUS

[2] In all previous keys this surface has wrongly been referred to as the anterior surface.

Body piceous; elytra with regularly placed spots of coarse yellow setae forming 2 prominent bars, one diagonal, directed posteriorly toward suture and extending from interval 7 to 2, a broad horizontal one across declivity extending from interval 10 to 2, stridulatory tubercles in 2 broken lines; posterior margin of 7th tergum rounded (fig. 9); median lobe of genitalia as figured (fig. 16); length 8.7-11.4 mm. -- **ALIRADICIS**

6. Femoral tooth absent or inconspicuous; rostrum rather stout, less than 2.6 times as long as wide, noticeably wider distally; apical umbones of elytra obscure or entirely undefined; body color very dark brown to blackish, with white to pale yellow slender setae forming irregular small spots on elytra; median depression of visible abdominal sterna 1-2 large, deep; metathoracic wings very short, not extending beyond the posterior margin of the first visible abdominal sternum; median lobe of genitalia as figured (fig. 10); length 12.5-13.5 mm.-------- **WARRENI**

Femoral tooth small but distinct; rostrum slender, more than 2.9 times as long as wide, not wider distally; apical umbones of elytra prominent; body color appears grayish, with indefinite, almost confluent patches of white or yellowish spots of slender setae on elytra; median depression of visible abdominal sterna 1-2 small, shallow; metathoracic wings long, extending well beyond elytral apex, median lobe of genitalia as figured (fig. 11); length 10.7-13.2 mm.-------- **PINICOLA**

A Key to the Species of Nearctic Hylobius (Females)

1. Femoral tooth well developed -- 2

Femoral tooth absent or inconspicuous ------------------------------------ 6

2. Scutellum glabrous or with a few fine setae; basal third of posterior surface of metafemur carinate and grooved; spermatheca and 8th sternum as figured (figs. 22, 26); length, 6.5-9.4 mm. -------------------------------------- **CONGENER**

Scutellum covered with scale-like setae; metafemur not carinate and grooved ------ 3

3. Body black, antennae and tarsi dark brown; fine white setae distributed over surface, with dense patches scattered irregularly over dorsal surface of elytra; pronotum with median smooth carina on anterior three-fourths; very fine white setae present in most of the punctures; patches of coarser setae on both sides of carina and mediolaterally on sides of prothorax; spermatheca and 8th sternum as figured (figs. 23, 29); length, 9.8-11.6 mm.------------------------------- **RHIZOPHAGUS**

Body brown or piceous -- 4

4. Body brown; vestiture fine, elytra with irregularly placed spots of pale yellow setae, better developed on even intervals and rarely forming submedian or subapical bars, the general effect tessellate; lateral setae on visible abdominal sterna diffused, usually not condensed into spots; spermatheca and 8th sternum as figured (figs. 19, 30); length, 9.5-12.5 mm. ---------------------------------- **RADICIS**

Body piceous -- 5

5. Rostrum slender, 2.6 mm., very little wider beyond antennal insertion; punctures immediately behind interocular fovea separated; rostral setae white, conspicuous, dense, suberect; spermatheca and 8th sternum as figured (figs. 17, 28); length, 9.5-12.8 mm. --- **ALIRADICIS**

Rostrum stout, 2.1 mm., noticeably wider beyond antennal insertion; punctures immediately behind interocular fovea coalescent, forming short, irregular rugae; rostral setae brownish, not very conspicuous, fine (sometimes coarser near interocular fovea), sparse, not erect; spermatheca and 8th sternum as figured (figs. 21, 27); length, 7.4-10.3 mm.-- **PALES**

6. Apical umbones of elytra obscure to entirely undefined; body color very dark brown to blackish, white to pale yellow setae forming irregular small spots on elytra; spermatheca and 8th sternum as figured (figs. 20, 24); length, 12.0-15.1 mm. **WARRENI**

Apical umbones of elytra prominent; body color appears grayish, with indefinite, almost confluent patches of white or yellow spots of slender setae; spermatheca and 8th sternum as figured (figs. 18, 25); length, 11.0-14.5 mm.------------ **PINICOLA**

Because three species that attack root systems, *radicis, rhizophagus,* and *aliradicis,* are so similar, the following table (table 1) of contrasting biological data will be helpful in separating those species.

TABLE 1. CONTRASTING BIOLOGICAL HABITS OF THREE MORPHOLOGICALLY SIMILAR SPECIES OF HYLOBIUS THAT ATTACK ROOT SYSTEMS

radicis[3]	*rhizophagus*[3]	*aliradicis*[4]
1. Larvae tunnel in bark and cambium of root collar region; pupation occurs in nearby soil. Larvae found not more than 12 inches from root collar.	1. Larvae tunnel in roots from smaller end towards base, usually found in roots under half inch in diameter; pupation occurs in pupal cells in the roots.	1. Larvae tunnel in both lateral roots and the outer part of the upper tap root, completely boring the smaller roots and more or less spiraling around the larger ones; pupation occurs in cells in the roots, often in the upper tap root area under the bark.
2. Activity of insect causes abundant resin flow and root collar is surrounded with pitch-infiltrated, blackened soil.	2. Activity of insect results in very light resin flow which rarely saturates soil more than one inch away.	2. Activity of the insect results in moderate resin flow which causes the soil to adhere loosely in the infested roots.
3. Adult oviposition in or on bark in root collar region.	3. Adult oviposition site not known, but circumstantial evidence suggests the region of the root tips.	3. Oviposition site unknown; association of infestation with pine roots in loose soil suggests the upper tap root area as a logical oviposition site.
4. Infests primarily open-growing, young pines. Trees over 1 inch in diameter at ground line are susceptible to attack.	4. Infests primarily closed plantations of pole-sized pines on formerly cultivated land. In advanced infestations, reproduction pines may also be infested.	4. Infests young pines, pencil-sized to about 2 inches in root collar diameter; associated with young pines growing in loose soil.

Hylobius pales (Herbst)
(FIGS. 34, 41)

Curculio pales Herbst. 1797. Natursyst. Ins. Käf. 7:31.

The species *pales,* the pales weevil, has been reported feeding on a number of pines (*Pinus*)[5] including white pine (*P. strobus* L.), pitch pine (*P. rigidia* Mill.), ponderosa pine (*P. ponderosa* Laws.), mugho pine (*P. mugo* Turra.), Mexican pinyon pine (*P. cembroides* Zucc.), Scotch pine (*P. sylvestris* L.), red pine (*P. resinosa* Ait.), loblolly pine (*P. taeda* L.), shortleaf pine (*P. echinata* Mill.), longleaf pine (*P. palustris* Mill.), Austrian pine (*P. nigra* Arn.), and jack pine (*P. banksiana* Lamb.). White pine is the preferred host plant. White pine, pitch pine, ponderosa pine, mugho pine, and Mexican pinyon pine have been named specifically as probable hosts of the immature stages (Peirson, 1937; Wells, 1926). In southern Ontario, Canada, adults were reared from red, jack, scotch, and white pine (Finnegan, 1959). Other conifers listed as hosts are tamarack (*Larix laricina* (Du Roi) Koch), balsam fir (*Abies balsamea* (L.) Mill.), red spruce (*Picea rubra* (Du Roi) Dietr.), Nor-

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[3] Millers, Benjamin, and Warner, 1963.

[4] Ebel, personal communication, subject to modification by more detailed observation.

[5] All scientific and common names of the host trees were checked in Little (1953).

way spruce (*P. abies* (L.) Karst.), eastern hemlock (*Tsuga canadensis* (L.) Carr.), Douglas fir (*Pseudotsuga menziesii* (Mirb.) Franco), eastern red cedar (*Juniperus virginiana* L.), common juniper (*J. communis* L.), Arizona cypress (*Cupressus arizonica* Green), northern white-cedar (*arborvitae*) (*Thuja occidentalis* L.), as well as gray birch (*Betula alleghaniensis* Britton) and white ash (*Fraxinus americana* L.) (Carter, 1916; Peirson, 1921).

The adults hibernate beneath stones, in litter, or in soil at the base of the seedlings, becoming active, depending on the locality and altitude, from April to June, during which time they feed on the tender bark of the twigs of saplings and at the base of seedlings. The eggs are laid singly, in the inner bark of freshly cut pine logs or the roots of freshly cut pine stumps. They hatch in about two weeks. Larvae feed for about two weeks in the cambial area of the roots and stumps. They pupate in "chip cocoons" constructed in the stump lying below the surface and in the root system where roots are over one-quarter of an inch in diameter. The new adults emerge in about a month, and it is at this time they feed on the pine seedlings. *H. pales* is typically a nocturnal feeder. The susceptibility of the young seedlings seems to depend upon the nature of the bark, those seedlings having relative thin, tender bark, being favored for food. Injury likely to cause death is confined to trees under three feet in height. In southern Ontario, Canada, *H. pales* is associated mostly with Christmas tree plantations where selective cutting is practiced and a continuous supply of breeding material is available. (Beal and McClintock, 1943; Carter, 1916; Finnegan, 1959; Peirson, 1921; and Wells, 1926).

DISTRIBUTION[6] (fig. 45): *Hylobius pales* is found in most of the eastern half of the United States from Maine to Florida and west to Texas and in Canada from Nova Scotia to Manitoba. MAINE: Cumberland Co.; Kittery Point; Mt. Katahdin, Camp Kennedy. NEW HAMPSHIRE: Canbie Lake; Durham; White Mts.; Webster; Manchester. CONNECTICUT: Stamford. VERMONT: Brattleboro. MASSACHUSETTS: Springfield; Cambridge; Chicopee; Petersham; Berlin; Stoughton; Hummerock; Tynsboro; North Saugus; Ipswich; Marshfield; Framington. RHODE ISLAND: Watch Hill. NEW YORK: Bellport; Long Island; Greenwood Lake; Cranberry Lake; West Point; Haverhill; Islip; Buffalo; Ithaca; Albany; Ballston Spa. NEW JERSEY: Malaga; Seaside Hts.; Greenwood Lake; Lakehurst; Newark; Ocean City; Orange; Barnegat; Bayhead; New Lisbon; Rancocas Park; Whitesbag. MARYLAND: Beltsville; Berwyn Heights; Piney Point; Bladensburg; Hagerstown; Hyattsville; Plum Point; Plummers Island; Bethesda; Branchville. WEST VIRGINIA: Driscoll; White Sulphur Springs; Kanawha Station. VIRGINIA: Mount Vernon; Falls Church; Rosslyn; Warrenton; Chester; Nelson Co.; St. Elmo; Maywood; Bostin; Bland Co.; King and Queen Co.; Ft. Monroe; Herndon. NORTH CAROLINA: Durham; Southern Pines; Ellenboro; Tyron; Biltmore; Atkinson; Mount Mitchell; Black Mts.; Asheville; Raleigh; Roundtop; Pisgah Ridge; Pink Beds; Beaufort. GEORGIA: Clayton; Miller; Richmond Hill; Thomasville; Homerville. SOUTH CAROLINA: Myrtle Beach; Florence; Fort Mill; Clemson. FLORIDA: Palatka; St. Nicholas; Orange Co.; Lake City; Foley; Villa Tassa; Key West; Olustee, Baker Co.; Valparaiso. ALABAMA: Birmingham; Montgomery; Lamar; Lasca; Mobile; Jena. LOUISIANA: Bogalusa; Hodge; Sardis. MISSISSIPPI: Saucier; Meridian; Gulfport; Paris; Durant; A&M College. ARKANSAS: Crossett; Benton; Hot Springs; Star City; Kingsland. TEXAS: Call; Deweyville; Nacogdoches. MISSOURI:

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[6] From specimens in the Canadian National Collection and the United States National Museum Collection unless otherwise stated.

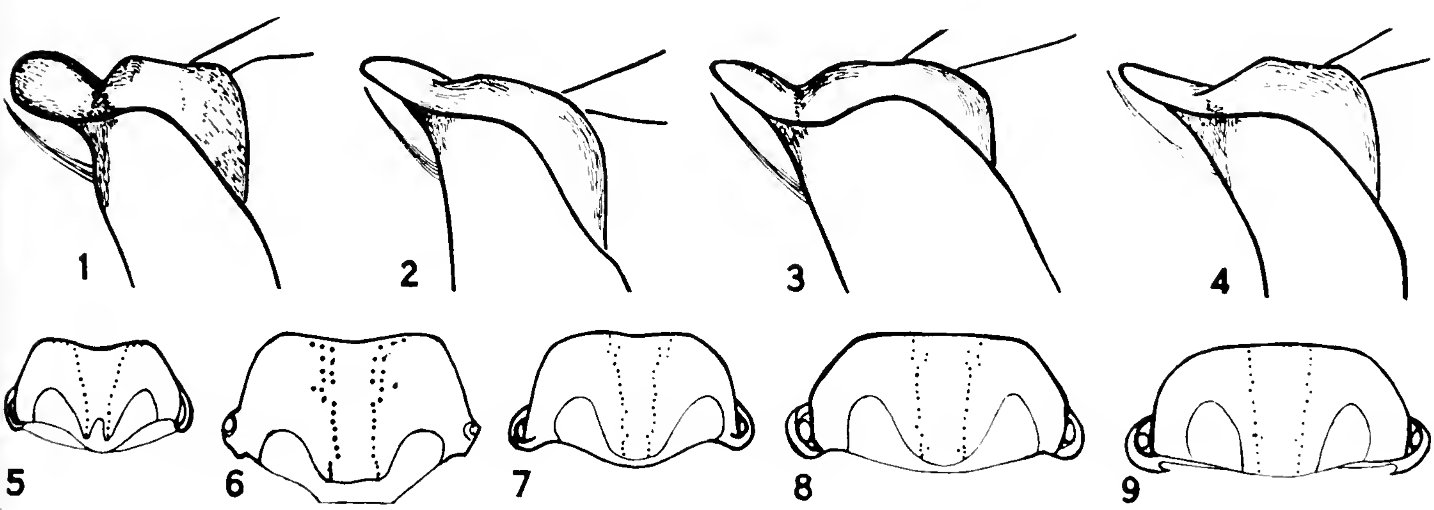
St. Louis. WISCONSIN: Sparta; Cranmoor, Wood Co. OHIO: Hocking Co. MICHIGAN: Port Huron. MINNESOTA: Bemidji; Itasca Park; Collegeville. PENNSYLVANIA: State College; Morrisville; Glenside; Lehigh Gap; Holiday; Twin Lakes; Monroe Co. DISTRICT OF COLUMBIA: Rock Creek [Park]. CANADA. QUEBEC: Norway Bay; Ft. Coulonge; Covey Hill; Montreal; Wright. ONTARIO: Marmora; Petawawa; Go Home Bay; Maple; Kerr Lake; now occurring (Finnegan, 1959) in epidemic numbers in Simcoe Co., Durham Co., and generally in the area west of a line drawn through Port Severn and Trenton; Ottawa; Constance Lake; Grand Bend; Mount Hope.

Hylobius pinicola (Couper)
(Fig. 32)

Curculio pinicola Couper, 1864. Trans. Lit. Hist. Soc. Quebec, n.s. 2:65.

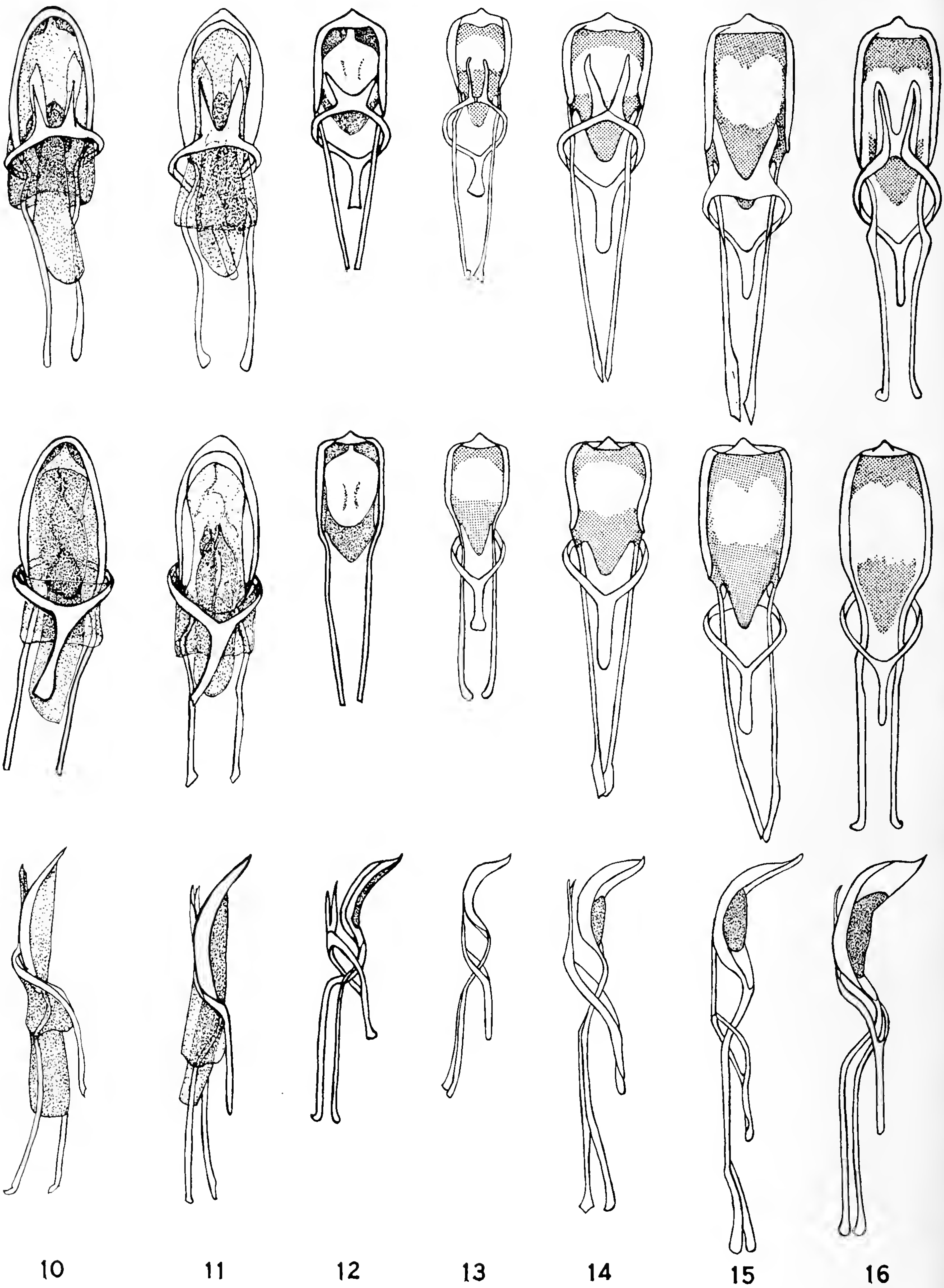
Larvae of this species attack the root systems of most coniferous trees, including members of the genera *Pinus, Abies,* and *Larix,* specifically tamarack (eastern larch) (*Larix laricina* (DuRoi) K. Koch) and white spruce (*Picea glauca* (Moench) Voss) when they occur on moist to wet sites. (Wood, 1957; Warren, 1960).

DISTRIBUTION[6] (fig. 43): CANADA: NEWFOUNDLAND: St. John; Port au Basque. LABRADOR: Cartwright; George River. NEW BRUNSWICK: Bathurst. QUEBEC: Percé; Natashquan; Little Mecatina Is.; Knob Lake; Chicoutimi; Montmorency; Gaspé; Trinity Bay; Abitibi; Great Whale River; Cascapedia. ONTARIO: Petawawa; Stittsville; Sudbury. MANITOBA: Awame; Churchill; Onah. SASKATCHEWAN: Prince Albert; Christopher Lake; Dorentosh. ALBERTA: Mitsue. BRITISH COLUMBIA: Dome Creek. YUKON TERRITORY: Swin Lakes. UNITED STATES: MAINE: East Branch; Center Mt.; Chesuncook; Kennedy Camp, Mt. Katahdin. VERMONT: Mt. Mansfield. NEW HAMPSHIRE: Carter Dome, White Mts. NEW YORK: White Face Mt. Trail; Top of Slide Mountain, Ulster Co.; Mt. Marcy; Ithaca. MICHIGAN: Marquette; Grand Isle; Seney. WISCONSIN: Cranmoor, Wood Co.; Mamie Lake. NORTH CAROLINA: Mount Mitchell, Black Mts.



Figures 1-4, *Hylobius* spp., metatibial unci of males. 1—*congener* and *pales*. 2—*radicis*. 3—*rhizophagus*. 4—*aliradicis*.

Figures 5-9, *Hylobius* spp., dorsal view of 7th tergum of males. Dotted lines represent arrangement of stridulatory tubercles. 5—*pales*. 6—*congener*. 7—*radicis*. 8—*rhizophagus*. 9—*aliradicis*.



FIGURES 10-16, *Hylobius* spp., median lobe of male genitalia, top row, dorsal view; middle row, ventral view; bottom row, lateral view. 10—*warreni*. 11—*pinicola*. 12—*congener*. 13—*pales*. 14—*radicis*. 15—*rhizophagus*. 16—*aliradicis*.

Hylobius congener Dalla Torre, Schenkling, and Marshall (Fig. 33)

Hylobius congener Dalla Torre, Schenkling, and Marshall, 1932. Coleopterorum Catalogus, pars 122:15.

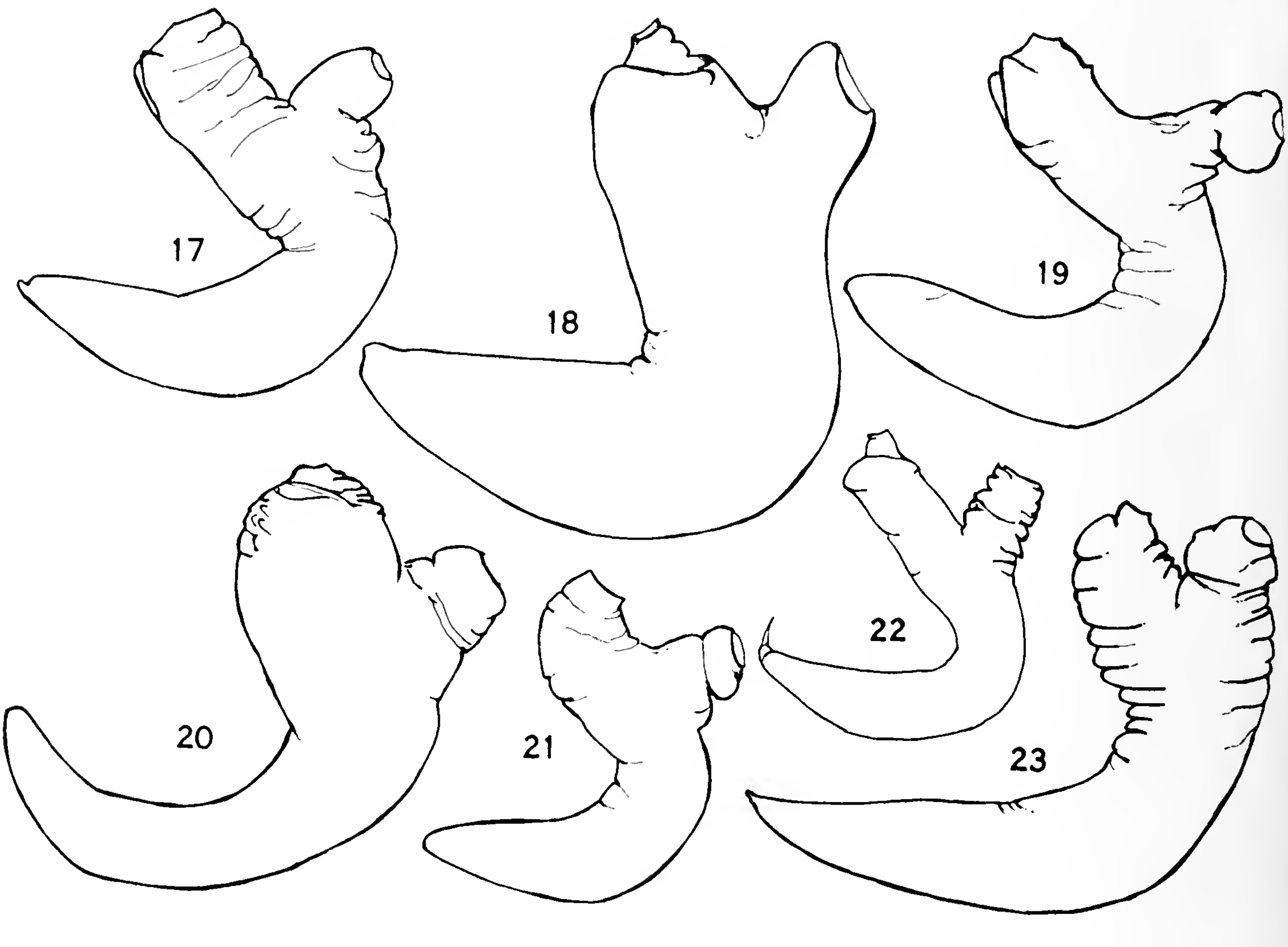
Hosts: Red pine (*Pinus resinosa* Ait.), white pine (*P. strobus* L.), and Scotch pine (*P. sylvestris* L.). The following is from Martin (1964). The adults deposit their eggs singly in the shallow cavities excavated in the bark of logs and stumps, usually at the margin of branch or mechanical scars and often at the end of logs. The entrances to the cavities are filled with bark chips and frass. Oviposition begins during the last week of May and continues into June. The eggs hatch in about 10 days. Newly hatched larvae excavate small irregular cavities in the bark at the oviposition site. Second instar larvae begin more or less regular tunnels following the grain of the wood. Feeding is restricted to the phloem, and brown frass fills the tunnel behind the larvae. The larvae reach maturity in about 65 to 70 days. After feeding is completed, the larvae begin to excavate pupal pits. They tear out coarse wood chips and make short tunnels, about 5 mm. in depth, at right angles to the surface of the wood. At this depth, the larvae turn at right angles again and excavate their pupal cells parallel to, but several millimeters below, the surface of the wood. The wood chips are packed with frass in the old feeding tunnels. The larvae enter the prepupal stage from mid-August until late September and remain in this stage throughout the winter. After emergence from the pupal cells during late July and August, the adults feed on the inner bark of logs and slash. After feeding intermittently for several weeks, they enter the duff and overwinter. The weevils come out of the litter the following spring about mid-May and resume feeding. A flight period of one to two weeks occurs at this time. Following the flight period, breeding begins, and the adults adopt a nocturnal habit and travel mostly by crawling on the ground.

DISTRIBUTION[6] (fig. 44): CANADA: LABRADOR: Goose Bay. NEWFOUNDLAND: Gander; Corner Brook. NOVA SCOTIA: Kentville; South Ohio; Yarmouth; Dartmouth; Beaver Bank; Wayerley; Grosses Goques; Halifax; Parrsboro; Pt. Maitland. NEW BRUNSWICK: French Lake; New Castle; Bathurst; Tabusintac. QUEBEC: Duparquet; Ft. Coulonge; Indian House Lake; Hemmingford; Mistassini Lake; Seven Isle; Mt. Laval; Wright; Cascapedia; Gaspé; Forestville; Knob Lake; Laniel; Bradore Bay; Natashquan; Trinity Bay; Thunder River; Duchesnay; Ile Montreal; Mt. St. Hilaire; Great Whale River; Aylmer. ONTARIO: One Side Lake; Ojibway; Ottawa; Arnprior; Constance Bay; Kerr Lake; Dryden; Petawawa; Ogoki; Sudbury; Frater; Trentor; Algoma District (Martin, 1962). MANITOBA: The Pas; Makinak; Rennie; Riverton; Pine Falls. SASKATCHEWAN: Prince Albert. ALBERTA: McMurray; Edmonton. BRITISH COLUMBIA: Inverness; Massett, Queen Charlotte Island; Vancouver; Trinity Valley. NORTHWEST TERRITORIES: Fort Smith. UNITED STATES: MAINE: Passadunkeag; Cumberland Co. NEW HAMPSHIRE: Pike; White Mts.; Rumney; Hampton; Mt. Washington. VERMONT: Brattleboro. RHODE ISLAND: Watch Hill. MASSACHUSETTS: East Otis; Framington; Ipswich. NEW YORK: Cranberry Lake; Peru, Clinton Co.; Buffalo; Ithaca; Greene Co. NEW JERSEY: Menantico; Newark. MICHIGAN: Agri. College; Marquette; Port Huron; Escanaba; Eagle Harbor; Michipicten. WISCONSIN: Oshkosh; Apostle Island; Lake St. Germaine; Bayfield; Iron River. MINNESOTA: Lake Itasca Park; Two Harbors; Duluth; Little Winnebegosish. ALASKA: Ft. Wrangle. NORTH CAROLINA: Mt. Guyot, Great Smoky Mts.

Hylobius radicis Buchanan
(Figs 35,40)

Hylobius radicis Buchanan, 1935. Proc. Ent. Soc. Wash. 36(8-9) 1934 [1935]:252

The species *radicis,* the pine root-collar weevil, attacks the root crown of living Scotch pine (*Pinus sylvestris* L.), Austrian pine (*P. nigra* Arn.), lodgepole pine (*P. contorta* Dougl.), Corsican pine (*P. nigra poiretiana* Schneid), eastern white pine (*P. strobus* L.), Mugho pine (*P. mugo* Turra.), jack pine (*P. banksiana* Lamb.), pitch pine (*P. rigida* Mill.), and red pine (*P. resinosa* Ait.). The adults that hibernate resume activity early in the spring. They feed at night on the inner bark of the trunk in the vicinity of the root collar and the tree crown where they eat the tender bark of twigs and small branches. The eggs are placed in the adult feeding wounds in the inner bark of the root collar but often are laid in the soil as far as two inches from the tree. Larvae are found not more than twelve inches from the root collar. Larvae tunnel in the bark and cambium of the root collar region at or below the ground level completely girdling the trunk and also basal portions of the large lateral roots. Activity of the insect causes abundant resin flow, and the root collar is surrounded with pitch-infiltrated, blackened soil. A layer of pitch-infiltrated soil 2-3 inches thick may form near the feeding area.



Figures 17-23, *Hylobius* spp., spermatheca. 17—*aliradicis.* 18—*pinicola.* 19—*radicis.* 20—*warreni.* 21—*pales.* 22—*congener.* 23—*rhizophagus.*

Pupation occurs in the tunnels in the pitch-saturated soil or in enlarged cells in the bark of the root collar of the infested trees; the pupal cells are not lined with shredded wood fibers such as are characteristic of the pupal cells of the pales weevil. The weevil overwinters in the adult and larval stages and occasionally in the pupal stage. Adults that emerge late in the summer hibernate in the duff or litter under the trees. The larvae that have hibernated pupate and emerge in July and August. In Ontario, Canada, eggs laid early in the spring may produce adults in late September, but eggs laid during the remainder of the growing season produce larvae that overwinter and pupate the following July. The weevil infests primarily open-growing young pines, the larvae rather than the adults causing the severe injury, and large as well as small trees are attacked. (Finnegan, 1962; Millers, Benjamin, Warner, 1963; Warren, 1956b; Schaffner and McIntyre, 1944; Wallace, 1954.)

DISTRIBUTION[6] (fig. 46): UNITED STATES: NEW YORK: Ballston Spa, Saratoga Co.; Albany; Glen Head, Long Island; Sea Cliff. CONNECTICUT: New Canaan; Greenwich; Stamford; Old Lyme; New London. MASSACHUSETTS: Weston. MICHIGAN: Muskegon Co. MINNESOTA: Cass Lake. KENTUCKY: Booneville. WISCONSIN: Glacial Lake, Adams Co., (Brown and Young, 1955). CANADA: (Elliott and Hildahl, 1961; Sipple, MacDonald, and Rose, 1961). ONTARIO: Simcoe Co.; Lake Simcoe District; Westmeath Township, Pembroke District; McAuley Township, Parry Sound District; Essa Township; Sunnidale Township; Tosorontio Township; Tiny Township; Gibson; Balm Beach W. of Penetanguishene; W. of Barrie; Angus area. MANITOBA: Sandilands Forest Reserve, Renfrew Co.; Sault Ste. Marie.

Hylobius warreni Wood
(Fig. 31)

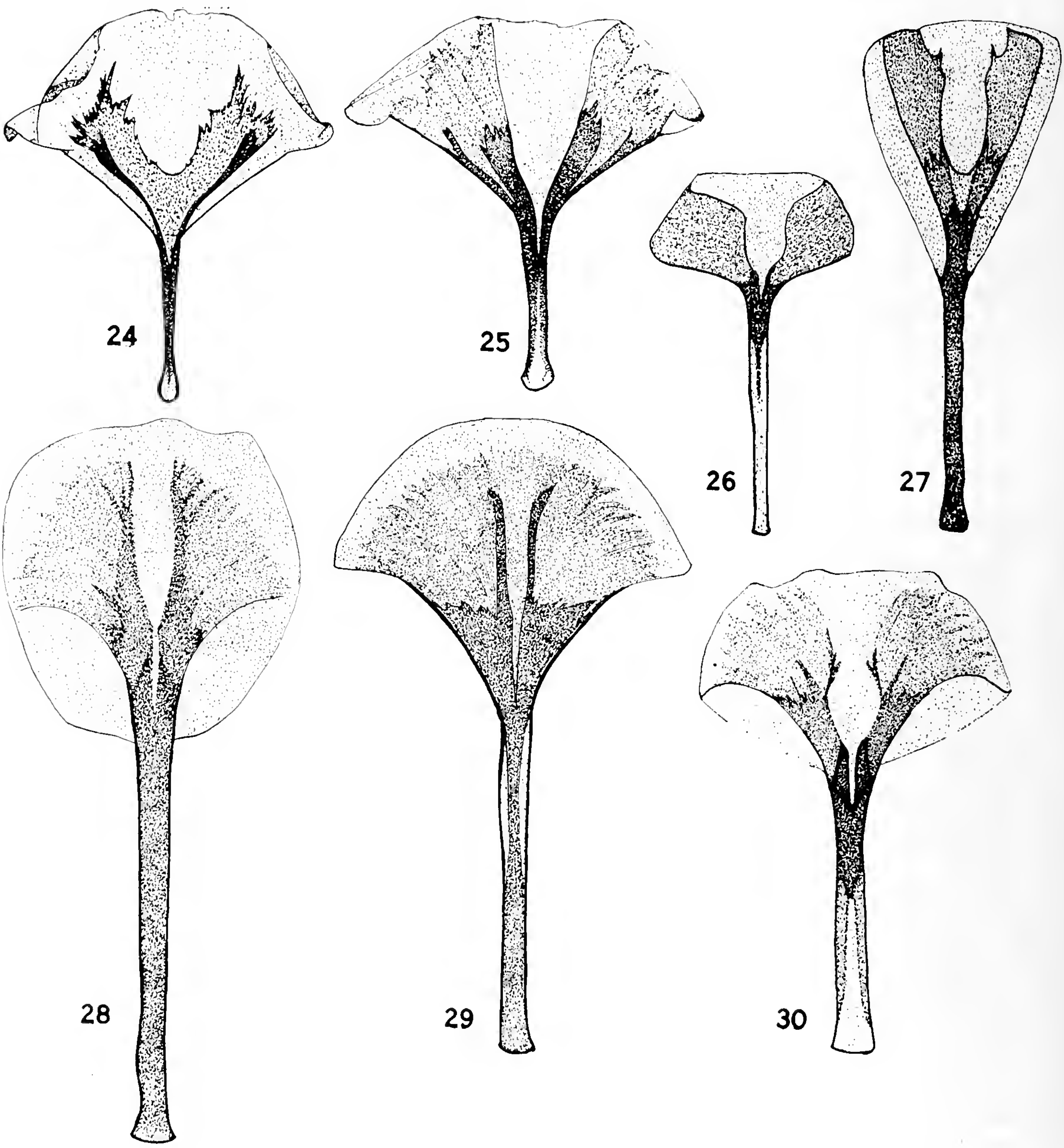
Hylobius warreni Wood, 1957. Canadian Ent. 89(1):40.

This species attacks the inner bark and cambium of the root systems of coniferous trees. Among the hosts are white spruce (*Picea glauca* (Moench) Voss), Scotch pine (*Pinus sylvestris* L.), jack pine (*P. banksiana* Lamb.), lodgepole pine (*P. contorta* Dougl.), white pine (*P. strobus* L.), red pine (*P. resinosa* Ait.), western white pine (*P. monticola* Dougl.), balsam fir (*Abies balsamea* (L.) Mill.), alpine fir (*A. lasiocarpa* (Hook) Nutt.), tamarack (eastern larch) (*Larix laricina* (DuRoi) k. Koch), Norway spruce (*Picea rubens* Sarg.) and black spruce (*P. mariana* (Mill.) B.S.P.). (Wood, 1957; Warren, 1956a; Warren, 1960).

The adults feed on the bark of small roots and twigs and on the needles of the host, but the most serious damage is caused by the larvae. The newly hatched larvae bore into the bark and along the cambium of roots and root collars of the host. This boring causes resinosis, producing noticeable exudations similar to the pitch tubes formed by scolytids. Using the exudation, a feeding larva forms a tube-like covering. This covering increases in size and hardness as the larvae grows. A number of mature larvae, feeding close together, usually cause a copious resin flow and a solid mass of hardened tubes. (Warren, 1956a)

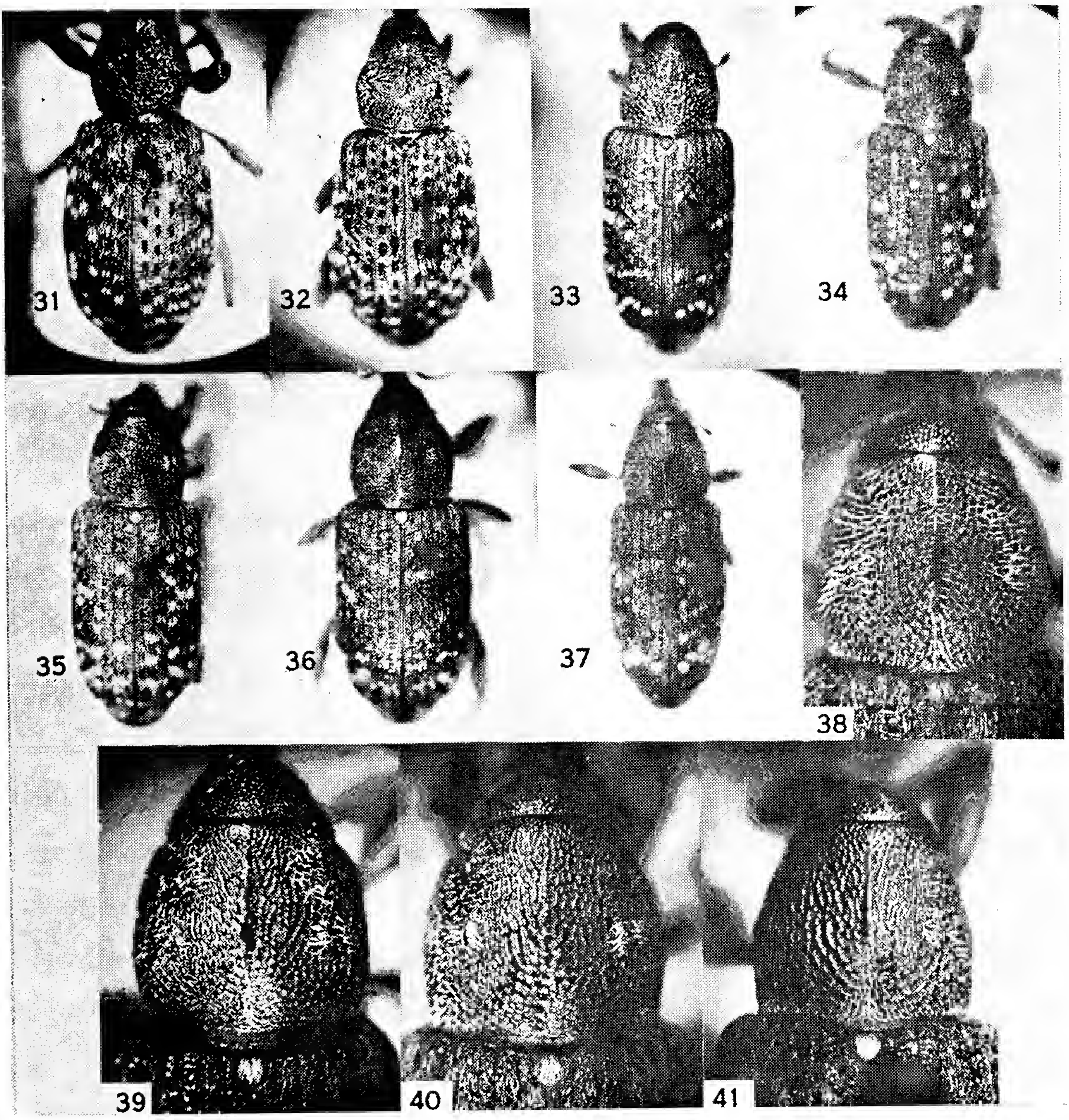
Boring larvae may be found either on roots or root collars but appear to prefer root crotches. Small trees may be completely girdled at the collar, but their main roots may be girdled or severely debarked at or adjacent to crotches. A root is considered susceptible to attack when it is more than one inch in diameter at the base. When larger roots of a tree are 4 or 5 inches in diameter at the base, the distal portions less than 2 inches in diameter are seldom damaged. Roots smaller than 2 inches on a larger tree are usually free from attack. The degree of insect damage is related to differences in the moisture content of sites. Damage is greater when the trees occur on wet or moist sites. (Warren, 1956a.)

DISTRIBUTION[6] (fig. 42): CANADA: MANITOBA: Clear Lake Trail, Riding Mountain National Park; Pine Falls; Wasagaming; Winnipeg. ALBERTA: Cold Lake; Colinton; Strachan; Cypress Hills (near Robb) (Brown, Robins, and Steven-



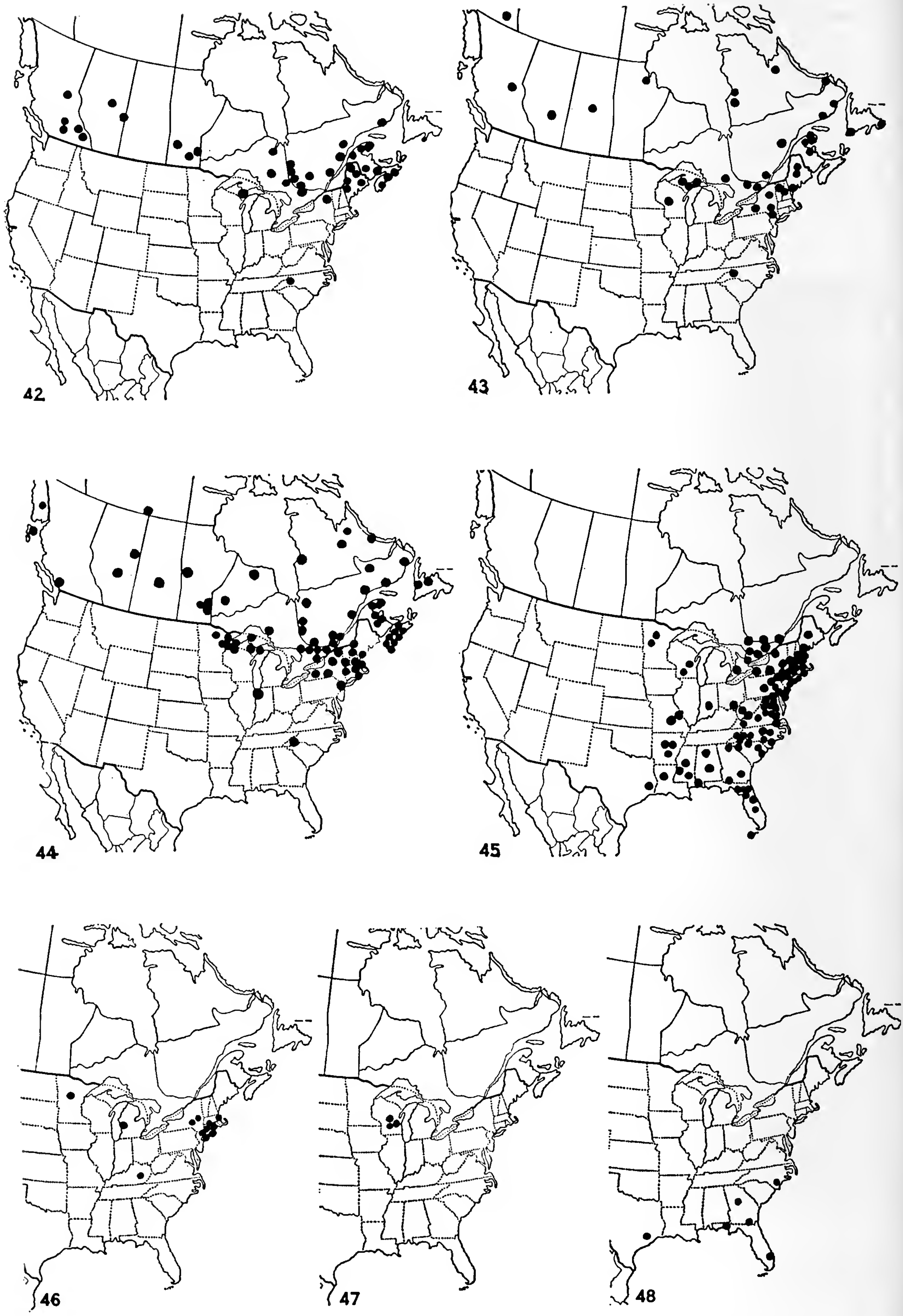
FIGURES 24-30, *Hylobius* spp., 8th sterna of females. 24—*warreni*. 25—*pinicola*. 26—*congener*. 27—*pales*. 28—*aliradicis*. 29—*rhizophagus*. 30—*radicis*.

son, 1961). BRITISH COLUMBIA: Mi. 65 Alaska Highway; Golden; McLeod Meadows in Kootenay Park; Longworth; Summit Lake, Prince George; Fish Trap Creek, Barrière. NEW BRUNSWICK: Nashwaaksis. NOVA SCOTIA: Little River; Manchester; Halifax. ONTARIO: Chapeau; Cochrane; Moose Factory; Cobalt. QUEBEC: Anse St. Jean; Baie St. Paul; Cascapedia; Gaspé County; Islet Caribou; Laniel; Macamic; Maniwaki; Parke Reserve; Riviere Musquoro; Sanaur [Sanmovy]; St. Vianney; Trios Pistoles; Temiscaming; Trinity Bay, Abitibi. NEWFOUNDLAND: Burin Peninsula, Salmonier Line (prob. this species, Carroll and Parrott, 1961). UNITED STATES: MAINE: Bridgewater; Danforth; Rangeley; Seboomook; St. Francis; Sorrento; Capsuptic. MICHIGAN: Marquette; Vermilion. NEW YORK: Raybrook; Wallface Mt.; Essex Co. NORTH CAROLINA: Black Mountain.



FIGURES 31-37, *Hylobius* spp. 31—*warreni.* 32—*pinicola.* 33—*congener.* 34—*pales.* 35—*radicis.* 36—*rhizophagus.* 37—*aliradicis.*

FIGURES 38-41, *Hylobius* spp., pronotum. 38—*aliradicis.* 39—*rhizophagus.* 40—*radicis.* 41—*pales.*



FIGURES 42-48, *Hylobius* spp., distribution maps. 42—*warreni*. 43—*pinicola*. 44—*congener*. 45—*pales*. 46—*radicis*. 47—*rhizophagus*. 48—*aliradicis*.

Hylobius rhizophagus Millers, Benjamin, and Warner (Figs. 36, 39)

Hylobius rhizophagus Millers, Benjamin, Warner, 1963. Canadian Ent. 95(1):18.

This species, the "root tip weevil," attacks the roots of jack pine (*Pinus banksiana* Lamb.), red pine (*P. resinosa* Ait.), and Scotch pine (*P. sylvestris* L.). Roots of seedlings are tunneled by larvae which leave behind tightly packed frass enclosed by the scaly sheath of the root. On larger pines, lateral roots are sometimes tunneled. Frequently, all roots in the upper foot of soil and beyond a 6 foot radius are damaged. Weevil larvae tunnel in the proximal ends of the roots, with the frass tunnels extending to the root tips. Hence the weevil is referred to by the common name, "root tip weevil." Activity of the insect results in very light resin flow, which rarely saturates soil more than an inch away. Larvae overwinter in the roots and resume feeding the following spring. Pupation takes place in early August within pupal cells constructed in the roots. Adults emerge a few weeks later and feed on the lateral branches. Root tip weevil eggs are slightly smaller than the eggs of the pine root-collar weevil. The species infests primarily closed plantations of pole-sized pines in formerly cultivated land. In advanced infestations, reproduction pines may also be infested. Larvae were reported leading to the death of 3-foot red pines planted among older jack pines. (Millers, Benjamin, 1961; Millers, Benjamin, and Warner, 1963).

DISTRIBUTION[6] (fig. 47): WISCONSIN: Lone Rock, Sauk Co.; Big Flats, Adams Co.; Wild Rose, Waushara Co.; Black River Falls, Jackson Co. MICHIGAN: Alcona Co. (larvae only, Anonymous, 1965).

Acknowledgments

My special thanks are extended to Bernard H. Ebel, USDA Forest Science Laboratory, Athens, Georgia, for providing the reared and collected specimens of the type series of a new species and for the biological data pertaining to it. I wish to thank Dr. Edward C. Becker, Canada Department of Agriculture, Research Branch, Entomology Research Institute, Ottawa, Canada, for supplying the distribution data of the *Hylobius* specimens in the Canadian National Collection. The photographs are the special work of Dr. David G. Kissinger, Atlantic Union College, South Lancaster, Massachusetts, who so generously gave of his time during one of his visits to the U. S. National Museum to study *Apion*. My thanks go also to Mr. Elbert L. Little, Jr., Forester, Division of Dendrology and Range Forage Investigations, U. S. Forest Service, for help with the scientific and common names of the host trees.

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BOSTRICHIDAE (COLEOPTERA) 7: A NEW XYLOTHRIPS FROM CHINA

By HANS REICHARDT[1, 2]

Study of the Bostrichidae in the collection of the Museum of Comparative Zoology has revealed an interesting new Chinese species of the Old World genus *Xylothrips* Lesne. Very few bostrichids have been reported from China, so that this new species is an interesting addition to the family. Details of synonymy and distribution of two of the previously described species of *Xylothrips* are given by Chûjô (1958); the third, a previously described species, is the enigmatic *X. geoffroyi* (Montrouiser), known only from the type-specimen (Lesne, 1900:626) and a subsequently collected female (Chûjô, 1961:5), both from New Caledonia. Lack of knowledge of this species precludes its inclusion in the key presented below.

1 Departamento de Zoologia, Secretaria da Agricultura, São Paulo, Brazil; presently at the Museum of Comparative Zoology, Harvard University, Cambridge, Mass.

2 Number 6 in this series of articles appeared in Rev. Bras. Ent. 11:37-42.

Xylothrips cathaicus Reichardt, NEW SPECIES

(Figs. 1-2)

Description of female. Prothorax and elytra reddish-brown, the latter darkened at apex; head dark brown, almost black; anterior legs with reddish-brown coxae, trochanters and basal ¾ of femora; tibiae and apices of femora of anterior legs as well as the median and posterior legs dark brown; abdomen dark brown, with last segment somewhat reddish. *Head* as in other species of the genus, with dense, yellow pubescence on front; antennae 10-segmented, with three apical segments (club) typically much longer than wide. *Pronotum* wider than long, widest behind the middle; anterior angles ending in a strong hook; anterior half densely and sharply denticulate, the denticules being much larger laterally; posterior and lateral parts of pronotum very sparsely punctate; covered anteriorly and laterally with yellow pubescence; ridges at sides of basal half only vaguely indicated. *Elytra* very indistinctly punctate-rugose, including apical declivity; suture elevated at declivity; sides of declivity limited by four very weak and rounded, impunctate tubercules on each side, the lower one touching lateral margin, but distinctly separated from it, as in *religiosus.* Ventral side of thorax and abdomen very densely punctate and shortly pubescent. *Measurements:* length, 6.3-7.6 mm.; width, 2.75-3.2 mm.

Male unknown.

Examined material. CHINA: *Hopeh,* Peiping, G. Liu col. (holotype ♀ and 1 paratype ♀, Museum of Comparative Zoology n. 31194); *Honan,* Kaifeng, IV.1932, G. Liu col. (2 paratypes ♀, Museum of Comparative Zoology n. 31194; 1 paratype ♀, Departamento de Zoologia, Saõ Paulo, Brazil).

Discussion. The basilateral ridges of the pronotum are an important character for proper identification of *Xylothrips* in Lesne's generic key (1900:474). These ridges are only vaguely indicated in *cathaicus,* but there is no doubt about the generic placement of the species, since all the other characters agree with those of the type-species, *X. flavipes* (Illiger). *X. cathaicus* is easily distinguished from *flavipes* because the apical ridge of the declivity is not connected to the apico-lateral border of the elytra. *X. religiosus* agrees with *cathaicus* in this character, but the marginal tubercles of *religiosus* declivity are well developed, and the declivity itself is deeply foveolate, especially on its upper part. In *cathaicus* the marginal tubercles are very weakly developed, and the declivity is indistinctly punctured. In *flavipes,* the declivity and its marginal tubercles are sculptured as in *religiosus.*

X. cathaicus is the only species of the genus presently known from China. The only other species of *Xylothrips* on the Asian mainland is *flavipes,* which is restricted to India and Southeast Asia.

The three better known species of *Xylothrips* can be distinguished as follows:

1. Apical declivity of elytra ridged at lower half of lateral border and ridge completely fused into apico-lateral border------------------------------FLAVIPES (Illiger)
   Apical declivity of elytra ridged as in flavipes, but ridge short and not connected to apico-lateral border-- 2
2. Tubercles of elytral declivity well developed; declivity deeply foveolate ---RELIGIOSUS (Boisduval)
   Tubercles of elytral declivity very poorly developed; declivity indistinctly punctured ---CATHAICUS, n. sp.

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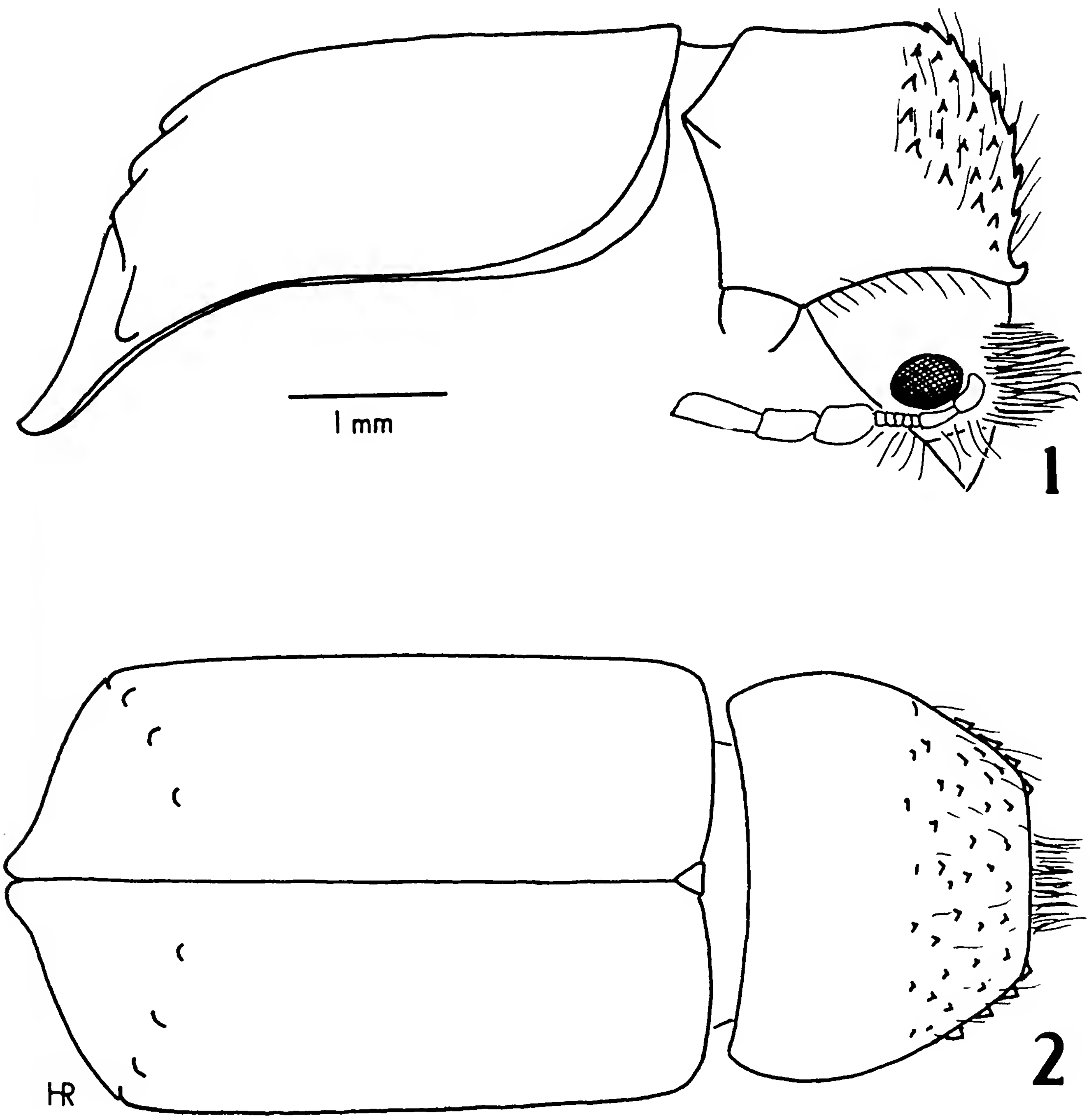

FIGURES 1-2. *Xylothrips cathaicus,* new species, holotype. 1—lateral view. 2—dorsal view.

SIGNALS AND MATING BEHAVIOR IN SEVERAL FIREFLIES (COLEOPTERA: LAMPYRIDAE)[1,2]

By JAMES E. LLOYD[3,4]

During the summers of 1963-65 while investigating flash communication in *Photinus* fireflies (Lloyd, 1966), I also studied several species in six other genera. Some of these observations have already been reported (Lloyd, 1965a, b). This paper presents data on other species. Recording and field techniques have been described in detail elsewhere (Lloyd, 1966). Distribution maps are given for each species where possible, as it is essential to correlate behavior with geographic distribution.

Lampyris (=*Pleotomodes*) *knulli* (Green)

Few lampyrid beetles described from North America are rarer than this Florida species (Map 3). Probably no more than two dozen are in collections, and until these observations females had not been found, or at least had not been recognized as *knulli* females. During May 1964 and 1965, five females were collected at the same site at Gainesville, Florida, and observations were made on their behavior.

Observation dates were between 2 and 16 May. Females were found glowing along a mowed roadside adjacent to a mesic woods. Their glows, visible at distances of 3 or more meters, appeared bright green. Captive females were placed in the site in open plastic boxes (8x8x3 cm). They began glowing 28-37 minutes after sunset and stopped glowing 60-68 minutes after sunset. Prior to glowing each evening they crawled from beneath the grass in their cages and exposed themselves in open areas or on perches. After each glowing period they retreated to cover. On May 4, 1965, midway through the normal glow period one female stopped glowing; investigation disclosed she had attracted a male and was mating with him. On May 8 a free female was seen glowing, but before she could be reached she dimmed and then extinguished her light. She was found mating with a male.

Males have a small luminous area on the ventral surface of the abdomen. None were seen glowing in nature even though over 40 nights were spent working in the site where females were found. When chemically stimulated (ethyl acetate, see Seliger et al. 1964) one male glowed from this light organ (J. Buck, personal comm.).

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[1] This investigation was supported by U. S. Public Health Service Predoctoral Fellowship No. 1-F1-GM-22, 196-01, the Sigma Xi-RESA research fund, and the Bache Fund, Grant No. 481.

[2] This is Appendix II of a thesis presented to the Graduate School of Cornell University in partial fulfillment of the degree Doctor of Philosophy.

[3] Present address, Dept. of Entomology, University of Florida, Gainesville, Florida.

[4] I thank Dr. Thomas Eisner of Cornell University for his assistance in obtaining funds for this investigation. I thank Dr. William L. Brown of Cornell University for his helpful comments, criticisms, and suggestions during the preparation of the manuscript.

Micronaspis floridana Green

For the distribution of this rare species see Map 4. Two males were collected at Coconut Grove, Florida, May 15, 1965. They were found within 100 meters of the ocean flying among low weeds and frequently being blown to the ground by the moderate wind. They emitted single flashes, estimated to be 0.13-0.18 seconds in duration (estimated by comparison with flashes of known duration produced by an electronic flasher (see Lloyd, 1966) at one second intervals (78°F.)).

Pyractomena borealis (Randall)

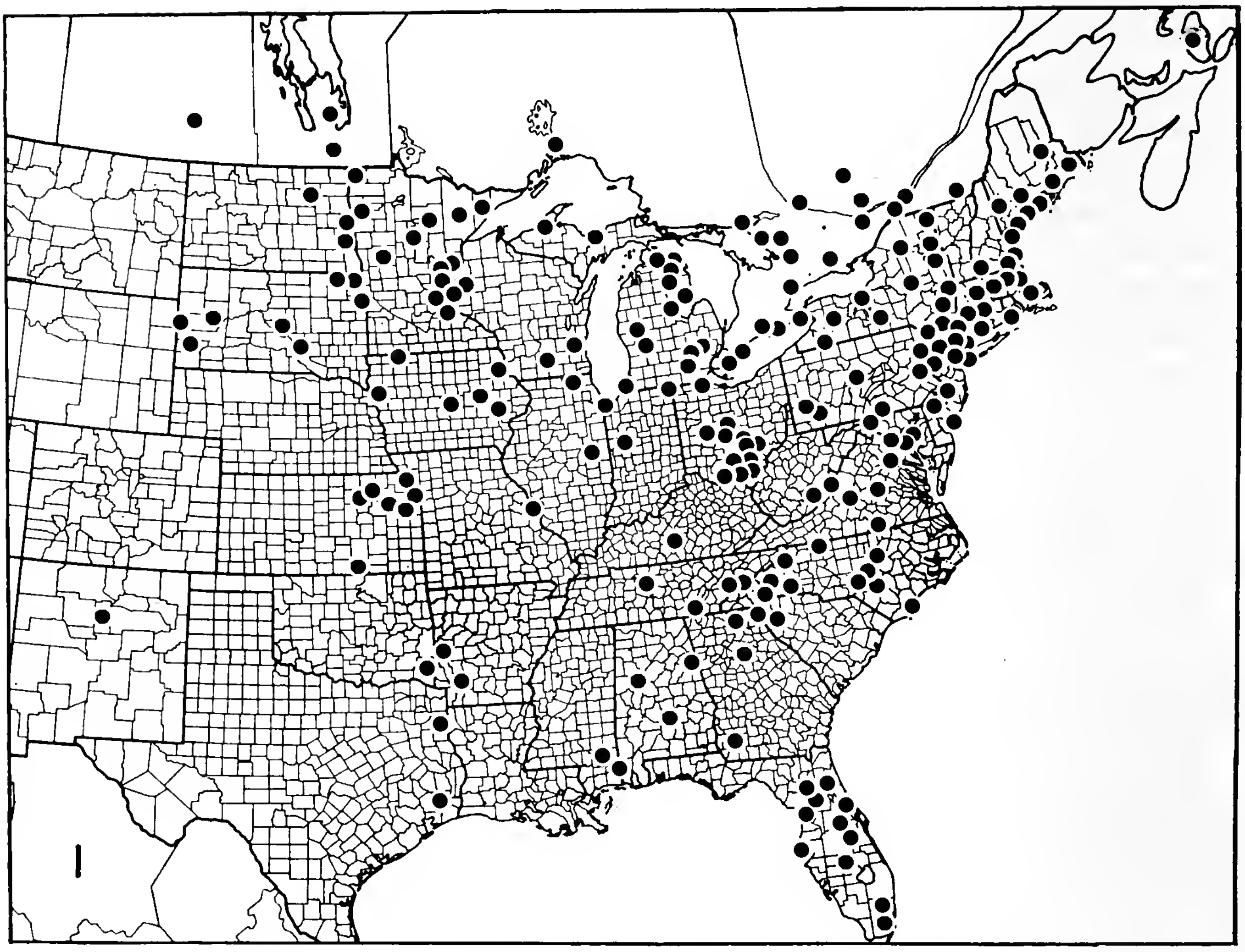
For distribution see Map 5. My observations are in agreement with those of McDermott (1917). This species was found in a mesic woods in Gainesville, Florida, and in a stand of red maple 4.3 miles west of Otter Creek, Florida, from February 28 to March 2, 1965. Moderately large populations were seen, suggesting that this is a cold-weather (in Florida a winter-adapted) species.

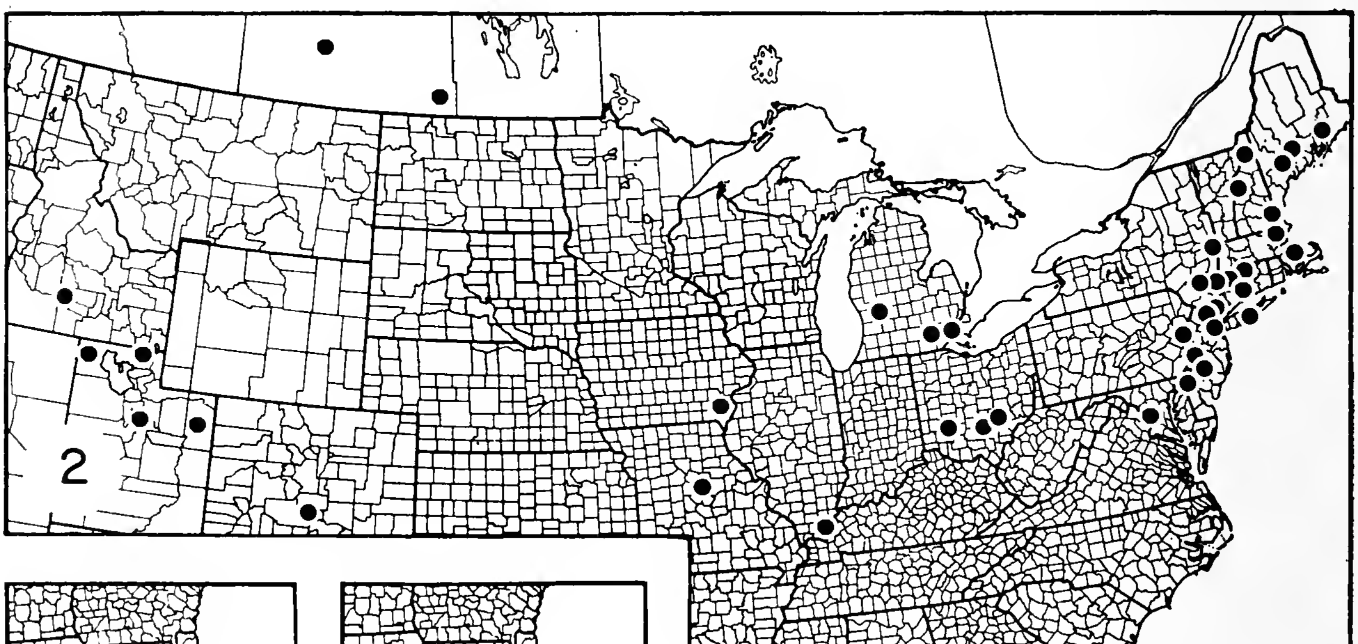
Flashing activity began about 32 minutes after sunset and lasted for approximately 50 minutes. Males flew among the leafless branches 2-8 meters above the ground. Their flash-pattern was a single flash estimated to be 0.30-0.35 seconds in duration at 50° and 0.20-0.25 seconds at 65°. They flew slowly, traversing 1-2 meters between flash-patterns and 4-10 centimeters during each pulse. Two males emitted the double flash described by McDermott; a normal flash followed by a less intense after-flash of approximately the same duration as the first. The pulse interval (time duration between beginning of first pulse and beginning of second pulse) of these two flashes in one male measured 0.6 seconds (stop watch) at 65°. Mean flash-pattern interval at 68° was 3.6 seconds and varied inversely with temperature; $\bar{x} = 4.2$ (65°) and $\bar{x} = 8.4$ seconds (50°).

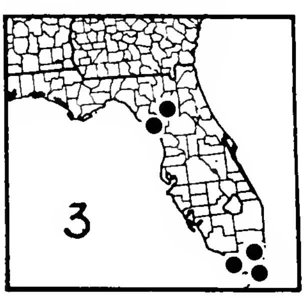
Three females were collected. These were 2, 4, and 6 meters above the ground on tree trunks. Another answered the flashlight from a perch over 10 meters above the ground. They responded to male, flashlight, and electronic-flasher flashes with single pulses at slight time delays. Delays of two females measured with stop watch at 65° averaged 1.0 seconds. The response flashes of one female were analyzed by means of a portable transducer: her flashes turned on an audio oscillator, and the resulting tone was recorded on tape and later analyzed with an oscilloscope (see Lloyd, 1966). Her mean pulse length at 67° was 0.56 seconds (range 0.49), mean delay time (beginning of male pulse to beginning of response pulse) was 0.69 seconds (range 0.09).

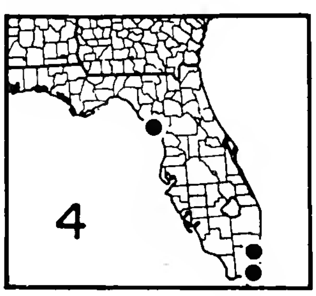
Several males were attracted to caged females and to the flashlight when it was flashed in a manner simulating female responses in length and delay. One approach to a free female was observed; after four flash exchanges the male was on the tree beside her.

One important difference was noted between the approaches of males of this species and males of *Pyractomena dispersa* Green. *P. borealis* males approach females as do *Photinus* males; they remain in flight after each









MAP 1. Distribution of *Pyractomena angulata* (Say).

MAP 2. Distribution of *Pyractomena dispersa* Green.

MAP. 3. Distribution of *Lampyris* (=*Pleotomodes*) *knulli* (Green).

MAP 4. Distribution of *Micronaspis floridana* Green.

exchange, not landing until very near the female. *P. dispersa* males drop to the ground immediately after the first exchange and do not flash for a minute or more (Lloyd, 1964). This is obviously out of the question for *borealis,* an "upper story" species.

Pyractomena dispersa Green

For distribution see Map 2. Since the behavior of this species was described (Lloyd, 1964), additional observations have been made. Previously, males were not attracted to the flashlight.

Males were seen flying at Durham, Pennsylvania, June 8, 1963. over a field adjacent to a small stream. Several were attracted with 4- or 5-pulsed flashes, similar to those described for females. They were also attracted to 2-pulse flashes. For attraction it was necessary for the flashlight to be flashed from a position in front of and below them. Immediately after the flashlight response males dropped to the ground. A minute or more passed before their next flash-pattern.

Pyractomena marginalis Green

For distribution see Map 6. This species was seen in Lake Lure, North Carolina, June 24, 1963, in a grassy grove adjacent to a stream. A few males were observed flying about 40 minutes after sunset. They flew within 2 meters of the ground, emitting single short flashes at 5-7 seconds intervals at 65°.

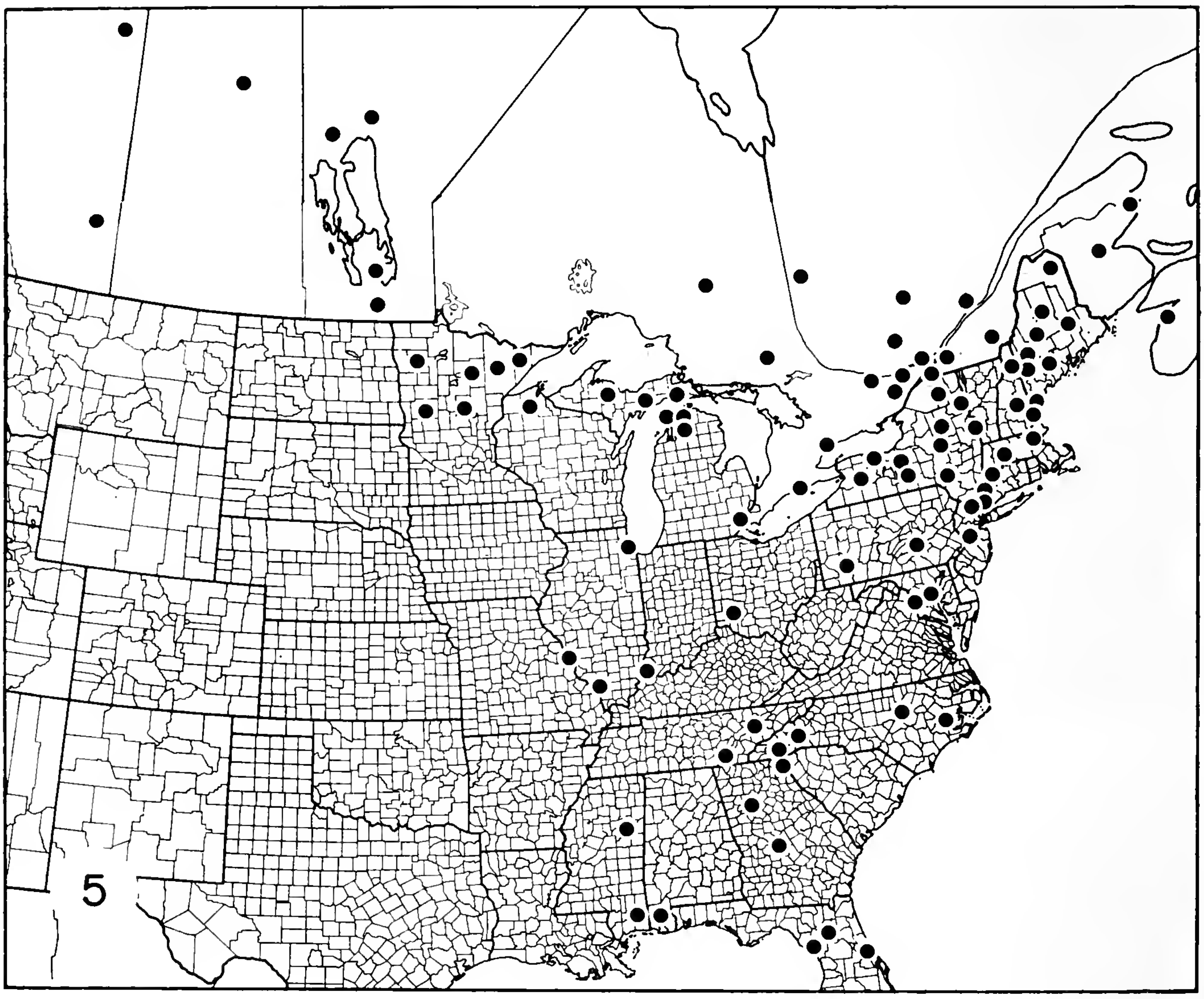
Pyractomena angulata (Say)

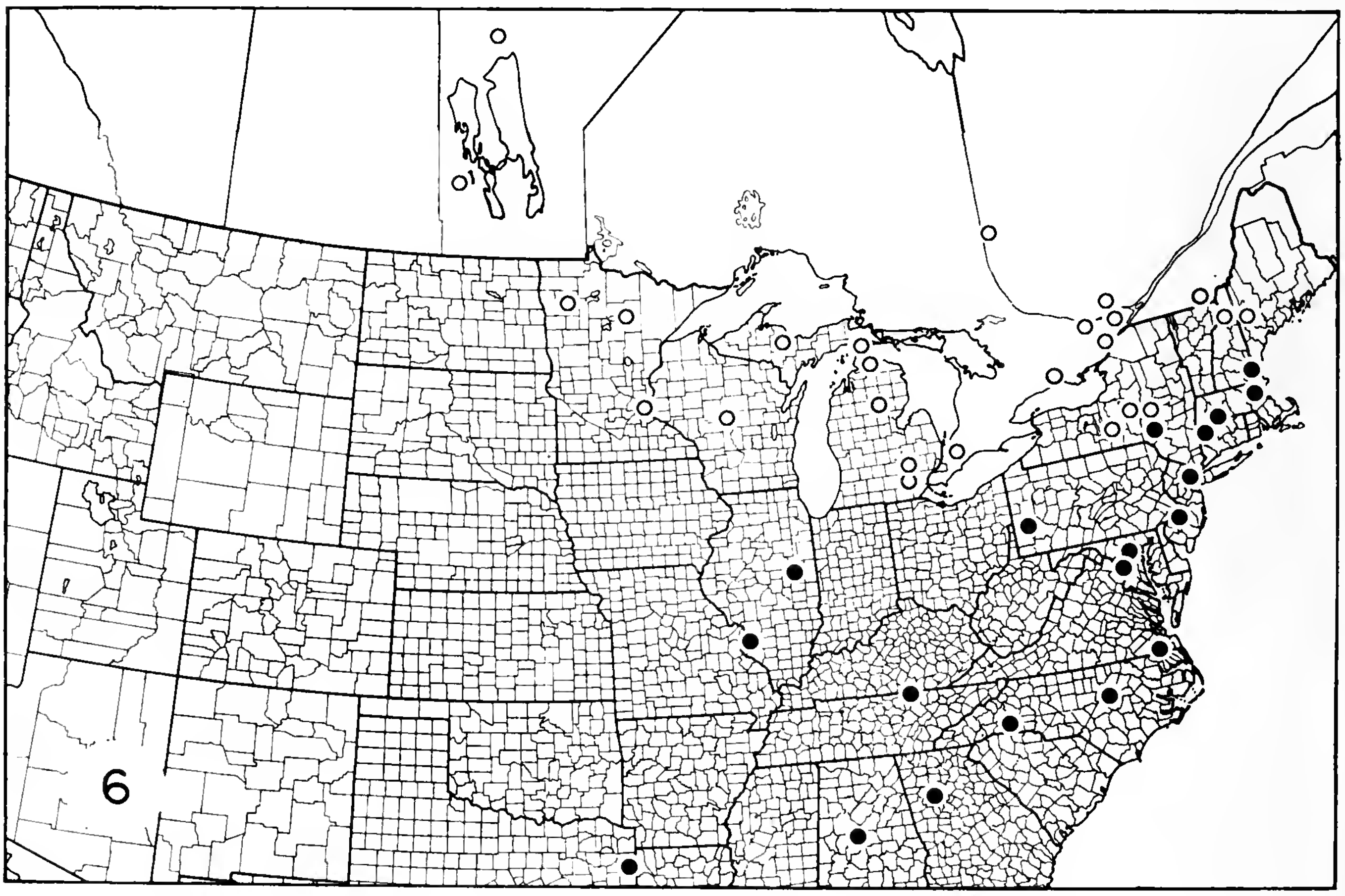
For distribution see Map 1. This species was seen in nearly every locality visited during the extensive *Photinus* investigation. Usually only one or two males were seen at one time. These flew 2-15 meters above the ground, usually at the tips of tree branches, with winding, leisurely courses while emitting their flickering rusty-yellow flashes. The flash-pattern was a rapidly-modulated emission, approximately 0.8 seconds in duration at 67°. There appeared to be 9-15 modulations in each flash. Flash-pattern intervals at 67° averaged 4.3 seconds. Their rapidly modulated, distinctively colored flashes made *angulata* easily recognizable.

I was unable to attract males of this species to the flashlight, and I failed to find either dense breeding aggregations or females.

Pyractomena linearis LeConte (complex)

For distribution of this complex see Map 6. The marsh-pasture habitat of the species in this complex is similar to that of *Photinus ardens* LeConte (Lloyd, 1966), and one member of the complex was found with each *ardens* deme studied in the *Photinus* investigation. The season of activity was also similar to that of *ardens,* about two or three weeks in duration and ending by the third week in June.





MAP 5. Distribution of *Pyractomena borealis* (Randall).

MAP 6. Distribution of *Pyractomena linearis* LeConte complex (circles). Distribution of *Pyractomena marginalis* Green (dots).

Long-pulsed linearis: This species was observed at Oneida and Milford Center, New York. Activity began 40-50 minutes after sunset and continued for about an hour. Males flashed while flying slightly downward 1-2 meters above the ground; 20-50 centimeters were traversed during their flash-pattern, a steady emission estimated to be 0.5 seconds in duration at 66°. Mean flash-pattern interval at 63° was 5.9 seconds. Flight paths of some males consisted of a series of angularly displaced segments. During each flash-pattern they flew in straight lines; between flashes they moved laterally 1-2 meters and rotated a few degrees. As a result during the next flash-pattern they scanned a different area.

Several females were found in the grass within 1 meter of the ground. They responded to male and flashlight flashes with single flashes 1 second or less in duration, at short time delays.

Attractions of males to free and caged females and to the flashlight were similar. After receiving response flashes from in front of or below them, males dropped immediately to the ground, usually within 1 meter of responding lights.

4-pulsed linearis: This species was observed at McLean Bog, McLean, New York. Activity began about 50 minutes after sunset. Male flight paths, including angular displacement, were similar to those described for long-pulsed *linearis.* Male flash-patterns were similar to those described for *P. dispersa* (Lloyd, 1964). Flash-pattern interval at 60° averaged 5.1 seconds

Females were found on grass stems within 1 meter of the ground; they answered male and flashlight flashes with 4- or 5-pulsed emissions, similar to those of males, at short time delays.

Male approaches were similar to those described for long-pulsed *linearis* and *dispersa,* in contrast to those described for *borealis* and *Photinus* species.

Delayed-linearis: On July 12, 1963, considerably later than the season for the two prevously discussed members of this complex, three males emitting flashes similar to those described for long-pulsed *linearis* were seen at the 4-pulsed *linearis* site at McLean, New York. One responsive female was found in the grass. She emitted single-pulsed responses approximately 1 second in duration at an average delay of 1.4 seconds (stopwatch) at 58°. This is possibly a third species in the *linearis* complex, considering that (1) female delay was much longer than that of long-pulsed *linearis,* and (2) long-pulsed *linearis* had never been observed in this site during several nights of early summer observation.

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NOTES ON HYPERA MARITIMA (TITUS). (COLEOPTERA: CURCULIONIDAE)

At present this species is known to occur only in Massachusetts: it was originally described from Nantucket Island, Martha's Vineyard Island, and Chatham. The late C. A. Frost collected several specimens at Harwich Port, which like Chatham is located on the Nantucket Sound side of Cape Cod.

Investigation at Harwich Port resulted in the discovery of three adults in early July; the following year larvae were found in early June feeding in the buds of Beach-Pea, *Lathyrus maritimus* (L.) Bigel according to Gleason (1958, The new Britton and Brown illustrated flora . . .) or *L. japonicus* Willd. according to Fernald (1950, Gray's Manual of botany, 8th ed.). Adults were reared from the larvae.

The host plant is widely distributed in the cooler parts of Eurasia and North America according to Gleason. In view of this Mr. R. T. Thompson, British Museum (N. H.), conducted a brief, preliminary study of *H. maritima* and is of the opinion that it is distinct from the European *Hypera* in the British Museum; I am grateful for his aid.

The existence of a species of *Hypera* apparently native to the United States and with such a singularly limited distribution as *H. maritima* is of great interest. This work was aided by grant GB 1442 from National Science Foundation.—D. G. Kissinger, *Atlantic Union College, South Lancaster, Mass.*

BEETLE TALK

The following proposals concerning the scientific names of beetles were placed before the International Commission on Zoological Nomenclature:

Trypetesinae and Trypetesini (Lacordaire): Proposed emendation of family-group names under the plenary powers (Insecta, Coleoptera). By C. W. Sabrosky and E. C. Zimmerman, 1966, Bull. Zool. Nomenclature 23(1): 46-47.

Galerita Gouan, 1770 (Pices): Proposed addition to the Official Index together with addition of *Galerita* Fabricius, 1801, to the Official List. By H. Reichardt, 1966, Bull. Zool. Nomenclature 23(1): 60-61.

LARVAL CHARACTERISTICS OF SOME NORTH DAKOTA CARABIDS (COLEOPTERA: CARABIDAE)

By J. R. DOGGER AND C. A. OLSON[1, 2]

Records of adult Carabid beetles collected in North Dakota indicate that at least 164 species occur within the boundaries of the state. Adult specimens in the collection of the Department of Entomology, North Dakota State University at Fargo, were examined and identified by Dr. W. C. Stehr of Ohio University at Athens, Ohio, in 1959.

The larvae of only a few of these ground beetles have been described. These include *Calosoma obsoletum* Say and *C. calidum* (Fab.) by Burgess and Collins (1917); *Poecilus lucublandus* Say, *Chlaenius sericeus* (Forst.), and *Galerita janus* Fab. by Dimmock and Knab (1904); *Harpalus pennsylvanicus* (DeG.) figured by Quaintance and Jenne (1912); *H. herbivagus* Say figured by Lugger (1899); and *H. compar* Lec., *Chlaenius pennsylvanicus* Say, and *Stenelophus conjunctus* Say by Chu (1945).

Van Emden (1942) in England made a comprehensive study of the Carabid larvae and prepared a descriptive key to the tribes and genera. This work serves as the chief source of background material for the present study, aiding in the recognition of larvae and providing descriptive terms for significant structures.

Because the larvae of the majority of the Carabid species are undescribed, the objective of this study was to contribute to the knowledge of this group.

METHODS AND PROCEDURE

COLLECTING

A portion of the material used in the study was obtained by field collecting. This was confined mainly to Cass County. Attempts at collecting early in the season (June 8-22) met with little success. During the period, July 1 to July 20, larvae were more abundant. Best results were obtained in wooded areas near water. Larvae, pupae, and adults were found in such situations under fallen logs and other debris. One of the most productive areas was near a bridge construction site where the ground was littered with debris. Larvae were difficult to find in cultivated fields early in the season.

Use of a posthole digger for sampling, particularly in cultivated fields, did not prove successful. The most satisfactory collecting equipment proved to be a hand trowel and a glass jar. Under logs and debris larvae were fairly close to the soil's surface, but some were found at a depth of four to six inches in damp soil with an abundance of humus. A light

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[1] Professor of Entomology and National Science Foundation Teacher Research Participant respectively, North Dakota State University.

[2] Published with the approval of the Director, N. D. Agr. Expt. Sta. as Paper No. 76 of the Journal Series.

forceps was first used to pick up the insects, but injury may have been sustained by some that did not survive. Picking them up with the point of a trowel along with some soil was a better method. Considering the active nature of the carabid larvae, an advantage of this method was that one hand could be used for both digging and collecting. Care was taken to separate larvae into individual containers as soon as possible. Cannibalism frequently occurred within an hour after collecting.

An attempt was made to collect two or more larvae of each apparent species so that some could be reared and some preserved as life-like as possible for study. Larval exuviae were retrieved and preserved as an additional check on the identity of preserved larvae, once the identity of a reared adult had been established.

In order to study specimens they were first placed under refrigeration at 45 degrees F. for two hours in individual salve boxes. After this period their activity was sufficiently reduced to make microscopic examination possible. When two larvae were determined to be identical, one was boiled in water and preserved in 80 per cent ethyl alcohol and the other one was returned to the culture box for rearing.

Rearing

Each larva was placed in a two-ounce tin salve box containing damp soil. Though moisture was essential, if the soil became too wet, the insects did not survive. A few drops of water added about every three days provided sufficient moisture if the culture was initially damp.

Soil from the natural habitat of the larva was used in most cases and proved satisfactory. However, in several boxes, larvae were placed in soil mixed for greenhouse use. The mixture was not sterilized and in nearly every culture the pupa was destroyed by mites.

Food for the larvae was gathered by sweeping alfalfa and grasses for lepidopterous larvae. Several species, mostly noctuids, were consumed as well as very small earthworms which existed in the natural environment of the Carabidae. One lepidopterous larva every two or three days provided sufficient food to maintain the carabid larva to pupation period. In many cases mature larvae pupated within a few days after collection.

For recording purposes, the living larvae, identical preserved specimens, cast skins and reared adults were all assigned the same number.

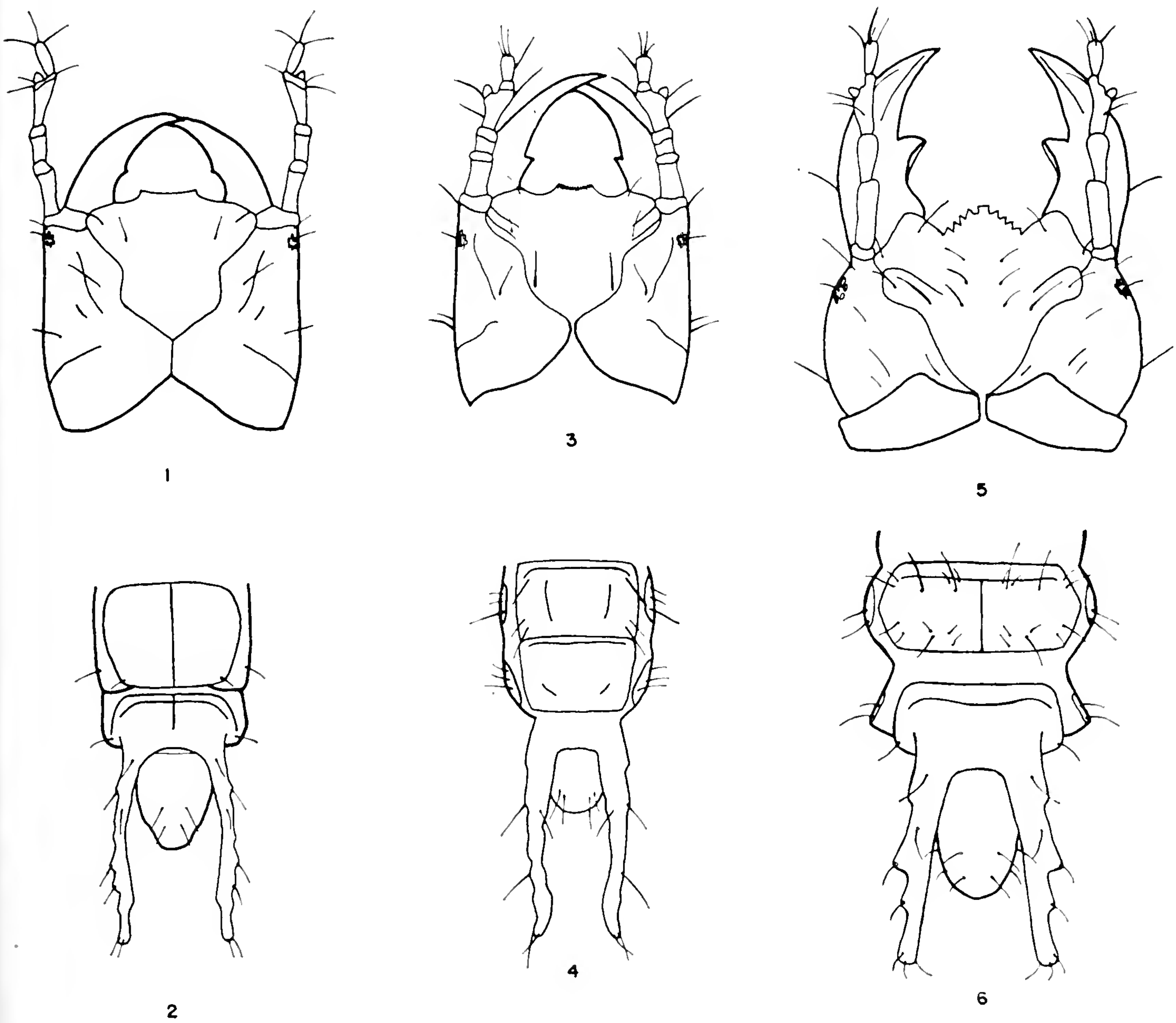
Material and Descriptions

Descriptions of identified larvae were based on insects taken as larvae and reared to the adult stage. The species reared and the numbers involved are reported with their descriptions.

Micromaseus femoralis (Kirby)

The description is based on one reared specimen and one preserved specimen, both taken in Cass County in July. The reared insect remained in the pupal stage only 4 days.

Head. Slightly broader than long and slightly narrower than prothorax and not strongly constricted posteriorly. Antennae extending forward beyond mandibles, first 2 segments cylindrical, second about three-fourths length of first, third with exterior margin angular and subequal in length to first, fourth about one-half the length of third. Sensorial appendage of third antennal segment conical with diameter of base subequal to height. Mandible with small triangular retinaculum located about two-fifths distance from base to apex. First segment of labial palps with single seta on inner margin. Maxillary palps with each segment smaller in diameter than the preceding from base to apex, first and fourth subequal in length, second and third subequal in length, first about as broad as long, fourth much longer than broad. Outer lobe of maxilla with first segment about one and one-fourth times as long as second. Inner lobe an apparently unsegmented projection with strong terminal seta. Nasale concave, without regular denticulation and with projecting outer limits. Fronto-clypeal area with single pair of prominent setae. Six ocelli on each side arranged in transverse arcs with a pigmented area just caudad of anterior 3, prominent seta just anterior to uppermost of posterior 3 and another anterior to second of this group. Ocellar grooves and cervical grooves prominent, former curving parallel with frontal sutures, latter paralleling cervical margin of head. Stem of epicranial suture short, about one-seventh as long as fronto-clypeal area. Cervical triangle large and lightly sclerotized.



FIGURES 1-6, Dorsal aspects of head (upper row) and abdominal segments 8 through 10 (lower row) of some carabid larvae. 1-2, *Micromaseus femoralis* (Kby.). 3-4, *Amara cupreolata* (Ptzys.). 5-6, *Anadaptus discoideus* (Dej.).

Thorax. Tergites margined anteriorly, pronotum completely margined. Prothorax approximately one and one-half times as long as mesothorax which is subequal to metathorax; tergum with 4 prominent setae along each lateral margin and an additional seta dorsad of the most anterior on each side; mesal longitudinal groove prominent, lateral furrows straight, running perpendicularly to meson one-third of distance from anterior margin of tergum to posterior. Pleural sclerites long and contiguous with pronotum, divided into 2 triangular plates on meso- and metathorax. Prosternum forming a subtriangular plate. Legs of medium length with two equal claws. Femora with double row of 5 to 7 irregular spines on ventral surface.

Abdomen. Segments gradually tapering caudally. Tergites covering most or all of dorsal surface, margined anteriorly and laterally for anterior half. Tergites with single prominent seta at each posterolateral corner. Epipleurites 1, 2, 3, and 8 each with 1 large and 2 small setae, fourth through seventh with 1 large and 1 small. First and second hypopleurites with 2 large and 1 small setae, third through eighth with a single large seta. Ninth segment two-thirds as long as eighth. Cerci twice as long as ninth segment, non-articulating, at first diverging then converging with tips almost parallel. Nine setae present on each cercus with all but first and last two on a distinct nodule. Tenth segment approximately as long as ninth and visible dorsally, extending caudally for about half length of cerci. Length of extended full grown larvae, 12 mm.

Amara cupreolata (Putzeys)

Two specimens collected in July, pupated ten days later and emerged as adults six days after pupation. The following description is based on these specimens and a preserved complete larva. All were taken in Cass County.

Head. Slightly longer than broad, of approximately same width as prothorax, not constricted posteriorly. Antennae extending forward slightly beyond mandibles, first 2 segments subcylindrical, second about one-half times length of first, their apical diameters subequal. Third antennal segment has exterior margin angular and is subequal in length to first. Sensorial appendage of third segment is conical with height one-half times diameter of base. Fourth segment is cylindrical and subequal in length to second. Third segment bears 3 setae, 2 on outer margin caudad to sensorial appendage, third on inner margin near the apical end of segment. Fourth bears 3 setae apically and another at about middle of inner side. Mandible without teeth but with small triangular retinaculum located on basal third. Labial palps with first segment longer than second, first subcylindrical, second cylindrical tapering to a rounded apex, basal diameter of second about one-half that of first. Ligula absent or reduced with 2 strong setae. Stipes of maxillae with 2 prominent setae, 1 on outer margin slightly below middle, second located dorsally on apical fourth. Inner lobe of maxilla reduced to an apparently unsegmented projection bearing strong terminal seta. Outer lobe with first segment cylindrical, second subconical with a rounded apex, about three-fourths length of first and with basal diameter one-half that of first. Maxillary palps with second segment two and one-half times length of first and subequal to combined lengths of third and fourth. Basal diameter of third segment is one-half that of second and twice that of fourth. Nasale slightly concave and with dense row of setae along concave margin. Adnasales not prominent but each bearing strong seta. Frontal clypeal area with 3 pairs of darkened ridges, 2 curving obliquely backward from antero-lateral margins, third parallel with mesal line and adjacent to sutures of posterior portion of fronto-clypeal area. With single pair of setae near inner end of median ridge on either side. Frontal piece not touching hind margin of head, epicranial suture short. Six ocelli on each side arranged in 2 transverse arcs just posterior to base of antenna with a darker pigmented area between ocelli. One strong seta located within ocellar area on either side. Ocellar and cervical groove present, former parallel to frontal sutures, latter running parallel to hind margin of head. Two strong setae located one on either side of frontoclypeal area mesad to caudal end of ocellar groove. Another seta located on either side of outer margin of head just anterior to seta just described.

Thorax. Meso- and metatergites margined anteriorly, mesal longitudinal line prominent. Prothorax only slightly longer than other segments. Pronotum with 3 setae on each side, 1 in antero-lateral corner, a second midway along lateral margin, and third located obliquely dorsad; others near posterior margin. Two additional small setae located in a line dorsad of anterior seta and 1 small seta located ventrad of posterior seta. Meso- and metanota differ in that so-called posterior seta is located almost directly dorsad of median seta and additional small posterior seta is lacking. Pleural sclerites are contiguous with pronotum faintly sclerotized but separate from meso- and metanota, bearing 1 seta each. Legs of medium length with 2 equal claws. Femur and tibia each with a transverse row of 3 or 4 spines on ventral side.

Abdomen. Segments gradually tapering caudally. Tergites covering most of the dorsal surface, margined anteriorly; mesal longitudinal groove prominent, with single prominent seta on each postero-lateral corner of each segment, another smaller seta at posterior ends of marginal groove and another small seta near large posterior seta. Epipleurites with 1 large and 2 small setae. Hypopleurites with 1 prominent seta and an additional small seta on some. Ninth and tenth segments subequal in length. Cerci approximately two and one-half times length of ninth segment, non-articulating, diverging for basal third, then almost parallel to tips. Five setae present on each cercus.

Anadaptus discoideus (Dejean)

Six larvae, collected in Cass County, were reared to maturity on July 18-20. These remained in the pupal stage for six days. In addition to the six exuviae, sixteen other larvae were examined and considered identical. All were from Cass County and were taken during the period June 20 to August 5.

Overall appearance. Larva appearing brown, head, meso- and metanota and abdominal tergites testaceous, pronotum deep brown, almost black. Remaining sclerites and legs are paler, the non-sclerotized area near white. Extended length of the full grown larva is 18.6 mm.

Head. Slightly broader than long, slightly narrower than prothorax and distinctly constricted posteriorly. Width 2.2 mm. Antennae extending forward as far as mandibles, first segment cylindrical, second subcylindrical, and three-fourths as long as first, third as long as second with outer margin excavated for apical third, fourth about one-half length of third and more slender. Sensorial appendage on third segment is conical with diameter of base subequal to height. Three setae arise from third and 4 from fourth segment, 3 of them prominent, fourth less evident. Mandible strong and somewhat flattened with prominent pointed retinaculum located nearly midway between base and apex and 1 seta extending from midpoint of lateral margin. First segment of labial palps cylindrical, second less than one-half length of first and very slender, tapering toward apex, mentum with several scattered setae, 2 prominent setae extending ventrally, ligula broadly triangular with 2 closely parallel setae. Stipes of maxillae rather slender with a fringe of long hair along median margin and 3 or 4 setae on lateral margin. Maxillary palps with each segment smaller in diameter than preceding from base to apex. First segment of palps short, nearly as broad as long. Second segment one and one-half times as long as third and tapering toward apex. Outer lobe of maxilla with first segment about one and one-fourth times length of second and with a prominent seta on apical third; second slender and tapering toward apex. Inner lobe an apparently unsegmented projection with strong terminal seta. Nasale projecting forward with blunt central tooth and 4 prominent, pointed teeth on either side. Adnasales prominent, projecting nearly as far anteriorly as central tooth of nasale. Fronto-clypeal area with prominent seta on either side posterior to inner end of clypeal groove, a somewhat less prominent seta behind junction of frontal and clypeal grooves on each side and a similar pair along each margin caudo-laterally from adnasale, and 3 pairs of shorter setae extending backwards from nasale in two diverging arcs. Additional finer setae also present. Six ocelli arranged in 2 transverse areas on each side with a pigmented area and a prominent seta between them.

Ocellar furrow lacking, cervical groove prominent, extending obliquely forward for about two-fifths of the distance between epicranial suture and ocelli, then bending backward in a straight line perpendicular to longitudinal axis of head, though not parallel with sinuate hind margin of head. Epicranial suture short, about one-sixth as long as fronto-clypeal area. Cervical triangle large, lightly sclerotized and with broadly rounded apex. Strong seta located on either side of head just antero-laterad of bend in cervical groove; 2 short setae present on either side, 1 just behind antenna, a second in line with this and midway between it and strong seta. A second prominent seta found on side of head laterad of strong seta and 2 small setae found on either side just anterior to cervical groove, one near frontal suture, other midway between bend and side of head.

Thorax. Pronotum margined on all sides; meso- and metanota margined anteriorly. Prothorax almost twice as long as either of other segments. Pronotum with 2 rows of 3 setae on each side, one row posterior to anterior margin, other anterior to posterior marginal line. Meso- and metatergites with large seta midway along lateral margin and 2 unequal lesser setae at antero-lateral corner on each side, 4 regularly spaced setae varying in size in a transverse line plus an occasional additional anterior seta on each side and three setae in a transverse line posteriorly on each side, 2 outer setae large, mesal small. Sternites lightly sclerotized with 2 rows of short setae coverging posteriorly. Mesothoracic spiracle elliptical and prominent. Legs of a uniform light color. Coxae with double row of setae on outer surface plus 2 additional setae forming a ring of 4 at distal end. Tarsus with 2 unequal claws subtended by 2 short, stout setae.

Abdomen. First 5 segments rather broad; segments 6 through 9 tapering caudally. Tergites covering one-half to two-thirds of dorsal surface, margined anteriorly, with 2 transverse rows of setae. These consist of 3 well-spaced prominent setae on either side of mesal line anteriorly and 2 well-spaced prominent setae posteriorly plus a small seta in line on either side of upper seta posteriorly, a small seta between 2 rows on lateral margin on first 5 tergites and several small setae appearing irregularly in association with large anterior setae. First epipleurite with 3 or 4 setae, second through eighth with 4 or 5 setae, ninth pleurite with 3 setae. First hypopleurite apparently subdivided with seta on each part; remaining hypopleurites with 3 or 4 setae. Ninth segment two-thirds as long as eighth. Cerci more than twice as long as ninth segment, at first diverging and then continuing almost parallel to apex, non-anticulating at base with 8 setae on each cercus and all but first and last 2 on a distinct nodule. Tenth segment slightly longer than ninth, cylindrical and directed ventrally at about a 30 degree angle.

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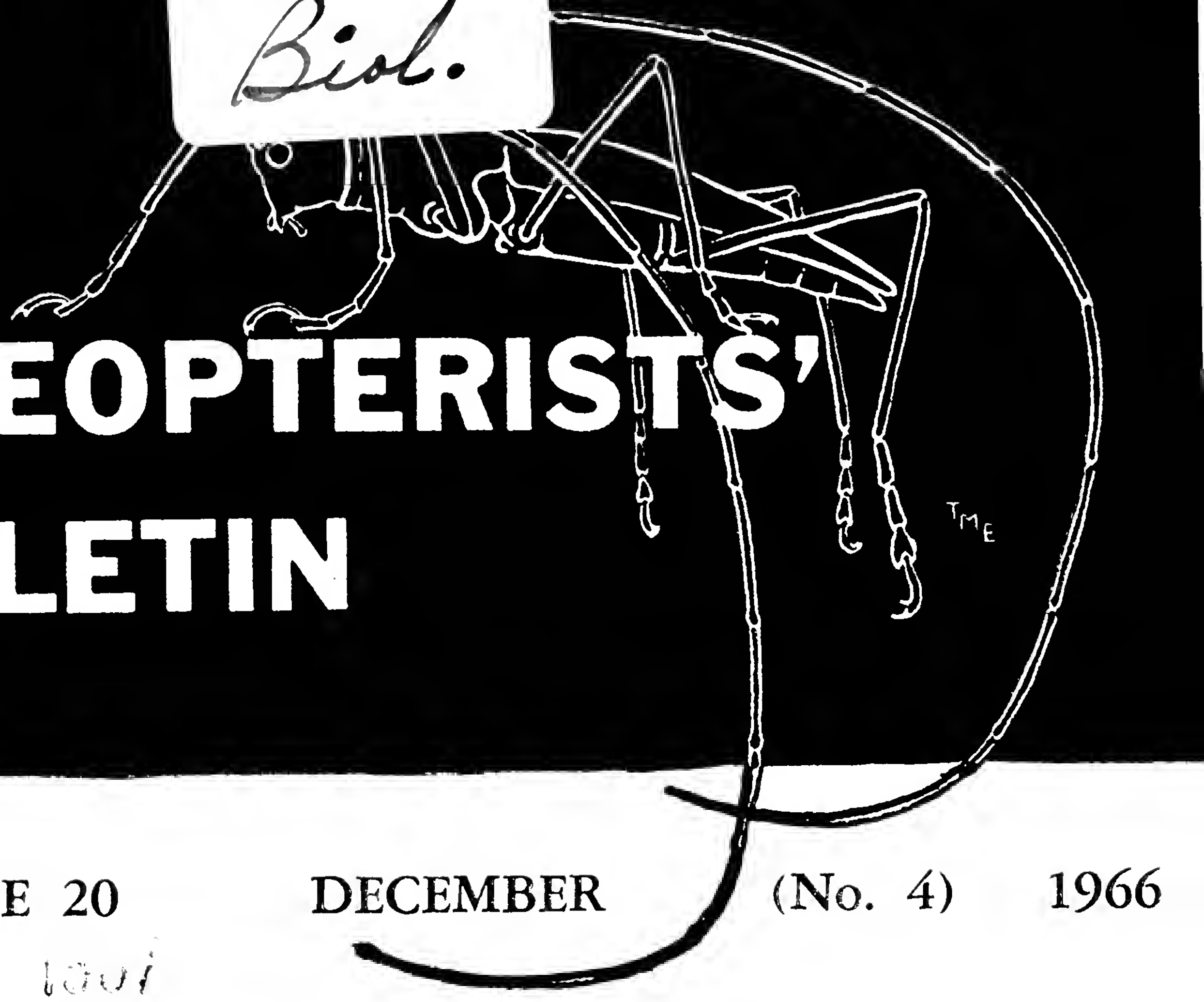
THE COLEOPTERISTS' BULLETIN



VOLUME 20 DECEMBER (No. 4) 1966

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Founded 1947 by Ross H. Arnett, Jr.

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A QUARTERLY PUBLICATION DEVOTED TO THE STUDY OF BEETLES

The Coleopterists' Bulletin

Volume 20 December (No. 4) 1966

A DESCRIPTION OF THE LARVA OF DERALLUS RUDIS SHARP (COLEOPTERA: HYDROPHILIDAE)[1]

By PAUL J. SPANGLER[2]

For many years the placement of *Derallus, Regimbartia* and *Globaria* in the tribe Berosini was questioned by systematists but probably not changed becaused the larvae were not definitely known. However, Bertrand (1962) described a hydrophilid larva (his Type D) from Africa which he assigned to the *Derallus* group and which he included in the subfamily Hydrobiinae. Bertrand stated that he placed his African larva in the *Derallus* group of hydrophilid larvae at the suggestion of J. Balfour-Browne of the British Museum who, when he examined the African larva, associated it with American larvae that he believed to be *Derallus*.

For several years I looked for larvae associated with *Derallus* adults that might represent the genus. On August 10, 1964, at Alvarado, Veracruz, Mexico, I found larvae new to me and which were associated with adults of *Derallus*. I suspected that these were *Derallus* larvae and six were kept alive for rearing and twelve others were preserved for study. Five of the six larvae kept for rearing died from excessive heat while enroute to Washington, D. C. The larva that survived pupated in my office sometime during my absence on September 16 and 17, 1964. When I discovered the pupa on Friday, September 18, the eyes were dark red indicating that eclosion probably would occur during the weekend. Therefore, I made a few hasty notes on the number of styli on the head and pronotum and rushed the pupa to the photo lab to obtain a photographic record of the pupal stage. Unfortunately, eclosion occurred while the specimen was lying on the stage as the camera was being adjusted. As a result, only a photo of the teneral adult and cast off pupal skin (fig. 1) was obtained. The larva definitely proved to be the immature stage of *Derallus*.

The similarity of the *Derallus* larva to that of Bertrand's African larva (either *Regimbartia* or *Globaria*) is striking and supports the separation of these three genera from the Berosini. It also indicates that Balfour-Browne correctly assigned the American larva to *Derallus*.

Because this is apparently the first *Derallus* larva reared to confirm its identity, the larva is described below.

1 This study was made possible in part by Grant GB-1697 from the National Science Foundation.

2 Department of Entomology, United States National Museum, Smithsonian Institution, Washington, D. C.

FIGURE 1—*Derallus rudis* Sharp, teneral adult and pupal skin.

Description of Last-Instar Larva of Derallus rudis Sharp (Figs. 2-11)

Total length, 5.8 mm.; width of prothoracic segment 1.0 mm. Color creamy yellow with sclerotized portions light yellowish brown. Integument covered with minute, irregularly arranged asperities.

Head quadrangular (fig. 8); 0.65 mm. wide; 0.45 mm. from labroclypeus to occipital foramen. Frontoclypeal suture absent. Ecdysial cleavage lines present, arising near outer angle of cervical sclerites and curving gently to bases of antennae. Frons broadly U-shaped. Cervical sclerites present, subrectangular in shape. Dorsal surface of head glabrous except 2 short setae each side of midline on a line between bases of antennae. Ventral surface of head glabrous except for 2 long setae below each ocular area and 1 long seta each side of midline at midlength; gula triangular; 2 tentorial pits in gular suture (fig. 9).

Labroclypeus (fig. 6) symmetrical; with 3 minute (magnified 90x) teeth medially and 3 minute teeth on inner side of feeble anterolateral projections of epistoma; each tooth separated by a small seta.

Ocular areas with 6 ocelli arranged in 2 oblique rows; anterior row of 4 ocelli, 3 large and 1 (innermost) small; posterior row of 2 large ocelli.

Antenna moderately long, subcylindrical, slightly longer than length of stipes. First segment sinuate, longer than remaining 2 segments combined and with a small, seta-bearing appendage on inner apical angle. Penultimate segment curved inward, bearing a stout seta as long as ultimate segment on outer apical angle and 2 fine setae on inner apical angle. Ultimate segment almost a fourth as long as penultimate segment and bearing 3 setae on apex.

Mandibles symmetrical, prominent, slender, sharply pointed apically. Each mandible with 1 large and 1 medium tooth. Molar area smooth and gently rounded.

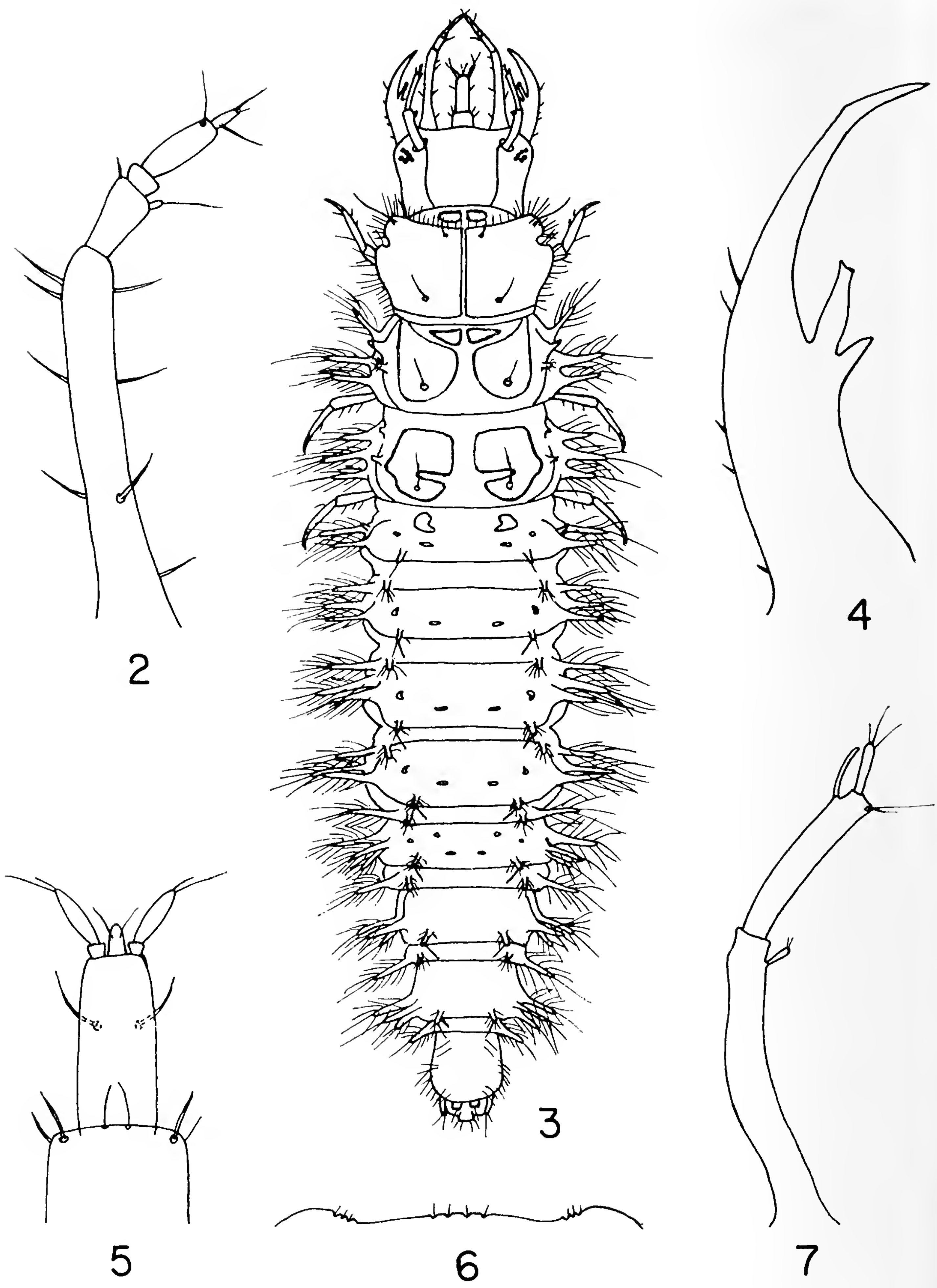
Maxilla with stipes slender, elongate and nearly parallel-sided, tapering distally and bearing row of 4 slender setae on inner and 4 slender setae on outer margin. Palpifer about as long as penultimate segment, with slender appendage about half as long as first segment of palpus on inner apical angle and a long, slender, terminal seta. Palpus tapering distally; first segment short and only a third as long as second segment; penultimate segment 3 times longer than ultimate segment, with a long slender seta on outer apical angle; ultimate segment at base with 1 long slender seta on inner side and 2 short setae on apex.

Labium extending as far forward as palpifer. Penultimate segment of palpus short. Ultimate segment 4 times as long as penultimate segment, with 2 terminal setae of unequal length. Ligula distinct, twice as long as penultimate segment of palpus, with 2 slender setae arising from midlength. Palpiger rectangular, ventrally 2 setae arising just beyond midlength. Mentum wider than palpiger, with 2 setae on each anterolateral angle and 1 seta each side of midline.

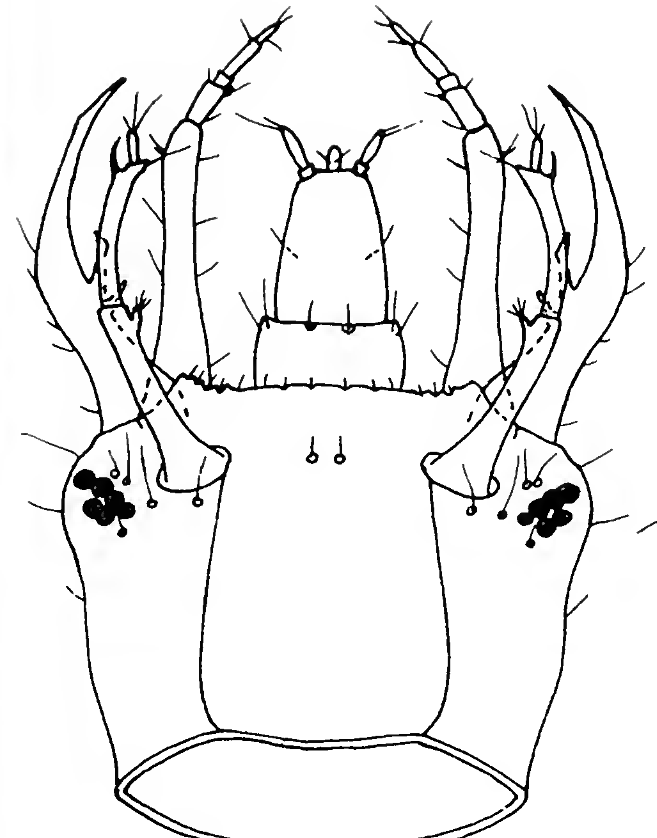
Prothorax broader than long, with sides emarginate at apical two-thirds, widest at midlength. Anterior and lateral margins fringed with slender setae. Sagittal line present. Prosternal sclerite broader than long, without sagittal line, with numerous setae scattered over surface. Mesothorax slightly wider than and about as long as prothorax; with 2 small, nearly triangular, anterior sclerites and 2 large, almost pear-shaped posterior sclerites; lateral margins each with prominent spiracular tubercle, minute setose tubercle and 3 large, setiferous gills (fig. 11). Metathorax as wide as mesothorax; with 2 large sclerites, each bearing a stout seta; and 3 large setiferous gills as illustrated (fig. 3).

Legs 4-segmented, a fourth longer than width of prosternal sclerite; coxae widely separated; transverse trochanter about half as long as coxa; femur about as long as tibiotarsus; tarsal claw single, slender seta arising at middle and extending to or slightly beyond apex of claw.

Abdomen with 8 distinct segments; ninth and tenth segments reduced. Segment 1 with pair of small oval sclerites anteriorly. Other segments without sclerites and separated by intersegmental membrane. First segment with distinct spiracular tubercle and 3 large setiferous gills laterally and 1 small setose tubercle on each side



FIGURES 2-7—*Derallus rudis* Sharp, larva. 2—Left maxillary palpus, dorsal view. 3—Habitus view. 4—Left mandible, dorsal view. 5—Labium, dorsal view. 6—Labroclypeus, dorsal view. 7—Left antenna, dorsal view.



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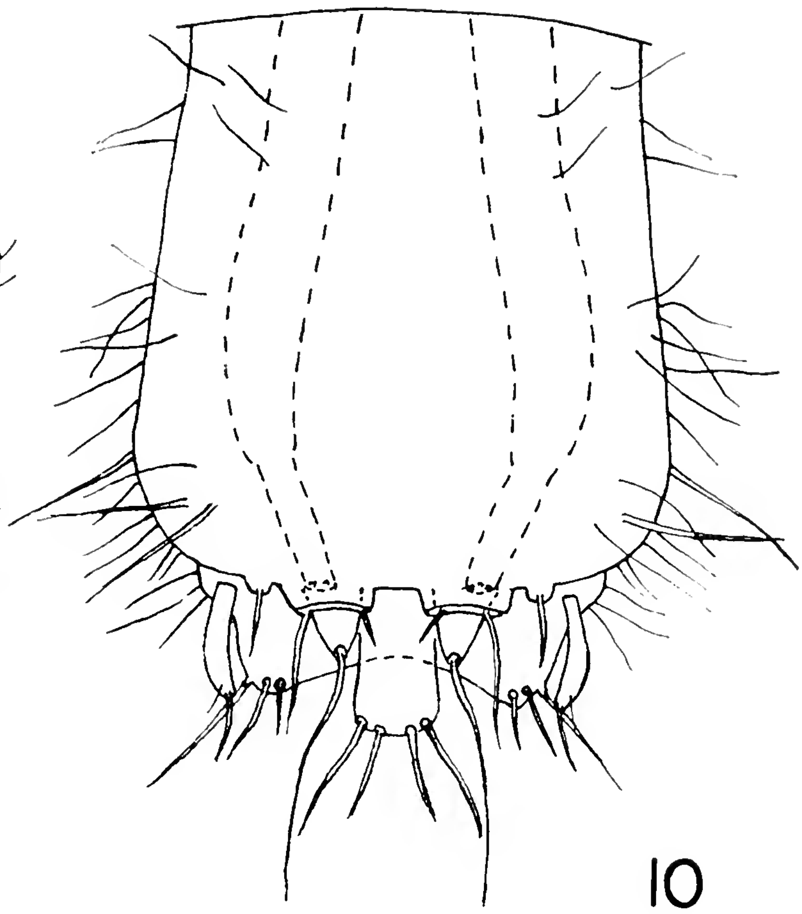

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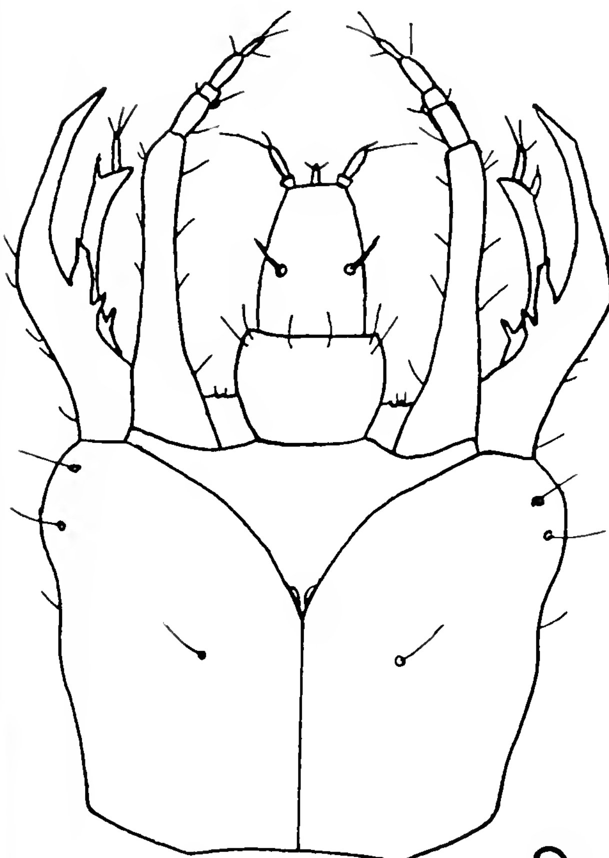

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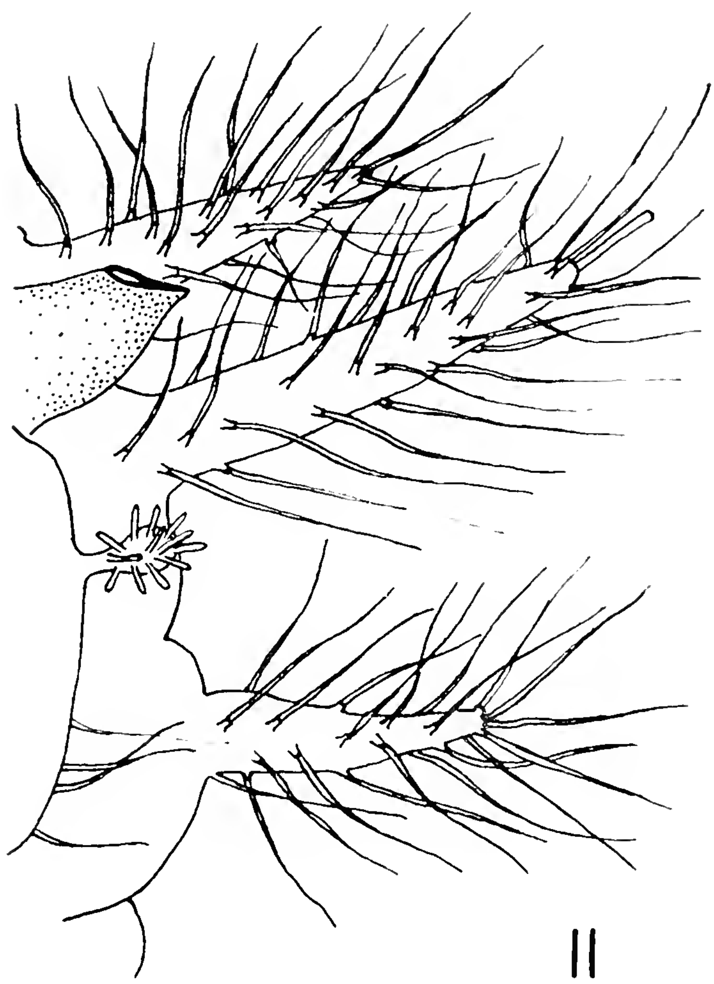

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FIGURES 8-11—*Derallus rudis* Sharp, larva. 8—Head, dorsal view. 9—Head ventral view. 10—Atrium, dorsal view. 11—Mesothoracic segment, right side, dorsal view.

of midline on hind margin. Segments 2 through 6 each with 2 folds; first fold with 1 small setose tubercle and 1 large setiferous gill laterally; second fold with 3 large setiferous gills laterally and 1 small setose tubercle on each side of midline on hind margin laterally. Eighth tergum represented by superior valve of stigmatic atrium, a large subquadrangular sclerite with 4 appendages on caudal margin as illustrated (fig. 10). Ninth tergum trilobed; middle lobe rectangular, with 4 long setae on caudal margin; lateral lobes less distinct, with 3 setae on each posterolateral angle. Spiracles present. Mesocerci prominent, conical, with 1 seta arising ventrally at apex. Paracerci present, flattened, apices incurved, unsegmented and each with 1 large and 1 minute seta on apex.

Habitat: Derallus larvae were collected with adult *Derallus* in dense emergent vegetation in a temporary pond (fig. 12) close to the beach at Alvarado, Mexico.

Other genera of water beetles associated with *Derallus* were: Hydrophilidae—*Enochrus, Hydrophilus, Paracymus, Tropisternus;* Dytiscidae—*Copelatus, Hydrovatus, Laccophilus, Megadytes, Pachydrus, Thermonectus;* Noteridae—*Hydrocanthus, Suphisellus*; Dryopidae—*Pelonomus*.

The larva of *Derallus* runs to the second rubric of couplet 5 in Leech and Chandler's (1956:339-340) larval key because the first antennal segment is distinctly longer than the following two segments combined (other characters in the rubric are not all valid for *Derallus*). The following couplet will separate *Derallus* from the other genera that run to the second rubric in couplet 5.

FIGURE 12—Habitat of *Derallus rudis* Sharp at Alvarado, Veracruz, Mexico.

Mesothorax, metathorax and abdominal segment 1 each with 3 setiferous, lateral gills; abdominal segments 2 through 6 each with four moderately long, setiferous, lateral gills; femur without fringe of long swimming hairs-------------- DERALLUS
Gills absent or, if present, with only a single lateral gill on each side of abdominal segments; femur with fringe of long swimming hairs----Leech and Chandler's couplet -- 12

Because of the urgent need to get the *Derallus* pupa to the photo lab I hesitated only long enough to count the styli on the head and pronotum. The pupa had 2 styli along the inner margin of each eye and 24 styli on the pronotum.

I am indebted to Mr. J. Balfour-Browne of the British Museum for lending a male of *Derallus rudis from* Sharp's type series. My reared male agrees very well with the cotype in sculpture and in the distinctive shape of the male genitalia.

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LITERATURE NOTICE

ITINERARIES OF THE WHEELER SURVEY NATURALISTS: HENRY WETHERBEE HENSHAW. By F. M. Brown. Jour. Lepid. Soc. 20(2): 71-82, 8 tables. 1966.—Many species of insects were collected on the U. S. Geographical Surveys West of the 100th Meridian and were then described as new by entomologists. Brown has realized the importance of determining more exact localities than given in the reports or descriptions and has researched the itineraries. He previously reported on the Wheeler Survey itineraries of Theodore L. Mead (Lepid. News 9:185-190, 1956) and Ferdinand Bischoff (Jour. New York Ent. Soc. 65:219-234, 1957).

CYTOLOGICAL SPECIES-SEPARATION IN ASIATIC EXOCHOMUS (COLEOPTERA: COCCINELLIDAE). By S. G. Smith. Canad. Jour. Genetics and Cytology 7:363-373, 22 figs. 1965.—Chromosomes of two species were studied. The chromosomes indicate that three species exist. The three species are externally very similar or identical. This study is a portent of things to come—the new systematics.

ELYTRAL INTERVAL POLYMORPHISM IN ANTHONOMUS GRANDIS BOHEMAN AND ANTHONOMUS VESTITUS BOHEMAN (COLEOPTERA: CURCULIONIDAE)[1, 2]

By HORACE R. BURKE[3]

Polymorphism of the 4th elytral interval of *Anthonomus vestitus* Boheman in Peru was observed during a recent taxonomic study of this species. Similar polymorph variants were later found among specimens of the cotton boll weevil, *Anthonomus grandis* Boheman, from North and South America. A preliminary survey of available material of these two species indicated that in a given population the modifications of the interval may either be present in varying degrees or entirely absent. Furthermore, there is a definite correlation of the frequency of the polymorphic forms with certain geographic areas. Although much has been written on various kinds of polymorphism in insects and other animals, no previous mention of elytral interval polymorphism in any curculionids appears to have been made in the literature.

The elytral intervals of *A. grandis* and *A vestitus* are typically slightly convex, usually about equal in width, and are clearly delimited by rows of punctures commonly called striae (fig. 1). In these two species the 4th interval may also either be narrowed (fig. 2) or completely interrupted (figs. 3, 4) near the base. Sometimes the striae delimiting the 4th interval coalesce (fig. 3) pinching off the interval, while in other cases these two striae are themselves interrupted (fig. 4) for a short distance. In the latter instance a slightly elevated bridge connects the 3rd and 5th intervals. The effect produced by either of the latter two modifications is a complete interruption of the 4th interval. Both elytra of an individual are usually similarly affected whenever there is any deviation from the normal form. However, many instances were noted where the 4th interval of one elytron was interrupted while the same interval on the opposite elytron was only narrowed or, less frequently, normal. Striae bordering the 4th interval may coalesce on one elytron and be completely interrupted on the opposite elytron. The frequency of occurrence of these morphs was observed to be approximately the same in both sexes.

In the following discussion on *A. grandis* only interrupted interval morphs are considered. Narrowed interval morphs do not appear to be as common in this species as in certain populations of *A. vestitus*. It should be noted here that an individual was counted as an interrupted interval morph if it had either one or both 4th intervals interrupted.

The highest incidence of elytral interval interruption in *A. grandis* occurs in Texas, the southeastern United States, and Venezuela. All samples

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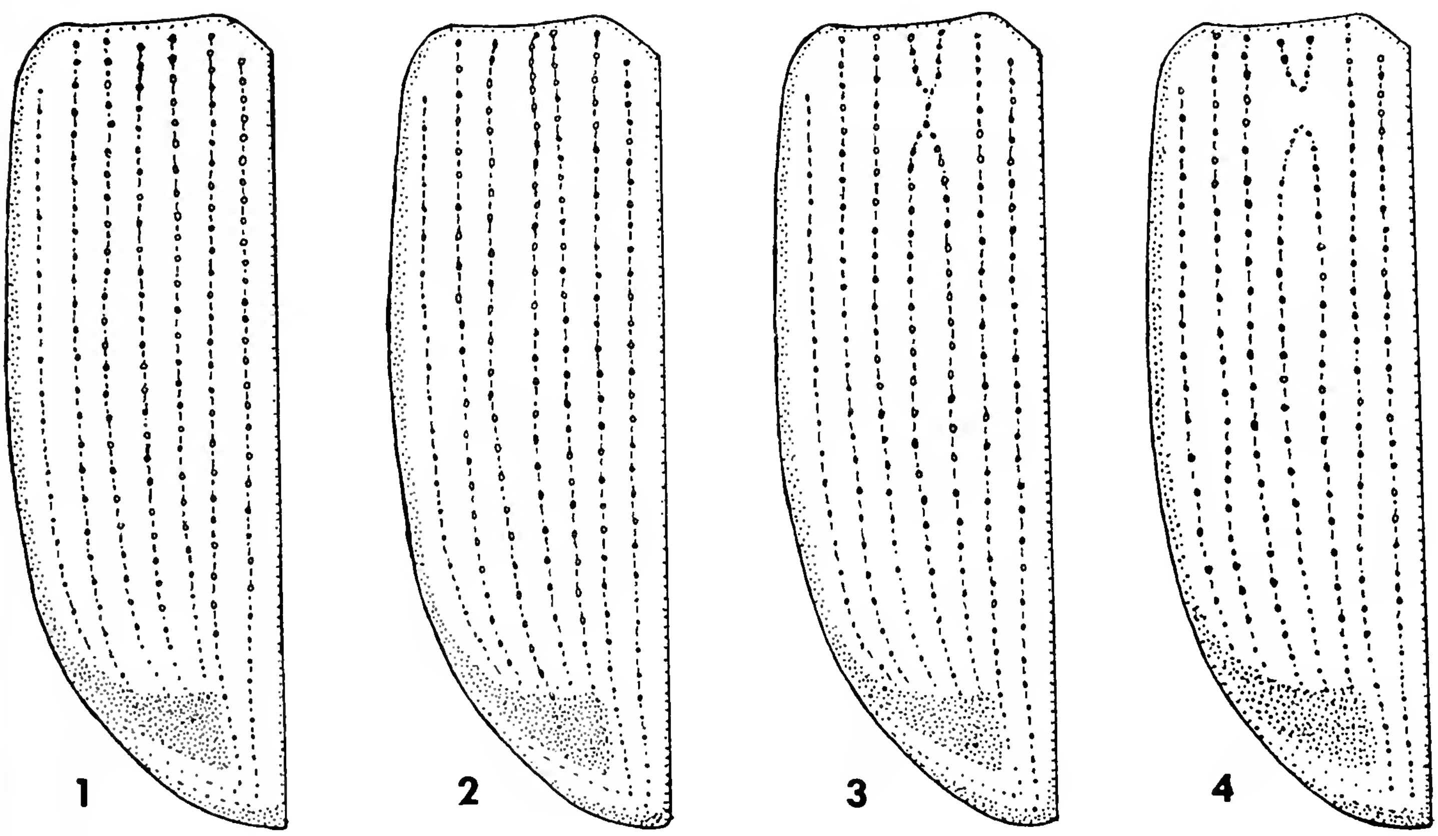
[3] Department of Entomology, Texas A&M University, College Station, Texas.

examined from these areas contained some interrupted interval morphs, although the frequency of these morphs varied considerably between the various localities. Percentages of interrupted interval morphs collected on cultivated cotton from localities within these areas are as follows (number of specimens examined in parentheses): Orangeburg Co., S. C., 20.8 (72); Issaquena Co., Miss., 12.3 (57); Fayetteville, Ark., 27.4 (73); Oklahoma, 22.6 (31); Dickens Co., Tex., 17.9 (56); Falls Co., Tex., 9.7 (103); Collingsworth Co., Tex., 12.9 (70); Runnels Co., Tex., 5.7 (70); Hardeman Co., Tex., 9.8 (61); El Paso, Tex., 40.0 (15); Brownsville, Tex., 3.2 (62); and Venezuela, 20.5 (44). A sample of 12 weevils reared from *Cienfuegosia sulphurea* in Nueces Co., Tex., contained 33.3% interrupted interval morphs. The frequency of interrupted interval morphs in a sample from Venezuela is comparable with that found in some areas in the southeastern United States. This along with certain other similarities in weevils from these two areas suggests that probably weevils now attacking cotton in Venezuela developed from one or more fairly recent introductions from the southeastern United States.

Considerably fewer interrupted interval morphs were usually found in samples from northeastern and north-central Mexico as compared with the frequency of this variant in most populations in adjacent Texas. The percentages of interrupted interval morphs collected on cultivated cotton from various localities in these areas in Mexico are as follows: Valadeces, Tamps., 11.1 (36); Tampico, Tamps., 3.6 (56); near Monterry, N. L., 4.1 (74); Rio Nazas, Dgo., 1.5 (67); and Delicias area, Chih., 0.0 (69). It is of interest that the study of other characters of the species, such as the spermatheca, scutellum, metepisternum and pronotal setae, indicates



FIGURES 1-4—*Anthonomus grandis* Boheman, left elytron of elytral interval morphs from Fayetteville, Arkansas. 1—Normal 4th elytral interval. 2—Narrowed 4th elytral interval. 3—Interrupted 4th elytral interval, with striae coalescing. 4—Interrupted 4th elytral interval, with striae interrupted.

that northeastern and north-central Mexico apparently represents a transitional zone between weevils farther south in Mexico and those of Texas.

Several samples of weevils from cultivated cotton in Arizona, Sonora, and Sinaloa were examined but only three of these contained individuals with interrupted intervals. The percentages of these morphs in the three samples are: Hyder, Ariz., 4.7 (86); Caborca, Son., 1.3 (80); and Guasave, Sin., 1.5 (69). No interrupted interval morphs occurred in two samples totaling 185 weevils collected on *Gossypium thurberi* in Arizona. Available material from cultivated cotton in El Salvador, Honduras and Nicaragua also did not include any of these morphs.

Interrupted interval morphs of *Anthonomus vestitus* Boheman constitute only a small proportion of weevils examined from cultivated cotton in the Peruvian departments of Lima and La Libertad, and appear not to occur at all in the more northern departments of Piura, Amazonas and Lambayeque. The percentages of these morphs in material examined were recorded as follows: Cañete, Lima, 6.0 (100); Pativilca, Lima, 2.2 (45); and La Libertad, 2.6 (38). Narrowed interval morphs were observed by H. R. Burke and W. H. Cross (unpublished data) to occur in all of the Peruvian departments from which sufficient samples were available, but the frequency of these variants was much higher in the more southern departments of Lima and Ica. The percentages of narrowed interval morphs in samples from departments arranged from north to south in Peru are: Piura, 1.8 (56); Amazonas, 28.0 (25); Lambayeque, 5.2 (19); La Libertad, 8.6 (35); Lima, 65.3 (95); and Ica, 57.1 (14).

Small numbers of a few other species of *Anthonomus* were examined but *Anthonomus fulvus* LeConte was the only one of these found to possess elytral interval polymorphism. Two out of 25 specimens of the latter species exhibited the same type of polymorphism as *A. grandis* and *A. vestitus*.

The foregoing account of elytral interval polymorphism in *A. grandis* and *A. vestitus* is preliminary. The objectives here were to show that such polymorphism exists and to point out the correlation between incidence of these polymorph variants and geographic areas. Elytral interval polymorphism is presently being used by the author as an additional factor in evaluating geographic variation in the two species and may be of some value in future studies on their genetics. Information derived from field and laboratory studies is now needed as a basis for attempting to determine the nature and significance of this phenomenon.

LITERATURE NOTICE

EGG BURSTERS AND HATCHING IN THE CERAMBYCIDAE (COLEOPTERA). By L. M. Gardiner. Canad. Jour. Zool. 44: 199-212, 57 figs. 1966.—Form and occurrence of so-called egg bursters on first instar larvae of 40 species are discussed. Studies of these structures in relation to hatching show that they perform an important ambulatory, as well as egg bursting, function. It is proposed that they should be more appropriately termed "hatching spines."

TRACHYPACHUS AND THE ORIGIN OF THE HYDRADEPHAGA (COLEOPTERA)[1]

By Ross T. Bell[2, 3]

The specialized aquatic families of the Suborder Adephaga have often been united to form a Superfamily Hydradephaga, while the terrestrial families are included in a contrasting Superfamily Geadephaga. Basic to an understanding of the phylogeny of the Adephaga is a decision as to whether this separation is a natural one. In other words, have the Hydradephaga arisen from a primitive adephagan different from that which gave rise to the Geadephaga, or are the Hydradephaga simply Geadephaga modified for an aquatic existence?

Available evidence overwhelmingly supports the latter view. Crowson (1955) held that the basic features of the adephagan metasternum, hind coxae, and abdomen were originally adaptations for life beneath bark; while Bell and Bell (1962) suggested that they were, instead, adaptations for cursorial locomotion. In either case, there is nothing in the structure of Hydradephaga to preclude descent from early geadephagans. Moreover, the characters supposedly distinguishing the two groups are not entirely constant. All Hydradephaga lack pubescence on the outer antennal segments, but it is also lacking in the terrestrial Trachypachini (*Trachypachus* Motschulsky and *Systolosoma* Solier). Hydradephaga are often said to lack a transverse sulcus on the metasternum. In Hygrobiidae, however, there is a remnant of the sulcus, while in Haliplidae it is represented by a row of coarse punctures. On the other hand, the aberrant, bark-inhabiting Rhysodini (usually accorded family rank, but regarded as modified Carabidae by Bell and Bell, 1962) lack a transverse sulcus. The sulcus is the external opening to an internal ridge, evidently serving for muscle attachments; and its tendency to disappear in Hydradephaga and Rhysodini is probably a reflection of changes in methods of locomotion.

All Hydradephaga have hind coxal cavities of the interrupted type, in which the hind coxa extends laterally to the margin of the body, eliminating contact between the metathoracic pleurites and the first abdominal sternite. Coxal cavities of this type occur also in Trachypachini and in *Gehringia* among terrestrial Adephaga. In the latter genus, this feature seems to be connected with the lateral displacement of the hind legs, while in Trachypachini and the Hydradephaga it is necessitated by the great enlargement of the coxae themselves.

Hydradephaga universally lack an antenna-cleaning organ on the anterior tibia. A secondary loss of this structure would be expected, how-

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[2] Department of Zoology, University of Vermont, Burlington, Vermont 05401.

[3] I am indebted to Philip J. Darlington, Jr., George E. Ball, and J. Gordon Edwards for the specimens used in this study, and to my wife, Joyce R. Bell, for the dissections and drawings.

ever, in the aquatic environment, where antennae are unlikely to become soiled. It has also been lost in the terrestrial Paussini, which have highly modified antennae unsuited to an antenna cleaner. Specialized tactile setae are apparently universal among Geadephaga, while they are sometimes said to be absent in Hydradephaga. Loss of tactile setae is a change that one would expect in a geadephagous beetle adapted for life in water, since such setae would increase friction during swimming. In *Haliplus triopsis* Say, however, there is a pair of well-developed tactile setae on the mentum, much like those of most Carabidae. Remnants of the system of tactile setae should be searched for in the other families of Hydradephaga.

If it is concluded that Hydradephaga have arisen from the Geadephaga, the next question is whether they represent a single invasion of the aquatic habitat, or multiple invasions. In other words, are the Hydradephaga a monophyletic group? Strong contrasts in the adaptations for aquatic life in both larvae and adults suggest that three separate invasions occurred. (Crowson, 1955, and Leech and Chandler, 1956, discuss these adaptations.) Dytiscidae, Hygrobiidae, Amphizoidae, and Noteridae (often included in Dytiscidae) seem to form a monophyletic group. In these families the larva has lost the apical portion of the abdomen, the ninth segment being vestigial or absent. In most species, the larva breathes air at the surface through the enlarged spiracles of the eighth abdominal segment. (In Noteridae, the abdomen is secondarily adapted for piercing air spaces in the stems of aquatic plants; in Hygrobiidae and in the dytiscid *Coptotomus* Say, there are tracheal gills on the abdomen; in Hydroporinae neither gills nor functional spiracles are present, and respiration is apparently cutaneous. All of these exceptional groups have an abbreviated abdomen, suggesting derivation from a species which breathed at the surface.)

In Gyrinidae, in striking contrast, the larval abdomen is much like that of Carabidae, the tenth segment forming a well-developed pygopod armed with hooks. The urogomphi are well developed. Each abdominal segment (except the tenth and, sometimes, the ninth) has a pair of lateral tracheal gills. The spiracles of the eighth segment are not enlarged, and the spiracles are not used at all except, perhaps, when the larva emerges on land to pupate. The larvae have a strong similiarity to those of Corydalidae (Order Megaloptera). For this reason, Bradley (1930) suggested that the Gyrinidae should be regarded as the most primitive living beetles. It seems more likely, in view of the highly specialized nature of adult Gyrinidae, that the larvae show a strong degree of evolutionary convergence with those of Corydalidae. Gyrinid larvae, in any case, show no convincing evidence of relationship to the preceding families (which will be referred to for brevity as the "dytiscoid" families).

In the Haliplidae, the spiracles are not used in larval respiration, oxygen being obtained directly through the skin, in some cases supplemented by scattered, rodlike outgrowths of the body wall. Although the tip of the abdomen is somewhat reduced (the urogomphi are absent, and the tenth segment, if present, is only a vestige, not forming a pygopod), it is less so than in the dytiscoid families. The spiracles of the eighth segment are not enlarged. The spiracles, according to Crowson, are not used except possibly in the last instar of some species. The haliplid larva, like the gyrinid one, appears far more likely to have evolved directly from a terrestrial form than from a larva of the dytiscoid type.

The aquatic adaptations of the adult Hydradephaga support the thesis of three separate invasions. The Haliplidae are unique in having large platelike extensions of the hind coxae, which more or less conceal the abdominal sternites, and which form an air storage chamber. On the other hand, the legs of Haliplidae are scarcely modified for swimming, except for the presence of a row of swimming hairs on the tibia.

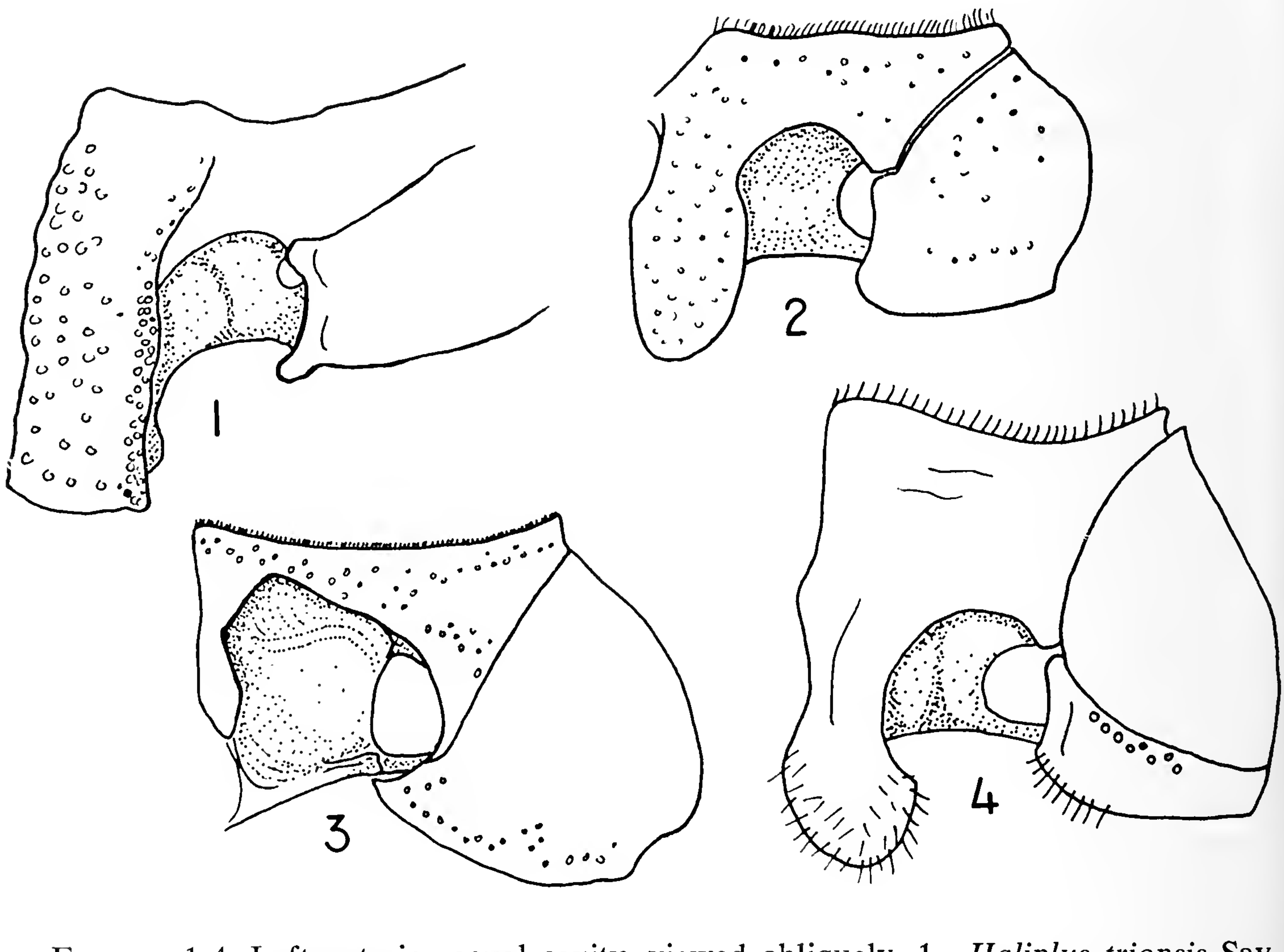
In the dytiscoid families, with the exception of Amphizoidae, the front and middle legs play no part in swimming, being adapted for clinging to objects, grasping prey, and climbing emergent vegetation preparatory to flight. The hind legs are highly adapted as paddles, being elongate, more-or-less compressed, and fringed with stiff swimming hairs. In Amphizoidae, the legs are closer to a typical geadephagous type. The hind tarsi are scarcely compressed, and their claws are large and divergent. All three pairs of legs are used in walking on the bottom of cold, swift mountain streams. According to Edwards (1951), the hind legs show vestiges of swimming hairs, suggesting derivation from a swimming dytiscoid ancestor. Since amphizoids live in a habitat where swimming is hazardous, a secondary loss of swimming adaptations would not be surprising.

The Gyrinidae are unique in that both middle and hind legs are adapted for swimming, while the front legs are highly specialized grasping organs. Moreover, the legs are adapted as paddles in a manner completely different from that of the dytiscoids. Each tibia has a broad, thin expansion on its outer margin. The distal margin of the expansion contains a deep slot into which the upper margin of the tarsus is fitted. The tarsus, which is extremely short and compressed, can be disengaged from the slot, a feature which might facilitate its use in terrestrial locomotion.

The anatomy of both adults and larvae, then, favors the theory of three separate invasions of the aquatic habitat. To what group of terrestrial Adephaga is each of these phyletic lines most closely related? Among the Carabidae, the Trachypachini show the most points in common with the Hydradephaga. It is worth considering, therefore, whether this tribe is really related to any or all of the Hydradephaga. There have been two sharply contrasting theories about the relationships of Trachypachini in recent years. Jeannel (1941) placed Trachypachini with Metriini, Ozaenini, Paussini, and Gehringiini in a major subdivision of the Carabidae, the Series Isochaeta. (Jeannel ranked the above tribes as families, and elevated the Carabidae to the rank of superfamily. Since most other workers have not accepted the change in ranks, it will minimize confusion if his rank changes are not adopted in this discussion.) Crowson (1955), on the other hand, has given the Trachypachini family status and has regarded it as intermediate between the Geadephaga and Hydradephaga.

Jeannel's theory is supported by the structure of the antenna cleaner of *Trachypachus*. It is of the typical isochaetous type, in the form of an emargination of the inner face of the anterior tibia, with both tibial spurs distal to it. (In the vast majority of Carabidae the antenna cleaner lies between the tibial spurs, and the posterior spur is more or less displaced proximally.) It agrees closely with the antenna cleaner of Metriini and Ozaenini. (Paussini, despite the absence of a well-developed antenna cleaner, are placed in the Isochaeta because there is other evidence for a relationship with Ozaenini—see Darlington (1950); Gehringiini do not have a typical isochaetous antenna cleaner and are probably not Isochaeta at all—see Bell (1964).) A further point of similarity between Trachypachini and the other Isochaeta is the presence of about twelve, rather than six, tactile setae on the labrum (Bell, 1964). To my knowledge, a doubling of the labral setae has not occurred in any other group of Adephaga in which the mouthparts are unspecialized. It does occur among Cicindelini, or at least some of them. In the latter group, however, the mouthparts, including the labrum, are strikingly different from those of other Adephaga. At any rate, the doubling of the labral setae is not obviously functionally related to the structure of the antenna cleaner, and the two characters together make a strong case for placing *Trachypachus* among the Isochaeta.

Two functionally unrelated characters, the absence of antennal pubescence and the presence of hind coxal cavities of the interrupted type, make a case for relating *Trachypachus* to the Hydradephaga. The first



FIGURES 1-4. Left anterior coxal cavity, viewed obliquely. 1—*Haliplus triopsis* Say (Haliplidae). 2—*Amphizoa insolens* Lec. (Amphizoidae). 3—*Dineutes discolor* Aubé (Gyrinidae). 4—*Trachypachus gibbsi* Lec. (Carabidae).

character is restricted to the groups mentioned; the second is shared only with the Gehringiini. I have discovered a third character to be added to the list: in *Trachypachus,* as in all Hydradephaga so far dissected (*Haliplus, Amphizoa, Agabus, Laccophilus,* and *Dineutes*), there is a similar type of anterior coxal cavity (figs. 1-4). All have a *postcoxal bridge,* a thin bridge of sclerotized exoskeleton immediately posterior to the opening between the prothorax and coxa. This structure should not be confused with a *postcoxal bar,* which is found in those Adephaga with closed coxal cavities. A bridge is part of the primary body wall and therefore consists of a single thickness of exoskeleton. It is entirely hidden unless the coxa is removed from the cavity. A bar consists of two tubular outgrowths of the body wall united at their tips, one from the proepimeron and the other from the prosternum. It is heavily sclerotized and is visible externally. (I shall publish an extensive paper on the coxal cavities of Adephaga in the near future; a preliminary report (Bell, 1965) on this work has already been published.) Many Carabidae have both a bridge and a bar (Carabidae Biperforatae as defined by Sloane, 1923); but *Trachypachus* is the only carabid in which the bridge occurs without the bar, i.e., with open coxal cavaties. Thus there are three apparently unrelated characters shared by *Trachypachus* and the Hydradephaga, indicating the likelihood of a common ancestry.

Lindroth (1960) discovered the larva of *Trachypachus gibbsi* Lec. It is a typical terrestrial adephagous larva, living in dry sand and without any aquatic adaptations. The only feature it seems to share with the larvae of Hydradephaga is the absence of a ligula on the labium. A ligula is also absent in various terrestrial larvae, including *Brachinus, Lebia, Gehringia,* and Rhysodini. Lindroth considered that the terrestrial nature of the larva precluded any relationship with the Hydradephaga, and that the absence of the ligula, together with the incomplete hind coxal cavities of the adult, was evidence of relationship to *Gehringia.* For reasons stated above, I doubt the relationship of *Gehringia* to the Isochaeta, and that the absence of a ligula is significant evidence for it, since the ligula has been lost in many groups of Adephaga. The terrestrial character of the larva does not preclude relationship to the Hydradephaga, but it does suggest that *Trachypachus* is not descended from fully aquatic ancestors. This is consistent with the evidence previously presented, that the Hydradephaga made three separate invasions of the water.

The most reasonable explanation of the origin and relationships of the Hydradephaga is as follows:

1. The Hydradephaga do not constitute an independent phyletic line of Adephaga, but are Isochaeta modified for an aquatic existence. As in the case of the Paussini, this is not indicated by the possession of obvious isochaetous characters, but rather by clear indications of relationship to an undoubted member of the Isochaeta.

2. The Hydradephaga represent three phyletic lines: the Haliplidae, Gyrinidae, and the complex of dytiscoid families. Each of these lines became adapted for aquatic life independently. Each of these lines is as closely related to Trachypachini as it is to the other lines. Hydradephaga is therefore not a natural group unless it is defined so as to in-

clude Trachypachini. In this case, the name is inappropriate and misleading. I suggest the substitution of "Glabricornia," based on the lack of antennal pubescence, the most obvious common character of the group.

3. The common ancestor of the Glabricornia was a terrestrial, isochaetous adephagan, with open, bridged anterior coxal cavities and incomplete posterior ones, and with glabrous antennal segments. In all important characters it resembled the modern *Trachypachus*. The larva was a typical terrestrial adephagous larva (except, perhaps, in having lost the ligula). Although both adult and larva were certainly not aquatic, they may have been more hygrophilous than the living species of *Trachypachus*.

4. *Trachypachus* is an extraordinary phylogenetic relict, having survived almost unchanged from the time of origin of the Glabricornia. The Chilean *Systolosoma* should be investigated to see if it is really closely related to *Trachypachus*, or if it represents an independent line of persistently terrestrial Glabricornia.

It would require a wholesale rearrangement of the formal classification of the Adephaga to make it express accurately the interrelationships of the Isochaeta and the Glabricornia. Eventually it will be desirable to do so. At present, the interrelationships of terrestrial Adephaga are poorly understood and frequently debated. I decline, therefore, to propose any changes in family boundaries at the present time.

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LARVAE OF TWO SPECIES OF GENUS HETERONYCHUS FROM NIGERIA (DYNASTINAE: SCARABAEIDAE: COLEOPTERA)

By M. L. JERATH[1, 2]

Several species of the genus *Heteronychus* are of great importance to the agriculturist in many parts of Africa and Australia. Extensive damage to sugar cane, maize, rice, wheat and many other crops caused by adults, and sometimes by larvae, has been reported by several writers (Le Pelley and Goddard, 1952; Valle y March, 1954; Jepson, 1956 and Britten, 1959). The adults usually spend a greater part of their life underground and damage the tap roots, stem bases, tubers (potatoes) and the cuttings, young shoots and ratoon canes of sugar cane.

In Nigeria, *H. licas* (Klug) damage yams (*Dioscoria* spp.) and sugar cane. The damage to sugar cane is very severe at Bacita, Northern Nigeria, and is caused by both adults and larvae.

African Dynastid larvae are rather poorly known as the only Dynastid larvae described to date are *Oryctes boas* (F.), *Temnorhynchus coronatus* (F.), (Oberholzer, 1959 and 1963) and *Heteroligus meles* (Billb.) (Jerath and Unny, 1963).

In this paper, the biology of *Heteronychus* spp. is briefly outlined, the larvae of *H. licas* and *H. fossor* Reiche described, a key presented for the separation of the larvae of two species of *Heteronychus* characterized and compared with other Dynastid larvae.

BIOLOGY

In Nigeria, *Heteronychus licas* and *H. oryzae* cause damage to sugar cane at Bacita, Northern Nigeria, where a 10,000 acre sugar cane plantation is being established. The beetles chew the sugar cane stem and cause dead hearts. The attack is severe in newly planted cane fields. Larvae usually feed on the grass and sugar cane roots.

In Nigeria, *Heteronychus* spp. have one generation with two nocturnal flight periods a year. The first flight or post-teneral flight occurs during the period April to early June when the beetles distribute themselves in the field and are commonly seen feeding at ground level on the young tillers.

During June to August beetles usually burrow to a depth of 12 to 18 inches and rest. They again come up in September and feed on the new

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[1] Federal Department of Agricultural Research, Moor Plantation, Ibadan, Nigeria.

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tillers. By this time many beetles are seen mating. The second flight or pre-reproductive flight occurs during the period October to December. Oviposition begins by mid-September and eggs are laid in the wet soil around the sugar cane stool. The eggs hatch in 9 to 12 days and the larval stages are commonly found from late September until late February or early March when newly emerged adults make their appearance.

Larval Taxonomy

Larvae of the genus *Heteronychus* may be characterized as follows: Surface of cranium reticulate. Ocelli present. Lateral margin of labrum (and epipharynx) angulate posteriorly especially on the left side. Antenna four-segmented, first and third segments subequal and each smaller than second segment; the fourth segment fusiform and bearing a single sensory spot dorsally and two sensory spots ventrally. Left mandible with S_{1+2}, S_3 and S_4 and right mandible with S_{1+2} and S_{3+4}. Stipes of maxilla with a longitudinal row of 7 to 9 blunt, truncate, stridulatory teeth and a distal blunt tubercle. Abdominal spiracles on segments one to seven inclusive equal in size and that of segment eight much smaller. Abdominal segments 1 to 6, each with three dorsal annulets and dorsa of segments 7 to 10 undivided; dorsa of segments 1 to 6 with numerous rows of setae; those of segment 7 to 9 are with two rows of setae, one row placed anteriorly and the other posteriorly. Raster with a teges consisting of a broad patch of prominent hamate setae; lower anal lip with similar hamate setae; palidia absent. Two setae on each claw.

The larvae of genus *Heteronychus* agree with the American Dynastid larvae in the essential characters given by Richter (1944). However, the larvae of *Heteronychus* differs from *Oryctes boas* and *Heteroligus meles* in having one dorsal sensory spot on the last antennal segment, and also differs from *Temnorhynchus coronatus,* in that the last abdominal spiracle is much smaller than the other spiracles.

Key to the Larvae of the Two Species of Heteronychus

Right and left chaetoparia of epipharynx with many rows of setae; lateral face of each mandible with 7 to 8 setae, scrobis with one to two setae (fig. 4)--------LICAS
Left chaetoparia with one row of setae (fig. 8); lateral face of each mandible with four setae; scrobis with one to two setae (fig. 5)---------------------FOSSOR

Heteronychus licas (Klug). Third-stage larva.

(Figs. 1-5, 7, 9, 12 and 13)

Material studied: (a) Two third-stage larvae collected from sugar cane fields at Bacita during December 1964. The reared adults were identified by the Commonwealth Institute of Entomology, London.

(b) Three-stage larvae reared from the eggs laid in the laboratory by beetles collected from sugar cane fields at Bacita, Northern Nigeria, during 1964.

Description: Maximum width of head capsule of third-stage larvae ranging from 4.87 to 5.31 mm. Cranium reddish brown with many pits. Frons, on each side, with three anterior frontal setae, one long and three short posterior frontal setae, one short and two long setae in each anterior angle and one long and two short exterior frontal setae. Epicranium with two long and two short dorso-epicranial setae.

Haptomeral process on epiphyarnx entire or notched. Left and right chaetoparia with many rows of stout setae. Lateral face of mandible with 7 to 8 setae; scrobis with 1 to 2 setae.

Thoracic spiracle .06 to .62 mm. long and .40 to .42 mm. wide. Abdominal spiracles of 1st segment .60 to .63 mm. long and .40 to .42 mm. wide and of last segment .35 to .37 mm. long and .27 to .30 mm. wide.

Dorsum of abdominal segment 7 with an anterior row of four long and six to eight short, rather stout setae, posteriorly with a row of sparse, long, slender setae. Raster with a teges of 38 to 40 hamate setae, scattered on the posterior two thirds of the tenth venter.

Heteronychus fossor Reiche. Third-stage larva.

(Figs. 6, 8, 10 and 11)

Material studied: One third-stage larva and a cast skin of one third-stage larva reared to the adult stage, No. ON 210 (a) dated March, 1965, collected at Onitsha by M. L. Jerath. The reared adult was identified by Commonwealth Institute of Entomology.

Description: Maximum width of head capsule of third-stage larva 3.87 mm. Cranium light yellowish brown, and with few pits. Frons, on each side, with two long anterior frontal setae, one long exterior frontal seta, one short and two long setae in each anterior angle and one long and three short posterior frontal setae. Epicranium with two long and two short dorso-epicranial setae.

Haptomeral process on epipharynx entire, not notched. Right chaetoparia with many rows of setae; left chaetoparia with only one row of stout setae near the tormae. Lateral face of mandible with four setae; scrobis with one to two setae.

Thoracic spiracles .45 to .47 mm. long and 0.30 to .35 mm. wide. Spiracles of first abdominal segments .35 to .37 mm. long and .27 to .30 mm. wide and that of last abdominal segment .20 to .23 mm. long and .16 to .18 mm. wide.

Dorsum of abdominal segment 7 with an anterior row of four long, slender setae and 14 to 18 short, rather stout setae, posteriorly with a row of sparse, long, slender setae. Raster with a teges of about 30 short, slightly curved setae, scattered on the posterior one-third of the tenth venter.

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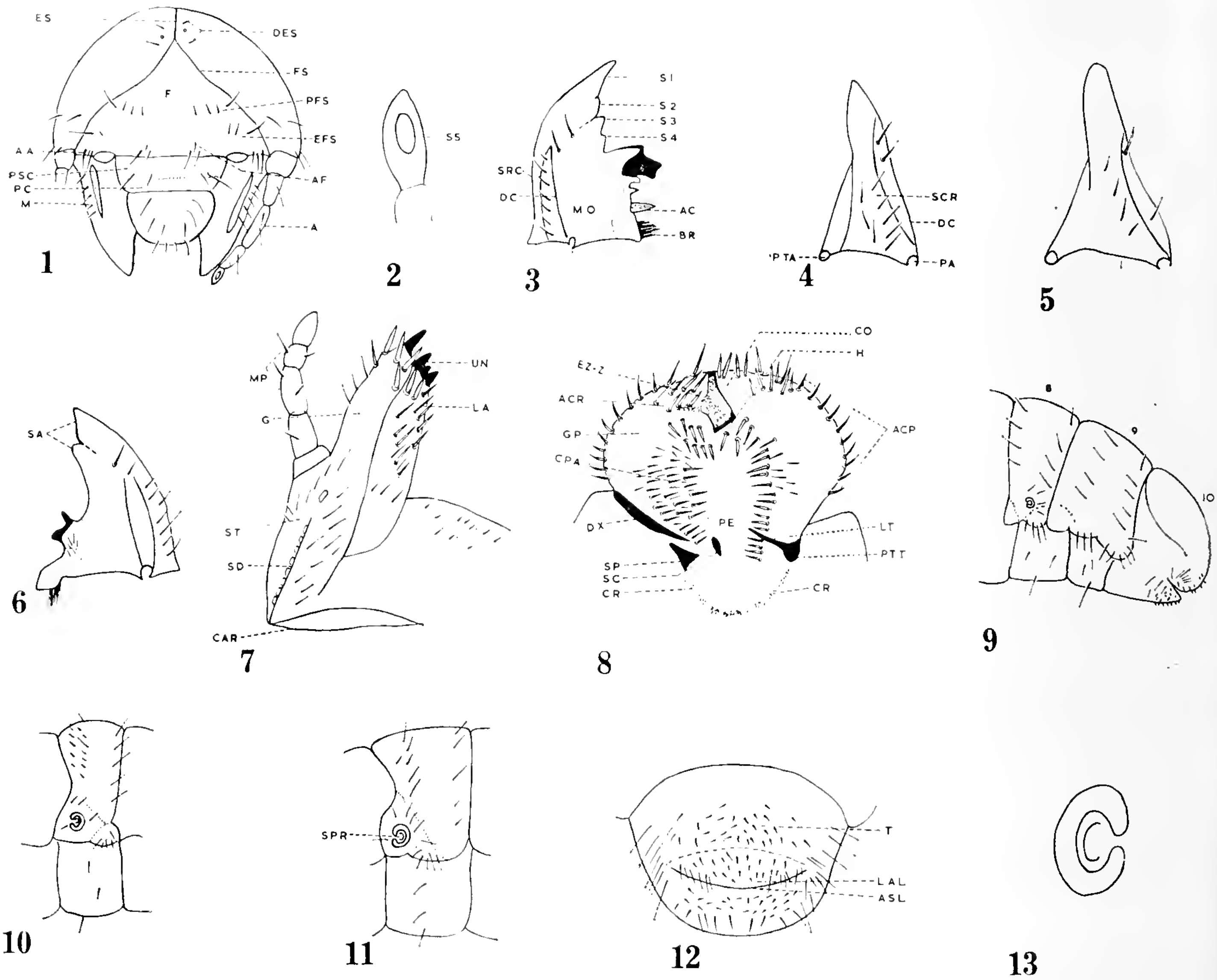

FIGURES 1-13. Larvae of *Heteronychus* sp.

H. licas. 1—Head capsule. 2—Last antennal segment. 3—Left mandible dorsal view. 4—Left mandible lateral view. 5—Right mandible dorsal view. 7—Maxilla ventral view. 9—7th abdominal segment. 12—Raster. 13—Abdominal spiracle.

H. fossor. 6—Left mandible lateral view. 8—Epipharynx. 10—7th Abdominal segment. 11—Last three abdominal segments, side view.

Symbols Used. A = Antenna; AA = Anterior frontal angle; AC = Acia; ACP = Acanthoparia; ACR = Acroparia; AFS = Anterior frontal seta; ASL = Anal slit; BR = Brustia; C = Campus; CAR = Cardo; CO = Corypha; CPA = Chaetoparia, CR = Crepis; DES = Dorsodepicranial setae; DIP = Dorsal impressed line; DMS = Dorsomolar; DX = Dexiotorma; E = Epicranium, EFS = Exterior frontal setae; ES= Epicranial suture; EZ = Epizygum; F = Frons; FS = Frontal suture; G = Galae; GP = Gymnoparia; HL = Haptolachus; LA = Lacinia; LAL = Lower anal lip; LT = Laeotorma; MA = Mala; MO = Molar area; PC = Preclypeus; PE = Pedium; PFS = Posterior frontal setae; PRSC = Prescutum; PSC = Postclypeus; PTT = Pternotorma; S_{1-4} = Scissorial teeth; SA = Scissorial area; SC = Sense cone; SCL = Scutellum; SCU = Scutum; SD = Stridulatory teeth; SN = Scissorial notch; SPA = Spiracular area; SPA = Spiracle; SS = Sensory sensilla; ST = Stipes; STA = Stridulating area; T = Teges; UN = Uncus; VP = Ventral process; Z = Zygum.

TAXONOMIC NOTES ON FOUR SPECIES OF LEXIPHANES (COLEOPTERA: CHRYSOMELIDAE) FROM MIDDLE AMERICA[1]

By Edward U. Balsbaugh, Jr.[2]

For his revision of the *Lexiphanes* north of Mexico, Balsbaugh (1966) borrowed "types" from several European museums for purposes of identification. Some of the specimens which he received were the Middle American species *L. guatemalensis* (Jacoby), *L. sculptilis* (Jacoby), *L. scaphidioides* (Suffrian), and *L. anaglypticus* (Suffrian). This paper redescribes these species and designates lectotypes for the two Jacoby species. These descriptions of the Jacoby species are based only upon their respective lectotypes. No lectotypes are fixed for either of the two Suffrian species for the reasons given in the discussion under these species.

Acknowledgments: For the loan of this material the author is indebted to J. Balfour-Browne, British Museum (Natural History); Fritz Hieke, Humboldt Universität, Berlin; and J. O. Hüsing, Martin Luther Universität, Halle-Wittenberg, Deutsche Demokratische Republik. Appreciation is also expressed to Francisco Pacheco M., Centro de Investigaciones Agricultural del Norte, Cuidad Obregon, Sonora, México, for the loan and exchange of Mexican specimens. Research for this paper was conducted while the author was in the employ of the Pennsylvania Department of Agriculture, Harrisburg, Pennsylvania.

Lexiphanes guatemalensis (Jacoby)

Monachus guatemalensis Jacoby, 1880:38.

Lexiphanes guatemalensis (Jacoby). Blackwelder, 1946: 643 (checklist).

Lectotype, here designated: Female, "Zapote, Guatemale"; British Museum (Nat. Hist.).

Description. Head black with blue reflections; frons flat, finely alutaceous with a few punctures. Eyes emarginate around antennal bases. Labrum fulvous. Antennae with basal 2 segments fulvous, segments 3 and 4 black and with a few short setae (segments 5 through 11 of right antenna and 3 through 11 of left antenna missing). Pronotum bluish-black with distinct fine punctures evenly distributed over entire surface; disc evenly convex. Prosternum bluish-black, alutaceous, length two-thirds of width.

Elytra bluish-black with orange-red fascia; fascia emarginate posteriorly around humeri, covering epipleura, and converging medially but not completely to suture. Curvature evenly convex except raised dorsally along elevated scutellum. Discal striae indistinct; strial punctures distinct but becoming effaced posteriorly. Surface finely alutaceous. Marginal striae, along with epipleura, strongly curved ventrally.

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[1] Approved by the Director of the South Dakota Agricultural Experiment Station as Journal Series No. 716.

[2] Entomology-Zoology Department, South Dakota State University, Brookings, South Dakota, 57006.

Scutellum nearly equilaterally triangular, base slightly shorter than sides; posterior apex elevated above level of base; surface smooth. Pygidium bluish-black, alutaceous. Abdominal intercoxal process setose. Fifth abdominal segment of female with glabrous fovea medially. A smaller setose fovea on each side of more shining central one. Legs bluish-black with following parts missing from lectotype: left protibia and tarsus, right protarsus, mesotarsal segments 2 through 5 of both legs, and right hind leg including coxa.

Measurements. The following measurements were taken from the lectotype (a female): body length, 3.75 mm.; body width, 2.50 mm.;body thickness, 2.10 mm.; pronotal length, 1.25 mm.; pronotal width, 2.25 mm.; elytral length, 2.50 mm.; epipleural length, 1.25 mm.

Discussion: The author examined 3 specimens of this species (1 female and 2 males), all from the Jacoby collection, British Museum (Natural History). Jacoby (1880) based his original description primarily on the female and only casually mentioned the males. Perhaps as an oversight, he failed to include the female when listing the type localities. Nevertheless, I am designating this female as lectotype because it carries the tag "Type Sp. figured"; it compares closely with the specimen figured by Jacoby; and it was the first specimen in the series of syntypes. Further, it is the only female in the group. I therefore consider that the lectotype is the specimen figured by Jacoby (1880, pl. III., fig. 1) and the chief subject for the original description.

Variation was observed between the three syntypes. One (Cordova, México) has much wider elytral fasciae. The ground color of this specimen is more light purple rather than the deep bluish-black of the other beetles.

Lexiphanes sculptilis (Jacoby)

Monachus sculptilis Jacoby, 1880:41.

Lexiphanes sculptilis (Jacoby). Blackwelder, 1946: 644 (checklist).

Lectotype, here designated: Male, "Guanajuato, Mexico, Salle Coll."; British Museum (Nat. Hist.).

Description. Head black; frons flat, alutaceous and with a few punctures. Eyes emarginate at antennal bases. Labrum black with fulvous distal margin. Antennae with basal two segments slightly fulvous; segments 3 and 4 becoming darker; segments 5 through 11 black, setose, and broader than basal 4. Pronotum black, alutaceous, with large basal median punctures diminishing laterally in number and size, and with some very fine punctures on disc in front of basal median punctures; disc evenly convex. Prosternum brownish-black, alutaceous; lateral margins rugulose; subquadrate.

Elytra bluish-black, evenly convex except raised dorsally along elevated scutellum. Deeply striate-punctate, marginal and submarginal striae especially well impressed; punctures large, becoming finer posteriorly; surface alutaceous. Scutellum narrowly triangular, pointed; apex elevated somewhat above level of base; surface very finely alutaceous. Pygidium black, roughly alutaceous, with broad close punctures. Venter black, alutaceous. Abdominal intercoxal process with long, close setae. Fifth abdominal segment of male non-foveate and with a few setae. Legs black, alutaceous. Tarsal claws appendiculate.

Measurements. The following measurements were taken from the lectotype (a male): body length, 2.62 mm.; body width, 1.70 mm.; body thickness, 1.50 mm.; pronotal length, 1.00 mm.; pronotal width, 1.50 mm.; elytral length, 1.62 mm.; epipleural length, 1.00 mm.

Discussion: The lectotype can further be recognized by the following labels. On a blue tag: "*Monachus sculptilis* Jacoby," and on a white tag: "B.C.A., Col. VI, 1. *Monachus sculptilis* Jac." I removed the lectotype from its mount, which was formerly glued by its ventrum to a quadrangular card, and remounted it on its right side to a triangular point in order to study its ventrum.

The second specimen of Jacoby's series was labeled as follows: "Guanajuato" "Mexico Salle Coll." "333" "B.C.A. Col. VI, 1. *Monachus sculptilis* Jac."

Balsbaugh (1966) notes a close relationship, based on genitalic similarities, between *L. sculptilis* and *L. mexicanus* (Jacoby).

Lexiphanes scaphidioides (Suffrian)

Monachus scaphidioides Suffrian, 1852:215.

Lexiphanes scaphidioides (Suffrian). Blackwelder, 1946: 644 (checklist).

Syntypes: "In Yucatan (*Mus. Chevrôlat*) und Guatimala (*Mus. Deyrolle.*)" (Suffrian, 1852).

FIRST SYNTYPE: Female, type number "24372"; "Guatimala"; Martin Luther Universität, Halle-Saale, Deutsche Demokratische Republik.

Description. Head black; frons flat, finely alutaceous. Eyes emarginate around antennal bases. Distal edge of labrum fulvous. Antenna with basal 5 segments fulvous, segments 6 through 11 black and with setae. Pronotum dull black, finely alutaceous; disc impunctate, elevated so that pronotum is not evenly convex but slightly lowered mid-basally; basal margin feebly rugose medially. Prosternum subquadrate; alutaceous along anterior margin; sparsely, feebly punctate.

Elytra evenly convex; black with yellowish-red fascia; fascial width two-thirds length of elytra; the fascia emarginate posteriorly around humeri, covering epipleura, and converging medially but not completely to suture. Discal striae and punctures obsolete, only feeble "water-soaked" spots in place of strial punctures visible on fascia. Surface very finely alutaceous. Marginal striae impressed and nearly parallel with impressed submarginal striae in vicinity of epipleura. Scutellum long and narrow (base three-fourths wide as sides long); posterior apex elevated; surface very finely alutaceous (nearly glabrous). Pygidium black, alutaceous, with sparse, relatively broad but shallow punctures. Ventrum black, alutaceous. Fifth abdominal segment of female with medial fovea; a transverse depression at posterior end of segment; long setae bordering medial fovea. Legs black. Tarsal claws appendiculate.

Measurements. The following measurements were taken from the first syntype (a female): body length, 2.88 mm.; body width, 2.00 mm.; body thickness, 1.50 mm.; pronotal length, 1.00 mm.; pronotal width, 1.75 mm.; elytral length, 1.88 mm.; epipleural length, 1.12 mm.

SECOND SYNTYPE: Male, type number "19690"; "Guatimala"; Martin Luther Universität, Halle-Saale, Demokratische Republik.

Description. Head brownish-black dorsally, fulvous from antennal bases antero-ventrally to and including labrum. Frons convex between upper lobes of deeply emarginate eyes. Surface very finely alutaceous. Labrum long, being slightly shorter than broad. Antennae with proximal 4 segments and basal part of fifth fulvous; segments 6 through 11 brownish-black and setose. Pronotum dull black, alutaceous, impunctate, and evenly convex. Prosternum wider than long (proportions not readily discernible on syntype because of being obscured by crossed prolegs); finely alutaceous.

Elytra brownish-black with yellowish fascia; width of fascia slightly less than one-half length of elytra, emarginate posteriorly around humeri, covering epipleura, and converging medially but not completely to suture; evenly convex. Discal striae obsolete, punctures very shallow. Surface finely alutaceous. Marginal striae impressed and nearly parallel with impressed submarginal striae in vicinity of epipleura. Scutellum with base two-thirds wide as sides long; base arched anteriorly; posterior apex elevated; surface very finely alutaceous. Pygidium brownish-black, alutaceous, with relatively broad but shallow punctures, each bearing a single seta. Fifth abdominal segment of male without fovea but setose medially. Legs brownish-black but with basal portions of pro- and mesofemora fulvous. Tarsal claws appendiculate.

Measurements. The following measurements were taken from the second syntype (a male): body length, 2.38 mm.; body width, 1.50 mm.; body thickness, not accurately discernible due to multilation of the specimen by the insect pin; pronotal length, 0.88 mm.; pronotal width, 1.33 mm.; elytral length, 1.50 mm.; epipleural length, 0.63 mm.

Discussion: In spite of Suffrian's accreditation of Chevrôlat as author, Suffrian is the currently acknowledged author of *L. scaphidioides,* as he is the first to have described the species (Suffrian, 1852). *Lexiphanes scaphidioides* of Chevrôlat is presently believed to be a *nomen nudum.*

Although Suffrian (1852) listed both Guatemala and Yucatan as type localities, only the two Guatemalan specimens were seen by this author. These carried their respective "type" numbers and were accompanied by a separate locality label: "Scaphidioides, Cho. M., Guatimala." This label was purported by Dr. J. O. Hüsing of Martin Luther Universität (personal communication) to be original with Suffrian. The two *L. scaphidioides* redescribed here are believed to be those Guatemalan examples in the original description (Suffrian, 1852). No specimens from Yucatan—those supposedly in the Chevrôlat collection—were examined.

It is difficult or impossible to specificially associate Suffrian's description of this species with one or the other of the two specimens studied since Suffrian compiled his description of the species from several examples. After having carefully examined the Guatemalan specimens, this author believes that these beetles represent two distinct species. At least one of these specimens should be described and named as a new species, but this more properly should be done after the "Yucatan (*Mus. Chevrôlat*)" specimens (Suffrian, 1852) can also be studied. Then the lectotype designation for *L. scaphidioides* could be fixed more accurately and the specimen determined which represents the new species of the Guatemalan syntypes.

The two Guatemalan syntypes differ from one another as follows: The coloration of the fascia of the first is a brighter yellowish-red, while the ground color of this specimen is a darker black. The overall size of the two beetles varies greatly, even considering the differences in their sex. Proportions are different. The uniqueness of the pronotal conformation of each is quite noticeable. That of the first syntype recurves posteriorly behind the disc, while the pronotum of the second is more uniformly convex. The scutellum of the second syntype appears proportionately shorter than this sclerite of the first. The pronotal surface texture is more coarsely alutaceous in the second specimen than that of the first. The author believes these differences are too great to be either sexual or infraspecific variations.

Both syntypes of *L. scaphidioides* differ from *L. guatemalensis* in having an impunctate pronotum and a black, rather than bluish-black, ground color. They further differ from this latter species in lacking a decided curve in the marginal and submarginal striae near the epipleura. Both specimens of *L. scaphidioides* can be distinguished from *L. mexicanus* (Jacoby) by their elytral fascia which partially surround the humeral umbones in an emarginate manner. The fasciae in *L. mexicanus* do not surround these prominences. Further, the pronotum of *L. mexicanus* usually has a few medial basal punctures, a feature lacking in *L. scaphidioides.*

All specimens of similarly marked beetles from Arizona that this author has seen proved to be *L. mexicanus. Lexiphanes scaphidioides* is known to him only by the above two examples which are from Guatemala. He therefore believes that Fall (1934) misidentified Arizonan beetles of *L. mexicanus* as *L. scaphidioides.* Thus *L. scaphidioides* could reasonably be deleted from the North American catalogue of beetles (Blackwelder, 1939).

Lexiphanes anaglypticus (Suffrian)

Monachus anaglypticus Suffrian, 1852:214.

Lexiphanes anaglypticus (Suffrian). Blackwelder, 1946: 643 (checklist).

Holotype: "Von Chalapa. (*Mus. Berol.*)" (Suffrian, 1852).

Description. Head dark brown, alutaceous; epicranium evenly rounded with surface of eyes; frons slightly convex. Eyes emarginate around antennal bases. Clypeus brown, with setae. Labrum glossy, light brown, with a few setae, three-fourths as long as wide. Antennae with basal segment fulvous; segments 2 through 5 darker; segments 6 through 11 dark brown, alutaceous, broader, and setose, (segments 7 through 11 missing from right antenna). Pronotum brownish, posterior part lighter, becoming more reddish laterally; surface finely alutaceous; base with an impressed, posteriorly arching, medial line. Prosternum brown, alutaceus, punctate at posterior corners and along posterior margins; length two-thirds of width.

Elytra dark brown, finely alutaceous, punctate-striate, striae shallow and completely effaced over apical half; marginal and submarginal striae deeply impressed for entire length; marginal interstrial spaces decidedly convex. Scutellum long and narrow, sides twice as long as base, very finely alutaceous. Pygidium dark brown, alutaceous, with broad, shallow punctures; impressed and glabrous at posterior corners. Ventrum dark brown, alutaceous. Prosternal episternum yellowish-orange, with recessed area for reception of profemora. Abdominal intercoxal process broad, devoid of setae. Fifth abdominal segment with glabrous fovea medially, a few short setae laterad of fovea, the fovea broader posteriorly. The fifth segment lighter brown posteriorly. Legs dark brown; tibiae of forelegs and all tarsi lighter. Left proleg missing.

Measurements. The following measurements were taken from the study specimen (a female): body length, 2.40 mm.; body width, 1.75 mm.; body thickness, 1.40 mm.; pronotal length, 0.80 mm.; pronotal width, 1.50 mm.; elytral length, 1.60 mm.

Discussion: The specimen described above carries the "type" number "23568" and is deposited in the Institut für Spezielle Zoologie und Zoologischen Museum, Humboldt-Universität, Berlin. Because of a discrepancy in type locality indications, some doubt exists as to the authenticity of this specimen as holotype. The type locality given with the original description (Suffrian, 1852) is listed here under the nomenclatural synonomy. The following is from the tag accompanying the presumed holotype from Humboldt-Universität: "anaglypticus Suff. Jalappa (sic) Depp." These differences in spelling may, however, result only from a *lapsus calami* in the published citation. In checking various atlases the locality "Chalapa" could not be found, whereas Jalapa is listed for Mexico, Guatemala, and Nicaragua. The holotype is likely from Mexico.

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LITERATURE NOTICE

THE FENNOSCANDIAN, DANISH AND BRITISH SPECIES OF THE GENUS ERNOBIUS THOMSON (COL. ANOBIIDAE). By C. Johnson. Opusc. Ent. 31(1-2): 81-92, 30 figs. 1966.—A key to 9 species, with figures of antennae. pronota, male genitalia, and a few other structures, and with notes on each species are presented. Previous identification has been difficult because of variation; male genitalia have helped alleviate this situation. Many species of *Ernobius* are of economic importance.

A CLASSIFICATION OF THE GENERA AND HIGHER TAXA OF THE MELOID SUBFAMILY ELECTICINAE (COLEOPTERA). By R. B. Selander. Canad. Ent. 98(5): 449-481, 75 figs. 1966.—2 tribes, seven subtribes (3 new), and 10 genera (3 new) are recognized, keyed, and diagnosed. Also, 4 new species are presented. Members are found in the Neotropical, Ethiopian, and Oriental Regions.

STAPHYLININI UND QUEDIINI (COL. STAPHYLINIDAE) VON NEWFOUNDLAND, SUDOST-LABRADOR UND NOVA SCOTIA (59. BEITRAG ZUR KENNTNIS DER STAPHYLINIDEN). By A. Smetana. Acta Ent. Fennica 20: 3-60, 77 figs., 1 table. 1965.—Contains mostly distribution records for 59 species and subspecies, of which 6 are new. Also, some new synonymies and a key to the nearctic species of the subgenus *Quedius*.

REVISAO DOS LANGURIINAE NEOTROPICAIS (COLEOPTERA, LANGURIIDAE). By U. R. Martins and F. S. Pereira. Arq. Zool. (Brazil) 13: 139-300, 97 figs., 4 maps. 1965.—Keys, descriptions, distributions, and illustrations of 15 genera (2 new) and 82 species (16 new) are given. The keys are also translated into English in the summary. This group is now well treated in the Western Hemisphere; in 1948 Vaurie did the Languriidae of North America.

A NEW SPECIES OF MARTINIUS FROM CUBA (COLEOPTERA: LIMNICHIDAE)

By T. J. SPILMAN[1]

The Thaumastodinae of the Limnichidae, according to my recent study (1959, Coleop. Bull. 13(4):111-122, 30 figs.), included three genera and four species from India, Philippines, the Malay peninsula, and Panama. The only member from the Western Hemisphere was *Martinius tellipontis* Spilman, from Panama. Now another western member must be added; an undescribed species of this genus was discovered by Fernando de Zayas in Cuba. Señor de Zayas generously sent the specimens for study.

A new observation on the morphology of all members of the Thaumastodinae should be presented before describing the new species. The orientation of the metatarsal claws of the Thaumastodinae is odd. The apices of the claws are directed toward the morphologically anterior surface of the leg, not toward the morphologically ventral surface, as is usual in most insects and as is the condition in the protarsal and mesotarsal claws of the Thaumastodinae. The reason for this odd orientation is in the attitude in which the whole metathoracic leg is positioned and moved. The parts of the leg do not rotate on the leg axis; the morphologically anterior surface always faces ventrally and the morphologically ventral surface faces posteriorly or toward the body's midline, depending on the flexure of the leg at any one time. Certainly the plate-like, immobile metacoaxe contribute to the lack of rotation, and the coxa-trochanter and trochanter-femur joints do not appear capable of rotation. Now, if the claws of these beetles were directed toward the leg's morphologically ventral surface, they would not be effective in gripping the surface of the ground below the beetle. Because the anterior surface of the metathoracic leg does face the ground, the claws are directed in what seems to be an abnormal position, toward the morphologically anterior surface. The claws thus come into contact with the ground.

Perhaps the metatarsal claws are not the only parts of the leg with an odd orientation; the metatarsal segments themselves may have their morphologically anterior surfaces directed ventrally. The orientation of these segments is not so easily determinable because the segments are cylindrical and do not have good reference points of direction as do claws. Yet, one characteristic of these segments might give a slight clue that the segments have the same orientation as do the claws: the long, coarse setae at the apices of segments 1-3 are on what appears to be the morphologically anterior surface, not on the morphologically ventral surface, as one might expect and as is the case in the protarsal and mesotarsal segments. However, not much weight can be attached to the position of these setae, because setae on beetle legs often occur or develop coarseness without any definite regard to morphological orientation. The

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[1] Entomology Research Division, Agr. Res. Serv., U. S. Department of Agriculture, Washington, D. C.

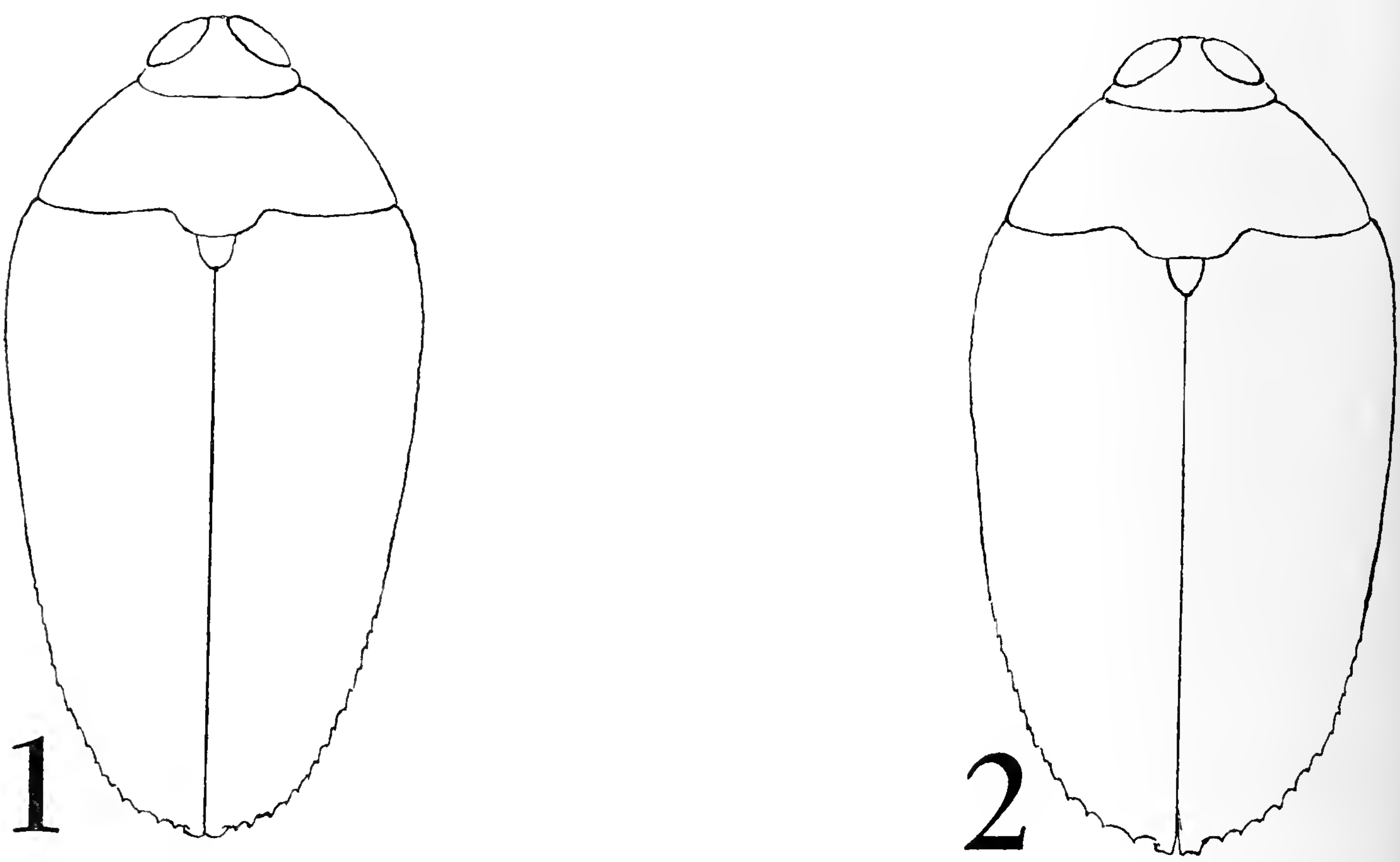
direction of the setae on the metatarsus in the Thaumastodinae, that is, orientation toward the surface of the ground below the beetle, has the same effect as the position of the claws; it provides a good grip on the ground.

In the two preceding paragraphs I have used the terms 'morphologically ventral surface' and 'morphologically anterior surface' as if each leg always had its longitudinal axis held perpendicular to the longitudinal axis of the body and as if the leg were always completely extended, with the femur-tibia flexure always ventral. Thus, difficulties of determining correct orientation of legs and of describing surfaces of those legs are avoided. It is a simple arrangement used by many entomologists; unfortunately it has not been commonly adopted by coleopterists. Such orientation would avoid the impossible terms 'inside' and 'outside' for leg surfaces.

Martinius ripisaltator Spilman, NEW SPECIES

Description. Similar to *Martinius tellipontis,* but differing as follows: In dorsal view, lateral border of pronotum and lateral border of elytra in posterior half slightly more convex (fig. 1); pronotal and elytral transverse convexity stronger; dorsoventral angulation of lateral borders of pronotum and elytra not so acute, not tending toward being explanate; long, coarse setae on tibiae and tarsi shorter and coarser, especially noticeable on metatibiae; generally smaller, length 2.35-2.60 mm., width 1.15-1.35 mm.; female with slightly longer setae on protibia and protarsus, sexual dimorphism thus not so distinct.

Specimens examined. Holotype, male, Cuba, Habana Province, seashore near Rio Santana, Marianao, June 1951, F. de Zayas. Allotype, female, same data as holotype. Paratypes, 32 males, 41 females, same data as holotype. All specimens in United States National Museum; type number 68186.



FIGURES 1-2. *Martinius* spp., body outline in dorsal view. 1—*ripisaltator.* 2—*tellipontis.*

The label name Rio Santana is probably a contraction of Rio Santa Ana. Señor de Zayas sent the following note with the specimens. "This species lives on the moist sand among the mangroves and 'dog-teeth' limestone in the intertidal zone. The locality is very near the mouth of the river, about 10 miles west of Habana. The beetles are very active and jump like fleas and fly, so collecting them is very difficult. To collect them I made several fast runs along the intertidal zone, holding the net about an inch above the ground."

The new species described above can be differentiated from the one previously described in the following manner.

Body outline in dorsal view as in fig. 1; metatibia with longest seta, excluding setae on apex, not longer than second metatarsal segment; from Cuba -- RIPISALTATOR Spilman

Body outline in dorsal view as in fig. 2; metatibia with longest seta, excluding setae on apex, longer than second metatarsal segment; from Panama -- TELLIPONTIS Spilman

CYRTOBAGOUS HUSTACHE, A GENUS OF WEEVILS NEW TO THE UNITED STATES FAUNA (COLEOPTERA: CURCULIONIDAE: BAGOINI)

By D. G. Kissinger[1, 2]

The following specimens of *Cyrtobagous singularis* Hustache (1929, p. 228), a monobasic genus, were found at the ultraviolet collecting light at the Archbold Biological Station, near Lake Placid, Highlands Co., Florida: one, 7 June, 1962; four, 28 May, 1964. The species was originally described from Curumba, Matto Grosso, Brazil. I have an additional specimen from Parque Sooretama, Linhares, Espirito Santo, Brazil. One specimen in the United States National Museum collection was intercepted on an airplane from Mexico. Material in the British Museum (N. H.), determined by R. T. Thompson, was seen from Obidos, Brazil, April, 1963, F. D. Bennett, on *Salvinia,* and Ogle Estate, British Guiana, October, 12, 1961, F. D. Bennett, on *Salvinia auriculata.* The present deter-

[1] Atlantic Union College, South Lancaster, Mass.

[2] Aided by grant GB 1442 from the National Science Foundation; I am indebted to Richard Archbold for his hospitality during my visits to the Archbold Biological Station; special thanks are due to R. T. Thompson for the loan of specimens from the British Museum (N.H.).

mination is based upon a study of the original description and material from the British Museum (N. H.) determined by R T. Thompson. The specimens seen agree with the original description but have a six instead of a seven segmented funiculus. It is assumed that the description is in error on this point because of the unusual antennae.

In using the subfamily key presented by Kissinger (1964) some difficulty may be experienced in placing the genus. At couplet 18 the genus is correctly described by the first statement except it has the first segment of the antennal club nearly glabrous and lacks both a seven segmented funiculus and an apical channel on the prosternum. The alternate statement of couplet 18 refers to Rhynchophorinae, with which *Cyrtobagous* could not be confused due to its lack of a tibial uncus. At couplet 36 a decision is difficult because the unusual claws of *Cyrtobagous* appear connate but are free when examined under a compound microscope. If the connate claw choice is followed the six segmented funiculus will immediately distinguish *Cyrtobagous* from the choices of five and seven segmented funiculi offered at couplet 37. If the free claw alternative at couplet 36 is followed the genus will come out at couplet 52 to Hyperinae due to its transverse eyes. *Cyrtobagous* lacks conspicuous setosity on the rostrum; the elytra and prothorax are clothed with well separated, round, green (or blue) submetallic scales; the funiculus has six segments; the antennal club has the first segment elongate and largely glabrous; and the ventral parts of the thorax, femur, tibia and tarsus are clothed with dense, grey water repellent vestiture. Hyperinae have the rostrum more or less uniformly setose; prothorax and elytra with dense, narrow, elongate scales or setae; funiculus with seven segments; antennal club uniformly pubescent; and lack water repellent vestiture.

In the key to the genera of Erirhininae of the United States presented by Kissinger (1964) the genus will run to couplet 9 because the hind tibia is not uncinate and will key to *Stenopelmus* Schoenherr due to the short prosternum and nearly centrally inserted front coxae. *Cyrtobagous* in addition to features mentioned above has the rostrum slightly longer than the dorsal margin of the prothorax in side view, scape not reaching eye, scrobe not extending below eye, and has the tarsal claws nearly straight in side view. *Stenopelmus* has a seven segmented funiculus, dense vestiture on prothorax and elytra, rostrum about one-half as long as prothorax in side view, scape extending past middle of eye on ventral margin of eye, scrobe extends beneath eye, and tarsal claws are distinctly curved.

The original description of *C. singularis* gives a range of length of 2.5 to 2.8 mm.; available material ranges from 1.88 to 2.64 mm. long by 1.00 to 1.50 mm. wide

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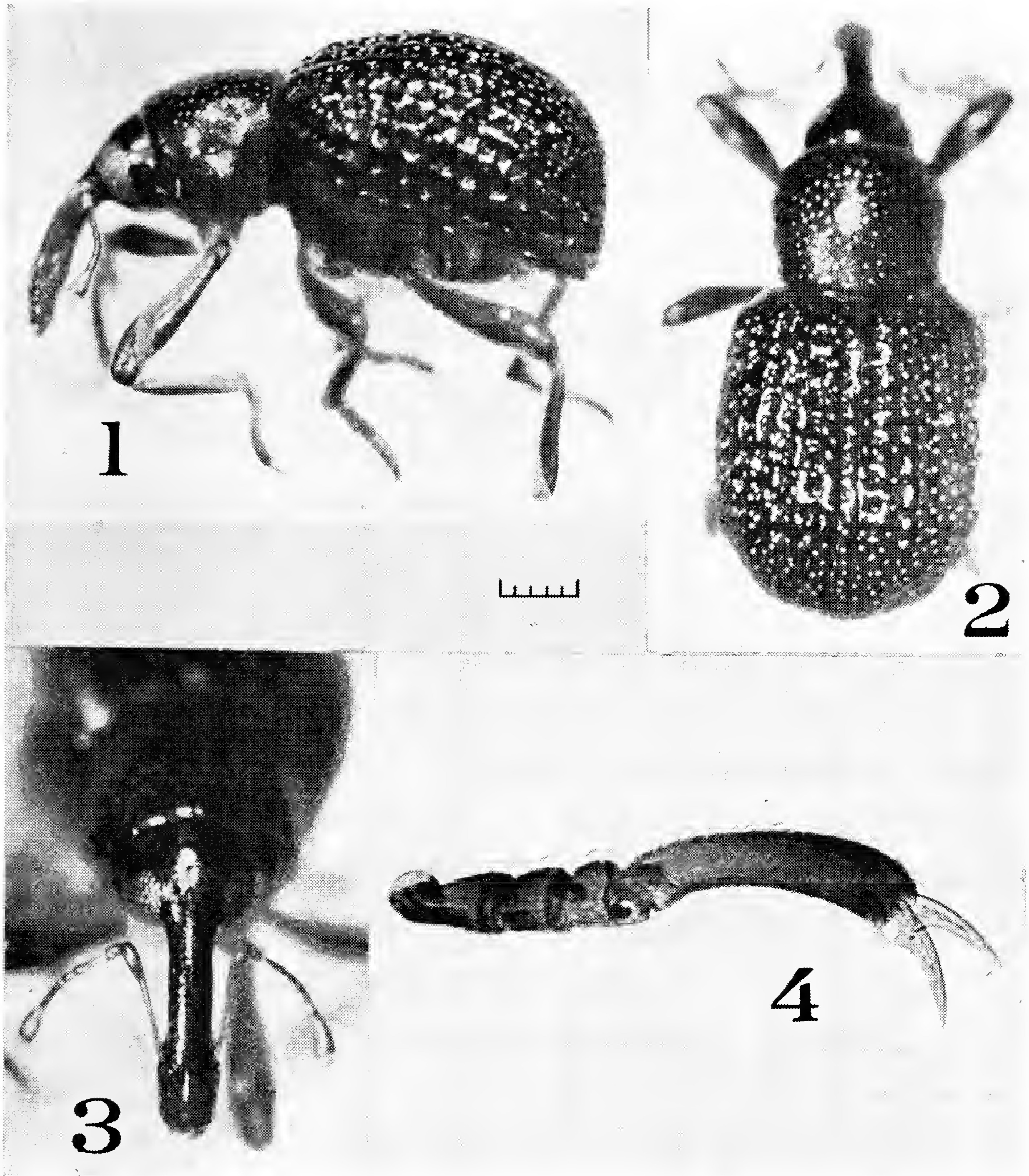

FIGURES 1-4—*Cyrtobagous singularis* Hustache, from Archbold Biological Station, Lake Placid, Florida, apparently a female. 1—Lateral view, scale equals 0.299 mm. 2—Dorsal view, scale equals 0.296 mm. 3—Dorsal view of head and rostrum, scale equals 0.232 mm. 4—Lateral view of tarsus 3, scale equals 0.072 mm.

WERE THEY HYDROPHILIDS? (COLEOPTERA).

In 1909 (Ent. News 20(8): 364) Warren Knaus published a note about two hunters who shot into a passing swarm of large insects with guns, and brought down what proved to be *Hydrophilus triangularis* Say. The beetles were flying eastward just after 6 P.M. at the western outskirts of McPherson, Kansas.

This record immediately came to mind upon reading the entry for the night of June 12-13, 1849, in Captain Howard Stansbury's "Exploration and survey of the valley of the Great Salt Lake of Utah, including a reconnoissance of a new route through the Rocky Mountains." There are two editions of this work, 1852 and 1853; bibliographically they are separate items.

According to Stansbury, then, p. 25. [Tuesday, June 12, 1849] "After travelling twenty-six miles, we encamped on the level bank of Walnut Creek—a tributary of the Little Blue, with a tolerable supply of grass and water. . . ."

"Wednesday, June 13.—About two o'clock in the morning, the camp was suddenly aroused by the bursting upon it of a most furious storm. The wind blew a hurricane, the rain fell in torrents, while the thunder and lightning were terrible and incessant. Fortunately the camp had been pitched in a sheltered spot, or it must have been entirely blown away by the tempest: as it was, the tents were prostrated by the wind, and preserved with much difficulty. Our men were exposed to all its fury for several hours. At length, however, the sky partially cleared, but the lowering enemy seemed still to linger, as if meditating another attack. The morning proved exceedingly hot and close; the barometer continued to fall. Our poor mules having been picketed within the lines all night, and consequently exposed to the storm, seemed dejected, tired, and hollow; altogether the camp seemed weary and dispirited. The weather looked so very doubtful that we did not move until half-past two o'clock; the men being until then engaged in drying their bedding, which had been thoroughly soaked by the rain. An immense number of black beetles and other insects swarmed around the camp last evening. Attracted by the light, they annoyed us beyond measure, and could be heard all night, pattering against the tent like large drops of rain in a heavy shower."

According to the daily and accumulated mileages given in Appendix A, Outward Journey from Fort Leavenworth, their camp on the night of June 12-13 must have been in present day Jefferson County, Nebraska, close to Fairbury. In the Appendix, Walnut Creek is equated with Emigrants' [*sic!*] Creek. On June 13 they travelled only five miles and camped on the right bank of the Little Sandy, crossing the Big Sandy at noon the next day.

Hydrophilus triangularis flies in the dark and readily comes to light—witness Blatchley's comment (1910. Coleoptera of Indiana, p. 255), "Sometimes attracted by thousands to electric light in Indianapolis and the larger cities." It seems a reasonable inference that Captain Stansbury's notes refer to this species. Indeed, his locality cannot be very far from that of Thomas Say's examples used for the original description of *H. triangularis.* Say accompanied Major Long on his 1819-1820 expedition to the Rocky Mountains, going via the Platte River and returning by the Arkansas; of his type series he wrote, "It is rather rare in Pennsylvania but I obtained several specimens near the Rocky Mountains."—Hugh B. Leech, *California Academy of Sciences, San Francisco, California.*

NOTICE

A new scientific book series, Series Entomologica, will contain all kinds of entomological publications. Works and catalogues of systematic entomology will be represented as well as studies on anatomy, physiology, bionomy, biology, ecology and epidemiology of insects, and on the geographical distribution of insects or the history of entomology. It will also provide for monographs on single species of insects. Special attention will be given to the treatment of entomophagous insects. Volume 1 is a revision of a subfamily of Braconidae and volume 2 is a catalogue of a genus of Zygaenidae. Dr. E. Schimitschik of Münden, Germany, is the editor, and Dr. W. Junk, Publishers, 13 van Stolkweg, The Hague, The Netherlands, is the publisher.